

CONTRACT DOCUMENTS AND SPECIFICATIONS

FOR

WYLIE-ROCKWALL-FARMERSVILLE 36"/48" PIPELINE, PHASE 2 IMPROVEMENTS

PROJECT NO. 490

MAY 2020

Prepared by: Kimley »Horn



Texas Board of Professional Engineers Firm Registration Number: F-928

NORTH TEXAS MUNICIPAL WATER DISTRICT WYLIE-ROCKWALL-FARMERSVILLE 36"/48" PIPELINE, PHASE 2 IMPROVEMENTS **PROJECT NO. 490** CATHODIC PROTECTION/AC MITIGATION RESPONSIBLE ENGINEER

Division 33 Utilities

- Joint Bonding and Electrical Isolation Corrosion Control Test Stations 33 04 10
- 33 04 11
- 33 04 12 Zinc Ribbon Cathodic Protection System



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00 01 20 INVITATION FOR BIDS

The North Texas Municipal Water District is soliciting proposals for the construction of the following project:

Project #490 – Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements

Proposals must be delivered to Office of the Executive Director at 505 Brown Street, Wylie, Texas 75098 no later than <u>2:00 PM on June 2, 2020</u> to be accepted. The proposals will be publicly opened and read aloud at this time and place. Bids received after this time will be returned unopened. Address proposals to President and Board of Directors of the North Texas Municipal Water District.

Contact information for engineer of record is as follows:

Kimley-Horn and Associates, Inc. Attention: Kyle Sanderson, P.E. 13455 Noel Road, Two Galleria Office Tower, Suite 700 Dallas, TX 75240 Phone: 972-770-3033 E-mail: kyle.sanderson@kimley-horn.com

The electronic version of the Contract Documents in PDF format may be obtained without charge from the website <u>www.civcastusa.com</u>. It is the responsibility of the Contractor to download a complete set of documents as defined in the Instruction to Bidders. The Bidders' attention is directed to Article 6 of the Bid Form for list of required submittals for complete Bid.

A non-mandatory pre-bid conference for the project will be held on <u>May 20, 2020 at 11:00 AM via</u> <u>WebEx. The call in number is +1-415-655-0001, access code 36299329</u>.

All questions must be submitted in writing, posted to CivCast, no later than 2:00 pm on Thursday, May 28, 2020.

This project includes construction of approximately 20,100 LF of 48-inch water line; 650 LF of tunnel with 66-inch I.D. tunnel liner plate; connections to existing water transmission lines; and all other improvements detailed in the construction plans and specifications. The 48-inch water line generally parallels an existing Oncor transmission line beginning at the intersection of Kreymer Lane and Brown Street and terminating at County Road 484.

Bidders must submit a cashier's check, certified check, or acceptable bidder's bond with their proposal as a guarantee that the Bidder will enter into a contract for the project with the Owner within fifteen (15) days of Notice of Award of the contract. The security must be payable to North Texas Municipal Water District in the amount of five (5%) percent of the bid submitted. Contractor must execute the contract, bonds and certificates of insurance on the forms provided in the Contract Documents.

Contractors for this Project must pay no less than the prevailing wage rates for the area established by the Owner and included in the contract documents.

Performance and Payment Bonds are required, each in an amount of not less than one-hundred percent (100%) of the contract price, conditioned upon the faithful performance of the contract and upon payment of all persons supplying labor or furnishing materials.

The North Texas Municipal Water District reserves the right to adopt the most advantageous interpretation of the bids submitted in the case of ambiguity or lack of clearness in stating proposal prices, to reject any or all bids, and/or waive formalities. Bids may not be withdrawn within sixty (60) days from date on which bids are opened.

NORTH TEXAS MUNICIPAL WATER DISTRICT

President, Board of Directors

00 01 20-1

00 21 16 INSTRUCTIONS TO BIDDERS

1.00 GENERAL

1.01 DEFINED TERMS

A. Terms used in these Instructions to Bidders have the meanings assigned to them in the General Conditions.

1.02 QUALIFICATIONS OF BIDDERS

A. Submit documentation required in Section 00 45 16 Statement of Qualifications within 5 days of the request by Owner to demonstrate that the Contractor is qualified by experience and capability to successfully construct the project within the Contract Time and for the Contract Amount.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. Examine Contract Documents, make observations and investigations, correlate knowledge and observations with the requirements of the Contract Documents and consider these in preparation of a bid for the project.
 - 1. Read the Contract Documents and related technical data and reports thoroughly. Use a complete set of Contract Documents in preparing Bids. Assume responsibility for errors or misinterpretations resulting from the use of partial or incomplete contract documents.
 - 2. Visit the site to become familiar with general, local and site conditions that may affect cost, progress or performance of the work in any manner.
 - 3. Become familiar with federal, state and local laws, ordinances, rules and regulations affecting cost, progress or performance of the work.
- B. Surveys and investigation reports of subsurface or latent physical conditions at the site, or conditions or situations affecting the design of the Project used by the Engineer in preparing the Contract Documents are referenced in the Supplementary Conditions.
 - 1. These reports are available for information only and neither the Owner nor Engineer guarantees their accuracy or that any opinions expressed in the report are correct.
 - Make additional surveys and investigations as necessary to determine the bid price for performance of the work in compliance with the terms of the Contract Documents before submitting a bid.
 - 3. Cost for these investigations is to be paid by the Bidders.
- C. Acknowledge sole responsibility for job site safety, including trench excavation and confined space entry safety, by the submission of a Bid for this project.

D. A non-mandatory pre-bid conference for the project will be held on <u>May 20, 2020 at 11:00</u> <u>AM via WebEx. The call in number is +1-415-655-0001, access code 36299329</u>.

The submission of a Bid is incontrovertible representation by the Bidder that he has complied with every requirement of this Section.

1.04 INTERPRETATIONS

A. Submit all questions about the meaning or intent of the Contract Documents to the Engineer in writing via the CivCast website at www.civcastusa.com. Replies are issued by Addenda through the CivCast website to all parties recorded by the Engineer as having received the bidding documents through CivCast. Only questions answered by formal written Addenda are binding. Oral and other interpretations or clarifications will be without legal effect. Questions received after 2:00 PM on Thursday, May 28, 2020 may not be answered.

1.05 BID SECURITY

- A. Submit a bid security in the amount of five (5%) percent of the amount of the maximum total bid as a guarantee that the Bidder will promptly enter into a Contract and execute a Performance **and** Payment Bonds on the forms included in the Contract Documents if awarded the contract.
- B. Acceptable Bid securities are:
 - 1. Certified or cashier's check made payable to the Owner.
 - 2. An approved Bidder's Bond underwritten by a surety named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Department.
- C. Bid securities will be returned to bidders when the contract award is made or bids are rejected.

1.06 CONTRACT TIME

A. This project is to be substantially complete and ready for operation within 510 consecutive calendar days from the date of the notice to proceed. Final Completion of the project shall be achieved within 30 calendar days of the Substantial Completion date. Liquidated damages are set forth in the Agreement.

1.07 BID FORM

- A. Submit bids on the Bid forms provided with the Contract Documents for each contract Bid. Include supplemental data to be furnished in the same sealed envelope with Bid.
- B. Bid forms must be completed in ink. The Bid price of each item on the form must be stated in words and/or numerals. Words take precedence in case of a conflict. In the case of a conflict between the unit price indicated and the extended amount shown, the unit price indicated multiplied by the stated quantity shall govern.
- C. Execute bids by corporations in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown below the signature.
- D. Execute bids by partnerships in the partnership name. Forms are to be signed by a partner. Print the name below the signature. Write the title of the Partner and show the official address of the partnership shown below the signature.
- E. Acknowledge receipt of all Addenda on the bid form by signing beside the Addenda number.

1.08 SUBMISSION OF BIDS

A. Submit bids at the time and place indicated in the Invitation for Bids. Submit bids in a sealed envelope, marked with the NTMWD Project title, NTMWD project number and name and address of the Bidder. Include the Bid security and other required documents in the envelope.

1.09 MODIFICATION AND WITHDRAWAL OF BIDS

A. Modify or withdraw bids by submitting an appropriate document executed in the manner that a Bid must be executed. Deliver the modification or withdrawal to the place where Bids are to be submitted at any time prior to the opening of Bids.

1.10 OPENING OF BIDS

A. Bids will be opened as indicated in the Invitation for Bids.

B. All Bids shall remain open for the period of time set forth in the Invitation for Bids, but Owner may, in his sole discretion, release any Bid and return the Bid Security prior to that date.

1.11 AWARD OF CONTRACT

- A. Owner may reject Bids, waive formalities, or disregard nonconforming, conditional Bids or counter proposals.
- B. Owner may consider the following in evaluating the bids and awarding the contract:
 - 1. Contractor's qualifications and ability to demonstrate current capability to complete the project in conformance with the requirements of the contract documents.
 - 2. Compliance of the Bids with requirements of the Contract Documents
 - 3. Alternates and unit prices if requested in the Bid forms.
 - 4. The amount bid.
 - 5. Proposed date of completion and the ability to meet intermediate milestones that may have been established for the project.
- C. The contract will be awarded based upon the Basis of Award described in the Bid Form.
- D. Each Bidder agrees to waive any claim it has or may have against the Owner, the Engineer, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any bid.

1.12 EXECUTION OF CONTRACT

- A. The successful Bidder must execute the formal Contract Agreement and required bonds on the forms prepared and submitted by the Owner within fifteen (15) days after the Notice of Award.
- B. A Notice to Proceed authorizing the Contractor to commence work will be issued after the Contract Documents have been executed.

1.13 WAGE RATES

A. Contractor must pay no less than the general prevailing rates for the Project location as determined in accordance with statutory requirements. The minimum rates for various labor classifications as established by the Owner are included in the Contract Documents.

1.14 BONDS

A. Performance and Payment are required for this project and shall be provided in accordance with the General Conditions.

1.15 SALES TAXES

A. The Owner qualifies as an exempt agency as defined by the statutes of the State of Texas. Owner's purchasing department will issue exemption certificates. Comply with all statutes and rulings of the State Comptroller.

1.16 PRE-BID SOILS INVESTIGATION

- A. In the event bidders desire soils data using backhoe, drilling rig, or other equipment, the following procedure will be required:
 - Bidders desiring this information shall contact <u>Kara Byrnes</u>, at the North Texas Municipal Water District office in Wylie, Texas, at (972) 442-5405.
 - 2. The soils investigation will be done only one time. The time and locations will be coordinated with the Owner.
 - 3. The soils investigation will be entirely at the bidder's expense.

END OF SECTION

00 42 23 BID FORM

ARTICLE 1 - BID RECIPIENT

1.01 This Bid is submitted to:

North Texas Municipal Water District Office of the Executive Director 505 Brown Street, Wylie, Texas 75098 Attention: Ms. <u>Kara Byrnes, PE</u>

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 - BIDDER'S ACKNOWLEDGMENTS

- 2.01 Bidder accepts all of the terms and conditions of the Invitation for Bids and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The 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.
- 2.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of its failure to complete Work in accordance with the schedule set forth in the Agreement.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

- 3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:
 - A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all of which is hereby acknowledged.

| Addendum No. | Addendum Date | Signature Acknowledging Receipt |
|--------------|---------------|---------------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and the furnishing of Goods and Special Services.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in SC-4.02, and (2) reports and drawings of Hazardous Environmental Conditions that have been identified in SC-4.06.

- E. Bidder has obtained and carefully studied all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions including surface, subsurface and Underground Facilities at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto or accepts the consequences for not doing so.
- F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the prices bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. 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.
- H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.
- L. Bidder further represents that 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 agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

ARTICLE 4 – BASIS OF BID

- 4.01 Bidder will complete the Work in accordance with the Contract Documents for the prices shown in the attached Bid Form:
 - A. Extended amounts have been computed in accordance with Paragraph 11.03 of the General Conditions
 - B. Bidder acknowledges that the estimated quantities are not guaranteed, and final payment for all Unit Price Bid items will be based on actual quantities provided, measured as provided in the contract documents
 - C. Unit Price and figures column will be used to compute the actual bid price.

ARTICLE 5 – TIME OF COMPLETION

5.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within the number of calendar days indicated in the Agreement.

ARTICLE 6 – ATTACHMENTS TO THIS BID

- 6.01 The following documents are attached to and made a condition of this Bid:
 - A. 00 42 23 Bid Form.
 - B. Required Bid Security.
 - C. 00 42 24 Vendor Compliance to State Law Certificate.

ARTICLE 7 – BASIS OF AWARD

7.01 The contract will be awarded to the Bidder with the lowest base bid price, who is also a qualified bidder as described in Section 00 21 16, INSTRUCTIONS TO BIDDERS, Article 1.02

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid have the meanings indicated in the General Conditions and the Supplementary Conditions. The significance of terms with initial capital letters is described in the General Conditions.

ARTICLE 9 – STATEMENT OF MATERIALS AND OTHER CHARGES

9.01 Provide the following information with this Bid:

| Statement of Materials and Other Charges | | | | |
|--|----|--|--|--|
| Materials Incorporated into the Project | \$ | | | |
| All Other Charges | \$ | | | |
| Total Contract Amount | \$ | | | |

ARTICLE 10 – VENUE

10.01 Bidder agrees that venue shall lie exclusively in Collin County, Texas for any legal action.

ARTICLE 11 – BID SUBMITTAL

11.01 This Bid submitted by:

If Bidder is:

An Individual

Partner:

Phone:

Doing business as: Business address:

By

| Name: | | | |
|------------------------|---------------|--------------------------|--|
| | | (typed or printed) | |
| Ву | | | |
| | | (Individual's Signature) | |
| Doing business as: | | | |
| Business address: | | | |
| | | | |
| Phone: | Facsimile: | E-mail | |
| Bid Submitted on the f | ollowing Date | | |
| | | | |
| | | | |
| A Partnership | | | |
| Partnership Name: | | | |
| | | (typed or printed) | |
| Name of General | | | |

(typed or printed)

(Signature of general partner -- attach evidence of authority to sign)

E-mail

Bid Submitted on the following Date

Facsimile:

A Corporation

| Corporation Name: | | |
|-----------------------------|----------------------|---|
| | | (typed or printed) |
| State of Incorporation: | | |
| Туре: | | |
| - | (General l | Business, Professional, Service, Limited Liability) |
| Date of Qualification to do | business in Texas is | |
| Ву | | |
| - | (Sigr | ature attach evidence of authority to sign) |
| Name: | | |
| - | | (typed or printed) |
| Title: | | |
| Attest: | | |
| | | (Signature of Corporate Secretary) |
| Business address: | | |
| - | | |
| Phone: | Facsimile: | E-mail |
| Bid Submitted on | | |

Joint Venture

| Joint Venturer Name: | | (toward an axistant) | | | | | | | |
|--------------------------------|------------------|--|--|--|--|--|--|--|--|
| Ву | | (typed or printed) | | | | | | | |
| Бу | (Signature | of joint venture partner attach evidence of authority to sign) | | | | | | | |
| Name: | (e.g.atal e | | | | | | | | |
| | | (typed or printed) | | | | | | | |
| Title: | | | | | | | | | |
| Business address: | | | | | | | | | |
| | | | | | | | | | |
| Phone: | Facsimile: | E-mail | | | | | | | |
| Bid Submitted on | | | | | | | | | |
| | | | | | | | | | |
| Joint Venturer Name: | | | | | | | | | |
| Joint Venturer Name. | | (typed or printed) | | | | | | | |
| Ву | | | | | | | | | |
| | (Signature | of joint venture partner attach evidence of authority to sign) | | | | | | | |
| Name: | | | | | | | | | |
| Title: | | (typed or printed) | | | | | | | |
| | | | | | | | | | |
| Business address: | | | | | | | | | |
| | | | | | | | | | |
| Phone: | Facsimile: | E-mail | | | | | | | |
| Bid Submitted on | | | | | | | | | |
| Contact for receipt of officia | l communications | | | | | | | | |
| Name: | | | | | | | | | |
| INGILIE. | | (typed or printed) | | | | | | | |
| Business address: | | | | | | | | | |
| | | | | | | | | | |
| Phone: | Facsimile: | E-mail | | | | | | | |

Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.

| ltem No. | Description of Items and Price in Words | Unit | Estimated Quantity | Unit Price in Numerals | Extended Amount in Numerals |
|-------------|---|------|-----------------------|---------------------------|--------------------------------|
| 1 | Mobilization, Bond and Insurance @ | LS | 1 | | |
| | Dollars and Cents Per Unit 30" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe (Install by Open | | | | |
| 2 | Cut) @ | LF | 195 | | |
| | Dollars and Cents Per Unit 36" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe (Install by Open | | | | |
| 3 | Cut) | LF | 36 | | |
| | Dollars and Cents Per Unit | | | | |
| 4 | 42" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe or AWWA C-200 Steel Water Line (Install by Open Cut) | LF | 15 | | |
| | Dollars and Cents Per Unit | | | | |
| 5 | 48" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe or AWWA C-200 Steel Water Line or (Install by Open Cut) | LF | 19,396 | | |
| | Dollars and Cents Per Unit | | | | |
| 6 | 48" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe w/ Mortar Bands or AWWA C-200 Steel Water Line with Stainless Steel Spacers (Install by Other Open Cut) | LF | 712 | | |
| | Dollars and Cents Per Unit Tunnel and 66" I.D. Tunnel Liner Plate | | | | |
| 7 | | LF | 712 | | |
| | Dollars and Cents Per Unit Post CCTV 48" Water Line Installation | | | | |
| 8 | | LF | 20,108 | | |
| | Dollars and Cents Per Unit Locate Existing Water Line | | | | |
| 9 | | EA | 5 | | |
| | Dollars and Cents Per Unit Connect to Existing 36" WRF Phase 1 Water Line (337) | | | | |
| 10 | | EA | 1 | | |
| | Dollars and Cents Per Unit | | <u> </u> | | |

| ltem No. | Description of Items and Price in Words | Unit | Estimated Quantity | Unit Price in Numerals | Extended Amount in Numerals |
|-------------|---|------|-----------------------|---------------------------|--------------------------------|
| | Connect to Existing 30" Treated Water Pipeline (CF 88-3) | | | | |
| 11 | | EA | 2 | | |
| | Dellara and Oanta Dan Unit | | | | |
| | Dollars and Cents Per Unit Connect to Existing 36" Royse City Pipeline (WCF 00-11) | | | | |
| | | | | | |
| 12 | | EA | 2 | | |
| | Dollars and Cents Per Unit | | | | |
| | 48" Butterfly Valve and Vault | | | | |
| 13 | | EA | 3 | | |
| | Dellara and Oanta Dan Unit | | | | |
| | Dollars and Cents Per Unit 42" Butterfly Valve and Vault | | | | |
| | | | | | |
| 14 | | EA | 1 | | |
| | Dollars and Cents Per Unit | | | | |
| | 36" Butterfly Valve and Vault | | | | |
| 15 | | EA | 2 | | |
| | | | | | |
| | Dollars and Cents Per Unit 30" Butterfly Valve and Vault | | | | |
| | | | | | |
| 16 | | EA | | | |
| | Dollars and Cents Per Unit | | | | |
| | 30" Butterfly Valve | | | | |
| 17 | | EA | 1 | | |
| | | | | | |
| | Dollars and Cents Per Unit 4" Combination Air Release and Vaccuum Valve and Vault | | | | |
| | | | | | |
| 18 | | EA | 2 | | |
| | Dollars and Cents Per Unit | | | | |
| | 8" Combination Air Release and Vaccuum Valve and Vault | | | | |
| 19 | | EA | 6 | | |
| | Dellara and Oanta Dan Unit | | | | |
| | Dollars and Cents Per Unit 8" Blow Off Valve and Vault | | | | |
| | | | | | |
| 20 | | EA | 2 | | |
| | Dollars and Cents Per Unit | | | | |
| 21 | 12" Blow Off Valve and Vault | | | | |
| | | EA | 5 | | |
| | Dellara and Canta Dar Linit | | - | | |
| | Dollars and Cents Per Unit 36" Manway and Vault | | | | |
| a - | | | _ | | |
| 22 | | EA | 7 | | |
| | Dollars and Cents Per Unit | | | | |

| ltem No. | Description of Items and Price in Words | Unit | Estimated Quantity | Unit Price in Numerals | Extended Amount in Numerals |
|-------------|---|------|-----------------------|---------------------------|--------------------------------|
| 23 | Bollards | EA | 4 | | |
| | Dollars and Cents Per Unit Seeding | | | | |
| 24 | Dollars and Cents Per Unit | LF | 19,642 | | |
| 25 | Sodding | SY | 1,000 | | |
| | Dollars and Cents Per Unit Dewatering | | | | |
| 26 | Dollars and Cents Per Unit Trench Safety | LS | 1 | | |
| 27 | | LF | 19,642 | | |
| 28 | Dollars and Cents Per Unit Traffic Control | LS | 1 | | |
| 20 | Dollars and Cents Per Unit Cathodic Protection | | | | |
| 29 | Dollars and Cents Per Unit | LS | 1 | | |
| 30 | Hydrostatic Test and Disinfection | LS | 1 | | |
| | Dollars and Cents Per Unit Storm Water Pollution Prevention Plan and Erosion Control | | | | |
| 31 | Dollars and Conto Per Linit | LS | 1 | | |
| 32 | Dollars and Cents Per Unit Tree Removal | AC | 15 | | |
| | Dollars and Cents Per Unit Remove and Replace 5' X 3' Type B Headwall | | | | |
| 33 | Dollars and Cents Per Unit | EA | 1 | | |
| 34 | Remove and Replace 5' X 3' RCB | LF | 36 | | |
| | Dollars and Cents Per Unit | | | | |

| ltem No. | Description of Items and Price in Words | Unit | Estimated Quantity | Unit Price in Numerals | Extended Amount in Numerals |
|-------------|---|------|-----------------------|---------------------------|--------------------------------|
| | Remove and Replace Asphalt Pavement | | | | |
| 35 | | SY | 256 | | |
| | Dellara and Ocata Deal Init | | | | |
| | Dollars and Cents Per Unit Remove and Replace Flex Base Pavement | | | | |
| | | | | | |
| 36 | | SY | 412 | | |
| | Dollars and Cents Per Unit | | | | |
| | Remove and Replace Concrete Sidewalk | | | | |
| 37 | | SY | 41 | | |
| | | | | | |
| | Dollars and Cents Per Unit Remove and Replace Concrete Pavement | | | | |
| | | | | | |
| 38 | | SY | 147 | | |
| | Dollars and Cents Per Unit | | | | |
| | Temporary Flex Base Pavement | | | | |
| 39 | | LS | 1 | | |
| 55 | | | I | | |
| | Dollars and Cents Per Unit | | | | |
| | Controlled Low Strength Material (CLSM) for Proposed Water Line | | 1,426 | | |
| 40 | | LF | | | |
| | Dollars and Cents Per Unit | | | | |
| | Controlled Low Strength Material (CLSM) for Existing Utilities | | | | |
| 41 | | LF | 190 | | |
| 41 | | LF | 180 | | |
| | Dollars and Cents Per Unit | | | | |
| | Miscellaneous Structure Demolition | | | | |
| 42 | | LS | 1 | | |
| | Dollars and Cents Per Unit | | | | |
| | Remove and Replace Barbed Wire Fence | | | | |
| | | | | | |
| 43 | | LF | 4,965 | | |
| | Dollars and Cents Per Unit | | | | |
| | Remove and Replace Chain Link Fence | | | | |
| 44 | | LF | 162 | | |
| | | | | | |
| | Dollars and Cents Per Unit Remove and Replace Steel Tube Fence | | | | |
| | | | | | |
| 45 | | LF | 81 | | |
| | Dollars and Cents Per Unit | | | | |
| | Remove and Replace Wood Fence | | | | |
| 46 | | LF | 535 | | |
| υF | | | 000 | | |
| | Dollars and Cents Per Unit | | | | |

| ltem No. | Description of Items and Price in Words | Unit | Estimated Quantity | Unit Price in Numerals | Extended Amount in Numerals |
|-------------|---|------|-----------------------|---------------------------|--------------------------------|
| | Temporary Fence | | | | |
| 47 | | LF | 12,916 | | |
| | Dollars and Cents Per Unit | | | | |
| | Temporary Gate | | | | |
| 48 | | EA | 11 | | |
| | Dollars and Cents Per Unit | | | | |
| | Permanent Chain Link Gate | | | | |
| 49 | | EA | 2 | | |
| | Dollars and Cents Per Unit | | | | |
| | Permanent Wrought Iron Gate | | | | |
| 50 | | EA | 1 | | |
| | Dollars and Cents Per Unit | | | | |
| | Permanent Steel Tube Gate | | | | |
| 51 | | EA | 17 | | |
| | Dollars and Cents Per Unit | | | | |
| | Staking, Surveying, and GPS | | | | |
| 52 | | LS | 1 | | |
| | Dollars and Cents Per Unit | | | | |
| | Plug Existing Water Well | | | | |
| 53 | | VF | 100 | | |
| | Dollars and Cents Per Unit | | | | |
| | Permitting Fees (Allowance) | | | | |
| 54 | | LS | 1 | \$ 5,000.00 | \$ 5,000.00 |
| | Dollars and Cents Per Unit | | | | |
| | | | | | |
| | TOTAL BID AMOUNT | | | | |

00 42 24 VENDOR COMPLIANCE TO STATE LAW

Chapter 2252 of the Texas Government Code applies to the award of government contract to non-resident bidders. This law provides that:

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

"Nonresident Bidder" refers to a person who is not a resident of Texas

"Resident Bidder" refers to a person whose principal place of business is in this state, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

Check the statement that is correct for Bidder.

| [] | Non-resident bidders in | | | (give | state), | our p | rinci | pal |
|----|--|----------|-------|-------|----------|---------|-------|-----|
| | place of business, are required to be State law. A copy of the statute is attached. | _percent | lower | than | resident | t bidde | ers | by |

- [__] Non-resident bidders in _____(give state), our principal place of business, are not required to under bid resident bidders.
- [___] Our principal place of business or corporate offices are in the State of Texas.

Bidder:

| Company Name: | | |
|----------------------|--|--|
| - | (typed or printed) | |
| Ву | | |
| - | (Signature attach evidence of authority to sign) | |
| Name: | | |
| - | (typed or printed) | |
| Title: | | |
| - | (Signature of Corporate Secretary) | |
| Business address: | | |
| | | |
| Phone: | Facsimile: E-mail | |

00 43 43 WAGE RATES

Contractor must pay no less than the general prevailing rates for the Project location in accordance with the following:

General Decision Number: TX20200020 02/14/2020

Superseded General Decision Number: TX20190020

State: Texas

Construction Type: Heavy

Counties: Collin, Ellis, Kaufman and Rockwall Counties in Texas.

Heavy Construction, Including Treatment Plants (Does not include water/sewer lines)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

| Modification | Number | Publication | Date |
|--------------|--------|-------------|------|
| 0 | | 01/03/2020 | |
| 1 | | 02/14/2020 | |

ASBE0021-003 06/01/2016

Rates Fringes ASBESTOS WORKER/HEAT & FROST INSULATOR (Includes application of all insulating materials, protective coverings, coatings, and finishings to all types of mechanical systems).....\$ 24.32 ELEC0020-003 12/01/2019

Rates Fringes Electricians: Cable Splicer.....\$ 30.20 8.91 Electrician....\$ 30.65 9.66 * ELEC0220-001 01/01/2020

| | Rates | Fringes |
|------------------------------|----------|-----------|
| Line Construction: | | |
| CABLE SPLICERS | | |
| EQUIPMENT OPERATORS | | |
| GROUNDMAN | | |
| LINEMAN | | |
| TRUCK DRIVER | \$ 19.96 | 9.5%+6.50 |
| ENGI0178-001 06/01/2009 | | |
| | Rates | Fringes |
| Cranes: | | |
| Hydraulic Crane (35 ton $\&$ | | |
| under) | \$ 23.70 | 9.35 |
| Hydraulic over 35 | | |
| tons,Derricks, Overhead | | |
| Gentry,Stiffleg,Tower,etc. | , | |
| and Cranes with | | |
| Piledriving or Caisson | | |
| attachements | \$ 24.70 | 9.35 |
| IRON0263-011 06/01/2017 | | |
| | Rates | Fringes |
| | | |
| Ironworkers: | | |
| Reinforcing & Structural | \$ 23.25 | 7.32 |
| PLUM0100-002 11/01/2017 | | |

| | Rates | Fringes |
|-----------------------------------|--------|---------|
| Plumbers and Pipefitters\$ | 30.84 | 11.51 |
| SHEE0068-002 11/01/2012 | | |
| | Rates | Fringes |
| Sheet metal worker\$ | 27.64 | 8.84 |
| SUTX1990-038 08/01/1990 | | |
| | Rates | Fringes |
| CARPENTER\$ | 10.536 | |
| Concrete Finisher\$ | 9.603 | |
| Form Builder\$ | 8.036 | |
| Form Setter\$ | 9.578 | |
| Laborers: | | |
| Common\$ Utility\$ | | |
| υττττίν | 1.25 | |
| Pipelayer\$ | 7.961 | |
| Power equipment operators: | | |
| Backhoe\$ | | |
| Bulldozer\$ Front End Loader\$ | | |
| Mechanic\$ | | |
| Motor Grader\$ | | |
| | | |

Oiler.....\$ 9.183 Scraper.....\$ 8.00

TRUCK DRIVER.....\$ 7.465

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)). The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations Wage and Hour Division U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210 2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION"

General Decision Number: TX2020055 01/03/2020

Superseded General Decision Number: TX20190055

State: Texas

Construction Type: Heavy Tunnel

Counties: Bell, Bexar, Bowie, Brazoria, Brazos, Cameron, Collin, Comal, Coryell, Dallas, Denton, Ector, El Paso, Ellis, Fort Bend, Galveston, Grayson, Gregg, Guadalupe, Hardin, Harris, Harrison, Hays, Hidalgo, Jefferson, Johnson, Kaufman, Liberty, Lubbock, McLennan, Midland, Montgomery, Nueces, Orange, Parker, Potter, Randall, Rockwall, San Patricio, Smith, Tarrant, Taylor, Tom Green, Travis, Victoria, Waller, Webb, Wichita and Williamson Counties in Texas.

TUNNEL CONSTRUCTION PROJECTS (BORED, 48"" IN DIAMETER OR MORE)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

| Modification | Number | Publication | Date |
|--------------|--------|-------------|------|
| 0 | | 01/03/2020 | |

* SUTX1992-010 01/15/1992

| | Rates | Fringes |
|---|-------|---------|
| CARPENTER (Including Form Setting - Wood Forms ONLY)\$ | 10.67 | .92 |
| ELECTRICIAN\$ | | .92 |
| IRONWORKER, REINFORCING | | |
| (Shaft Collar & Surface ONLY)\$ | 12.03 | 4.09 |
| Laborers: | | |
| Miner\$ | 11.77 | 1.28 |

| Surface\$ Tunnel\$ | | |
|--|-------------|----|
| MECHANIC (Maintenance and repair on trucks and power | | |
| equipment)\$ | 5 11.77 .9 | 92 |
| Oiler (Services trucks and | | |
| power equipment)\$ | 5 9.69 1.5 | 50 |
| Power equipment operators: | | |
| Backhoe Operator (1 1/2 CY | | |
| or more)\$ | 5 11.40 1.5 | 50 |
| Backhoe Operator (Less | | |
| than 1 1/2 CY)\$ | 5 10.68 | |
| Bulldozer\$ | 5 13.00 | |
| Crane (1 1/2 CY or more)\$ | 5 12.82 1.5 | 50 |
| Crane (Less than 1 $1/2$ CY)\$ | 5 11.89 | |
| Front End Loader (2 1/2 CY | | |
| or more)\$ | 5 12.17 | |
| Front End Loader (less | | |
| than 2 1/2 CY)\$ | 5 10.16 | |
| Locomotive Operator\$ | 5 9.00 1.5 | 50 |
| Road Head Operator\$ | | 21 |
| Tunnel/Boring Machine | | |
| Operator\$ | 5 13.61 | |
| Truck drivers: | | |
| Semi\$ | 5 7.25 1.0 |)5 |
| Single Axle, Light\$ | 5 7.55 | |
| WELDER\$ | 5 11.58 | |
| | | |

LABORER CLASSIFICATIONS

SURFACE - Air Tool Operator (Surface Only), Batch Plant Laborer, Changehouseman, Dumpman (Outside, Tool Man).

TUNNEL - Air Tool Operator (Tunnel Only), Bull Gang (Muckers/Trackmen), Cabletender, Concrete Crew (Rodders/Spreaders), Concrete Finisher in Tunnel, Concrete Screed Man, Conveyor Operator, Headerman, High Pressure Nozzleman, Hoist Operator, Jumbo Man, Loading/Unloading Agitator Cars, Nipper, Nozzleman-Slice Line, Pot Tender, Primer Man, Reboundman, Shaft/Raise Work (Below Ground), Shotcrete Man, Slusher Operator, Steel Form Raisers/Setters, (metal forms only) Swamper (Brakeman/Switchman), Timberman, Troweling/Grout Machine Operator, Tugger, Vibratorman, Jack Hammer, Pneumatic Tools (Except Driller), Vibratorman, Pavement Breakers.

MINER - Drill Doctor, Bit Sharpener, Bit Grinder, Rebar (Tunnel Only), Jack Leg Miner, Shaft Drill Operator

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

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Branch of Construction Wage Determinations Wage and Hour Division U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board U.S. Department of Labor 200 Constitution Avenue, N.W. Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

00 45 16 STATEMENT OF QUALIFICATIONS

1.00 GENERAL

- A. The statement of qualifications must be submitted within 5 days of the request by Owner and include, as a minimum, the information as described in this section of the Contract Documents. Failure to submit the required information in the statement of qualifications may result in the Owner considering the Bid non-responsive and result in rejection of the Bid by the Owner. Bidders may be required to provide supplemental information if requested by the Owner to clarify, enhance or supplement the information provided in the statement of qualifications.
- B. Bidders must provide the information requested in the statement of qualifications using the forms attached to this Section. A copy of these forms can be provided by the Engineer in Microsoft Word to assist with the preparation of the statement of qualifications. Information in these forms must be provided completely and in detail. Information that cannot be totally incorporated in the form may be included in an appendix to the form. This appendix must be clearly referenced by appendix number in the form, and the appended material must include the appendix number on every sheet of the appendix. The appendix must include only the information that responds to the question or item number to which the appended information applies.
- C. Bidders may provide supplemental information to the statement of qualifications using AIA, AGC or other industry standard statement of qualification forms and / or Bidders may submit additional information such as organizational brochures or other marketing information to help demonstrate the ability to provide best value to the Owner. This information may not be submitted as a substitute to the information specifically requested in this Section, or in the statement of qualifications forms.

General Information

| Organization doing business as | | | | |
|---|-------------|------------|---------------------|-----------------------|
| | | | | |
| Business address of principle office | | | | |
| | | | | |
| Telephone numbers | | | | |
| Main number | | | | |
| Fax number | | | | |
| Web site address | | | | |
| Form of business (check one) | A corporati | on | A partnership | An individual |
| If a corporation | | | <u> </u> | |
| Date of incorporation | | | | |
| State of incorporation | | | | |
| Chief Executive Manager's name | | | | |
| President's name | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Vice President's name(s) | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Secretary's name | | | I | |
| Treasurer's name | | | | |
| If a Partnership | | | | |
| Date of organization | | | | |
| State whether partnership is general | | | | |
| or limited | | | | |
| If an Individual | | | | |
| Name | | | | |
| | | | | |
| Business address | | | | |
| | | | | |
| Identify all individuals not previousl over the organization | y named whi | ch exert a | significant amoun | t of business control |
| | | | | |
| | | | | |
| | | | | |
| Indicators of organization size | | l | | |
| Average number of current full time | | Average | estimate of revenue | e for |
| employees | | the curre | | - |

Organizational Experience

| Organization doing business as | | | | |
|--|-----------------------|----------------------------|-------|----------------------|
| Business address of regional office | | | | |
| Name of regional office manager | | | | |
| Telephone numbers | | | | |
| Main number | | | | |
| Fax number | | | | |
| Web site address | | | | |
| Organization History | | | | |
| List of names that this organization | | | r ove | r the history of the |
| organization, including the names of Names of organizat | | From date | | To date |
| Names of organizat | | FIOIII date | | To date |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| List of companies, firms or organizat | ions that own any nai | rt of the organization | | |
| Name of companies, firms or organization | | | Pe | ercent ownership |
| | | | | |
| | | | | |
| | | | | |
| Construction Experience | | | | |
| Years experience in projects similar | to the proposed proje | ect: | | |
| As a general contractor | | int venture partner | | |
| Has this or a predecessor organization | | | plete | |
| any work awarded to it? | | | | |
| If yes provide full details in a separ | | | | |
| Has this or a predecessor organiza past ten years? | ation been released i | from a bid or proposal in | n the | |
| If yes provide full details in a separ | ate attachment. See | attachment No. | | |
| Has this or a predecessor organiz | | | er or | |
| proposer by any local, state, or feder | | | | |
| If yes provide full details in a separ | | | | |
| Is this organization or your proposed litigation? | | | ating | |
| If yes provide full details in a separ | | | | |
| Has this or a predecessor organizat materials defined in the contract doc | | onstruct or refused to pro | ovide | |
| If yes provide full details in a separ | | attachment No. | | |

Proposed Key Personnel

| Organization doing business as: | | |
|--|---|---|
| Proposed project organization | | |
| Provide a brief description of the managerial structu organizational cart. Include the title and names of key per this description. See attachment No. | | |
| | | |
| | | |
| | | |
| | | |
| Provide a brief description of the managerial structure organizational cart. Include the title and names of proporchart at an attachment to this description. See attachment | sed key personnel and | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Experience of Key Personnel | | |
| Provide information on the key personnel proposed for functions. Provide information for candidates for each of key personnel. Also provide biographical information for attachment. The biographical information must include th managerial experience, education and formal training, w including the roles and responsibilities for each ass information highlighting experience which makes them the | these positions on the pr each primary and al e following as a minimu ork history which desc ignment, and primary | a pages for each of these lternate candidate as an um: technical experience, ribes project experience, r language. Additional |
| be included. Role | Primary candidate | Alternate candidate |
| Project manager | | |
| Project manager Project superintendent | | |
| Project safety manager | | |
| Quality control manager | | |
| | | |
| If key personnel are to fulfill more than one of the roles lis how much time will be devoted to each function, their qua of their time that will be devoted to each role. If the indiv indicate how time it to be divided between this project and | alifications to fulfill each vidual is not to be devo | role and the percentage ted solely to this project, |

Proposed Project Managers

| Organization doir | ng business as | | | | |
|--------------------|--|-----------------------|-----------|---------------------------|--|
| Primary candidate | e | | | | |
| Name of individua | | | | | |
| | nce as project manager | | | | |
| · · · | | | | | |
| · · · | nce with this organization | | | | |
| | r projects as project manager | | | | |
| Number of similar | r projects in other positions | | | | |
| Current project as | ssignments | | | | |
| Name of assignm | ient | Percent of time u | sed | Estimated project | |
| | | for this project | | completion date | |
| | | | | | |
| | | | | | |
| | | | | | |
| | ct information (listing names indicate | s approval to cont | acting th | ne names individuals as a | |
| reference) | | | 1 | | |
| Name | | Name | | | |
| Title/ position | | Title/ position | | | |
| Organization | | Organization | | | |
| Telephone | | Telephone | | | |
| E-mail | | E-mail | | | |
| Project | | Project | | | |
| Candidate role | | Candidates role | | | |
| on project | | on project | l | | |
| Alternate candida | | | | | |
| Name of individua | al | | | | |
| Years of experier | nce as project manager | | | | |
| Years of experier | nce with this organization | | | | |
| Number of similar | r projects as project manager | | | | |
| Number of similar | r projects in other positions | | | | |
| Current project as | ssignments | | | | |
| Name of easimum | - | Percent of time u | sed | Estimated project | |
| Name of assignm | ient | for this project | | completion date | |
| | | | | | |
| | | | | | |
| | | | | | |
| Reference contac | ct information (listing names indicate | s approval to contain | actina th | ne names individuals as a | |
| reference) | (1.3) | | 5 | | |
| Name | | Name | | | |
| Title/ position | | Title/ position | | | |
| Organization | | Organization | | | |
| Telephone | | Telephone | | | |
| E-mail | | E-mail | | | |
| Project | | Project | | | |
| Candidate role | | Candidate role | | | |
| on project | | on project | | | |

Proposed Project Superintendent

| Organization doing but | siness as | | | | | |
|------------------------|-----------------------------------|-------------------|-----------|--------------------------|--|--|
| Primary candidate | | | | | | |
| Name of individual | | | | | | |
| | s project superintendent | | | | | |
| Years of experience w | | | | | | |
| · · · | ects as superintendent | | | | | |
| | • | | | | | |
| Number of similar proj | • | | | | | |
| Current project assign | ments | | | | | |
| Name of assignment | | Percent of time u | sed | Estimated project | | |
| | | for this project | | completion date | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | ormation (listing names indicates | approval to conta | cting the | e names individuals as a | | |
| reference) Name | | Name | | | | |
| Title/ position | | Title/ position | | | | |
| Organization | | Organization | | | | |
| Telephone | | Telephone | | | | |
| E-mail | | E-mail | | | | |
| Project | | Project | | | | |
| Candidate role | | Candidate role | | | | |
| on project | | on project | | | | |
| Alternate candidate | | | | | | |
| Name of individual | | | | | | |
| Years of experience as | s project superintendent | | | | | |
| Years of experience w | ith this organization | | | | | |
| Number of similar proj | ects as superintendent | | | | | |
| Number of similar proj | ects in other positions | | | | | |
| Current project assign | ments | | | | | |
| Nome of enginement | | Percent of time u | sed | Estimated project | | |
| Name of assignment | | for this project | | completion date | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Reference contact info | ormation (listing names indicates | approval to conta | ctina the | e names individuals as a | | |
| reference) | (| | 5 | | | |
| Name | | Name | | | | |
| Title/ position | | Title/ position | | | | |
| Organization | | Organization | | | | |
| Telephone | | Telephone | | | | |
| E-mail | | E-mail | | | | |
| Project | | Project | | | | |
| Candidate role | | Candidate role | | | | |
| on project | | on project | | | | |

Proposed Project Safety Manager

| 1 | | | | | |
|--------------------|---|---------------------------|-----------|--------------------------|--|
| Organization doir | ng business as | | | | |
| Primary candidat | e | | | | |
| Name of individu | al | | | | |
| Years of experier | nce as project safety manager | | | | |
| · · · | nce with this organization | | | | |
| · · · · · | - | | | | |
| | r projects as safety manager | | | | |
| | r projects in other positions | | | | |
| Current project a | ssignments | 1 | | 1 | |
| Name of assignm | nent | Percent of time u | ised | Estimated project | |
| | | for this project | | completion date | |
| | | | | | |
| | | | | | |
| | | | | | |
| | ct information (listing names indicates | s approval to conta | cting the | e names individuals as a | |
| reference) | | | 1 | | |
| Name | | Name | | | |
| Title/ position | | Title/position | | | |
| Organization | | Organization | | | |
| Telephone | | Telephone | | | |
| E-mail Project | | E-mail | | | |
| Candidate role | | Project Candidate role | | | |
| on project | | on project | | | |
| Alternate candida | | onproject | | | |
| Name of individu | | | | | |
| | • | | | | |
| | nce as project safety manager | | | | |
| Years of experier | nce with this organization | | | | |
| Number of simila | r projects as safety manager | | | | |
| Number of simila | r projects in other positions | | | | |
| Current project a | ssianments | ı | | | |
| | - | Percent of time u | ised | Estimated project | |
| Name of assignment | nent | for this project | | completion date | |
| | | | | | |
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| Reference conta | ct information (listing names indicates | s approval to conta | cting th | e names individuals as a | |
| reference) | | 5 approval to conta | ioung in | e names individuais as a | |
| Name | | Name | | | |
| Title/ position | | Title/ position | | | |
| Organization | | Organization | | | |
| Telephone | | Telephone | | | |
| E-mail | | E-mail | | | |
| Project | | Project | | | |
| | | | | | |
| Candidate role | | Candidate role | | | |

Proposed Project Quality Control Manager

| Organization doir | ng business as | | | |
|---------------------------------|--|---------------------------------|----------|--------------------------|
| Primary candidate | e | I | | |
| Name of individua | | | | |
| | nce as quality control manager | | | |
| | nce with this organization | | | |
| · · · · · | - | | | |
| | r projects as quality manager | | | |
| | r projects in other positions | | | |
| Current project as | ssignments | 1 | | 1 |
| Name of assignm | ent | Percent of time u | ised | Estimated project |
| | | for this project | | completion date |
| | | | | |
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| | | | | |
| | t information (listing names indicates | s approval to conta | cting th | e names individuals as a |
| reference) | | NI | | |
| Name Title/ position | | Name Title (position | | |
| Title/ position Organization | | Title/ position Organization | | |
| Telephone | | Telephone | | |
| E-mail | | E-mail | | |
| Project | | Project | | |
| Candidate role | | Candidate role | | |
| on project | | on project | | |
| Alternate candida | ite | | | |
| Name of individua | al | | | |
| Years of experier | nce as quality control manager | | | |
| Years of experier | nce with this organization | | | |
| Number of similar | r projects as quality manager | | | |
| Number of similar | r projects in other positions | | | |
| Current project as | ssignments | | | |
| | - | Percent of time u | sed | Estimated project |
| Name of assignm | lent | for this project | | completion date |
| | | | | |
| | | | | |
| | | | | |
| Reference contac | t information (listing names indicates | s approval to conta | ctina th | e names individuals as a |
| reference) | | | <u>-</u> | |
| Name | | Name | | |
| Title/ Position | | Title/ Position | | |
| Organization | | Organization | | |
| Telephone | | Telephone | | |
| E-mail | | E-mail | | |
| Project Candidate role | | Project Candidate role | | |
| on Project | | on Project | | |
| 01110,000 | | 01110j000 | l | |

Project Experience and Resources

| Organization doing business as: | | | | |
|--|--------------------------------------|------------------|-----------|-----------|
| Projects | | | | |
| Provide a list of major projects that are | currently underway, or have been | completed w | ithin the | last ton |
| years on Attachment A. | currently underway, or have been | completed w | | |
| Provide a completed Project Informatio | n form (Attachment B) for projects | that have be | en com | pleted in |
| the last five years which specifically ill | | | | |
| Owner for this project. | | | | |
| Include a completed Project Information | n form (Attachment B) for projects v | which illustrate | e the ex | perience |
| of the proposed key personnel. | . , | | | |
| Provide a description of your organization | ons approach to completing this pro | oject to provid | de best | value for |
| the Owner. Including a description of yo | our approach in the following areas: | | | |
| 1. Contract administration | | | | |
| 2. Management of subcontractor a | nd suppliers | | | |
| 3. Time management | | | | |
| 4. Cost control | | | | |
| 5. Quality management | | | | |
| Project site safety Managing changes to the project | * | | | |
| 8. Managing equipment | , t | | | |
| 9. Meeting HUB / MWBE Participa | tion Goal | | | |
| Equipment | | | | |
| Provide a list of major equipment pro | posed for use on this project. At | ttach additior | al infor | mation if |
| necessary | | | | |
| Equipment item | Primary use on project | Own | Will | Lease |
| | Fillinary use on project | Own | buy | Lease |
| | | | | |
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| Division of work hotward comparisotion of | | | l | |
| Division of work between organization a | | | | |
| What work will the organization complete | e using its own resources? | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| What work does the organization propos | se to subcontract on this project? | | | |
| | | | | |
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Subcontractors and Suppliers

| Organization doing busines | s as: | | | | |
|---|--------------|---------------------------------------|---------------|------------|------------|
| Project subcontractors | | | | | |
| | ctors that | will provide more than 10 percent | of the work | (based o | n contract |
| amounts | | | Est. per | cent HI | IB/MWBE |
| Name | Work to I | be provided | of contra | | |
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| Provide information on th | e propose | ed key personnel, project experier | nce and a c | lescriptio | n of past |
| relationship and work exper | rience for e | each subcontractor listed above using | g the Project | Informat | on forms. |
| Suppliers | | | | | |
| Provide a list of major ec information if necessary. | quipment o | or materials proposed for use on | this project. | Attach | additional |
| | | | Furnish | Furnish | HUB/M |
| Supplier name | | Equipment / material provided | only | and | WBE |
| | | | - , | install | firm |
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Current Projects and Project Completed within the last 10 Years

| Project owner | | | | | | | | | | |
|-------------------------------|-------------------|---------------|--------------------|------------|-------------------------|---------|----------|-----------|-------------------------|--|
| General description of pro | ject: | | | | | | | | | |
| Project cost | | | | | Date project of | comple | eted | | | |
| Key project personnel | | Project man | ager | Project | superintendent | | Safet | y manager | Quality control manager | |
| Name | | | | | | | | | | |
| Reference contact information | ation (listing na | ames indicate | es approval to con | tacting th | ne names individu | uals as | s a refe | erence) | | |
| | Name | | Title/ position | | Organization | | | Telephone | E-mail | |
| Owner | | | | | | | | | | |
| Designer | | | | | | | | | | |
| Construction manager | | | | | | | | | | |
| Project owner | | | | | Project name | | | | | |
| General description of pro | oject: | | | | | | | | | |
| Project cost | | | | | Date project of | comple | eted | | | |
| Key project personnel | | Project man | ager | Project | ect superintendent Safe | | Safet | y manager | Quality control manager | |
| Name | | | | | | | | | | |
| Reference contact information | ation (listing na | ames indicate | s approval to con | tacting th | ne names individu | uals as | s a refe | erence) | | |
| | Name | | Title/ position | | Organization | | | Telephone | E-mail | |
| Owner | | | | | | | | | | |
| Designer | | | | | | | | | | |
| Construction manager | | | | | | | | | | |
| Project owner | | | | | Project name | | | | | |
| General description of pro | oject: | | | | | | | | | |
| Project cost | | | | | Date project of | comple | eted | | | |
| Key project personnel | | Project man | ager | Project | superintendent | | Safet | y manager | Quality control manager | |
| Name | | | | | | | | | | |
| Reference contact information | ation (listing na | ames indicate | s approval to con | tacting th | ne names individu | uals as | s a refe | erence) | | |
| | Name | | Title/ position | | Organization | | | Telephone | E-mail | |
| Owner | | | | | | | | | | |
| Designer | | | | | | | | | | |
| Construction manager | | | | | | | | | | |

Project Information

| Project owner | | | | Project na | me | | | | | | |
|-------------------------------|--|--------------------|--|-------------------|----------------------|-------------|-----------|-----------------------------------|-----|--------------------|---------|
| General description of pro | oject | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Project Budget and Scheo | dule Performance | | | | | | | | | | |
| Budget history | | | Schedule per | formance | 1 | | | | | | |
| | Amount | % of Bid Amount | | | | | | | Da | ite | Days |
| Bid | | | Notice to Pro | ceed | | | | | | | |
| Change orders | | | Contract Sub | stantial C | ompletion | date at N | lotice to | Proceed | | | |
| Owner enhancements | | | Contract final | completi | on date at | Notice to | Procee | ed | | | |
| Unforeseen conditions | | | Change Orde | er authoriz | ed Substa | ntial Com | npletion | date | | | |
| Design issues | | | Change Orde | er authoriz | ed final co | mpletion | date | | | | |
| Total | | | Actual / estimated Substantial Completion date | | | | | | | | |
| Final cost | | | Actual / estim | ated fina | completio | n date | | | | | |
| Key Project Personnel | | | | | | | | | | | |
| | | | Project Mana | ger | Project Superinte | endent | S | Safety Manager | | Quality Manager | Control |
| Name | | | | | | | | | | | |
| Percentage of time devote | ed to the project. | | | | | | | | | | |
| Proposed for this project. | | | | | | | | | | | |
| Did Individual start and co | mplete the project? | | | | | | | | | | |
| If not, who started or co | mpleted the project in their | olace. | | | | | | | | | |
| Reason for change. | | | | | | | | | | | |
| Reference contact information | ation (listing names indicate | s approval to | o contacting the | names ii | ndividuals a | as a refere | ence) | | | | |
| | Name | Title/ positi | on | Organiz | ation | - | Telepho | one | E | -mail | |
| Owner | | | | | | | | | | | |
| Designer | | | | | | | | | | | |
| Construction Manager | | | | | | | | | | | |
| Surety | | | | | | | | | | | |
| | l or pending resolution by ar | | gation or dispute | | | | | | | • | |
| Number of issues resolved: | Total amount involve resolved issues: | ed in | | Number pending | of issues | | | al amount involv olved Issues: | /ed | in | |

Affidavits

One of the following four affidavits shall be executed and provided with this information. The individual signing the affidavit shall attach evidence of their authority to bind the organization to an agreement.

AFFIDAVIT FOR CORPORATION

| State |) | § | |
|---|----------|---------|----------------------------|
| County of |) | § | |
| (Name) | , b | eing du | uly sworn deposes and says |
| that he is(Title) | of | the | |
| qualification form and related information; that he are true and correct and contain no material misr affidavit on behalf of the Corporation. | has read | such do | |
| Signature | - | | |
| Signed and sworn to me before this | _day of | | , 20 |
| Notary Public | - | | |
| My commission expires: | | | |

AFFIDAVIT FOR PARTNERSHIP

| State | _) § |
|--|--|
| County of | _) § |
| (Name) | , being duly sworn deposes and says |
| that he is(Title) | _of the |
| related information; that he has read such docur | company submitting the foregoing qualification form and nents; and that such documents are true and correct and he is authorized to make this affidavit on behalf of the |
| Signature | - |
| Signed and sworn to me before this | _day of, 20 |
| Notary Public | _ |
| My commission expires: | |

AFFIDAVIT FOR INDIVIDUAL

| State |) | § | |
|--|----------------|------------------|---|
| County of |) | § | |
| (Name) | , being duly s | worn deposes and | d says |
| that he is(Title) | of the | | |
| related information; that he has read such a contain no material misrepresentations. | | | bing qualification form and are true and correct and |
| Signature | | | |
| Signed and sworn to me before this | day of | | _, 20 |
| Notary Public | | | |
| My commission expires: | | | |

JOINT VENTURE STATEMENT

We the undersigned do hereby give notice to our agreement to bid as a joint venture on the Project.

| Name of Joint Venture | | |
|------------------------------------|--------|------|
| Name of Firm | | |
| | | |
| Signature | | |
| Signed and sworn to me before this | day of | , 20 |
| Notary Public | | |
| My commission expires: | | |
| Name of Firm | | |
| Signature | | |
| Signed and sworn to me before this | day of | , 20 |
| Notary Public | | |
| My commission expires: | | |

END OF SECTION

00 52 23 AGREEMENT

This Agreement is between North Texas Municipal Water District ("Owner") and _

("Contractor").

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:
 - A. Approximately 20,100 LF of 48-inch water line; 650 LF of 66-inch I.D. tunnel liner plate; connections to existing water transmission lines; and all other improvements detailed in the construction plans and specifications.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

North Texas Municipal Water District Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements NTMWD Project No. 101-0490-18

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by

Kimley-Horn and Associates, Inc. 13455 Noel Road Two Galleria Office Tower, Suite 700 Dallas, TX 75240 Phone (972) 770-1300

Engineer, who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

- 4.01 Time of the Essence
 - A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 Dates for Substantial Completion and Final Payment
 - A. The Work will be substantially completed on or before 510 Calendar Days after the Notice to Proceed, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before 540 Calendar Days after the Notice to Proceed.
- 4.03 Liquidated Damages
 - A. Contractor and Owner recognize that time is of the essence of this Agreement and that

Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration preceding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof. Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$500.00 for each calendar day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$500.00 for each calendar day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment. In addition, liquidated damages are stipulated in Section 01 35 00, SPECIAL PROCEDURES, for failure to meet milestone completions. The Owner will be the sole judge as to whether the work has been completed within the allotted time. Assessment of liquidated damages by the Owner shall not constitute a waiver of the Owner's right to sue and collect additional damages which Owner may sustain by the failure of the Contractor to perform in accordance with the terms of its Contract.

ARTICLE 5 - CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents for the unit prices shown in the attached 00 42 23 Bid Form. Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 - PAYMENT PROCEDURES

- 6.01 Submittal and Processing of Payments
 - A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.
- 6.02 Progress Payments; Retainage
 - A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 10th day of each month during performance of the Work as provided in Paragraph 2.07A of the General Conditions. To facilitate approvals and processing, Contractor shall submit Applications for Payment no later than the first working day following the 10th day of the month.
 - B. For contracts that include major pipeline bid items, the value of Work completed for progress payments (exclusive of retainage) shall be made on the following basis:
 - 1. Prior to Restoration: Upon installation of the pipe and full-height backfill of the trench, payment will be allowed for eighty percent (80%) of the unit contract price per linear foot actually installed.
 - 2. After Restoration: Upon completion of restoration of the disturbed areas, the Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver over such materials and equipment in a bright, clean, polished and new-appearing condition. The remaining twenty percent (20%) of payment will be allowed when the property has been completely restored to its original or required condition as defined above. Grass establishment is covered under separate bid items and is not included under "restoration".

- C. Prior to Final Completion, progress payments will be made in an amount equal to ninety-five (95%) percent of the total amount of Work completed and properly stored materials on hand, with the balance being retainage.
- D. Payment will be less the aggregate of payments previously made and less such amounts as Construction Manager may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions. In addition to the amount retained above, the OWNER may retain additional amounts as set forth elsewhere in the Contract Documents.
- 6.03 Final Payment
 - A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 - INTEREST

7.01 The Owner is not obligated to pay interest on moneys not paid except as provided in Section 49.276(d) of the Texas Water Code.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Proposal Documents.
 - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site including Underground Facilities which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions.
 - E. Contractor has obtained and carefully studied all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions including surface, subsurface, and Underground Facilities at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Proposal Documents, and safety precautions and programs incident thereto or assumes responsibility for doing so.
 - F. Contractor does not consider that any 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 Documents.

- G. Contractor 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 Contract Documents.
- H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- I. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 - 1. Invitation for Bids
 - 2. Instructions to Bidders
 - 3. This Agreement
 - 4. Performance Bond
 - 5. Payment Bond
 - 6. General Conditions
 - 7. Supplementary Conditions
 - 8. Specifications
 - 9. Drawings
 - 10. Addenda
 - 11. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid.
 - b. Documentation submitted by Contractor prior to Notice of Award.
- B. The following are also Contract Documents which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - 1. Notice to Proceed
 - 2. Written Amendment(s)
 - 3. Change Order(s)
 - 4. Field Order(s)
 - 5. Work Change Directive(s)
 - 6. Engineers Written Interpretation(s)
- C. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- D. There are no Contract Documents other than those listed above in this Article 9.
- E. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Venue

A. Proposer agrees that venue shall lie exclusively in Collin County, Texas for any legal action.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

| Owner: | North Texas Municipal Water District | Contractor | : |
|------------|---|------------|--------------------------|
| | (typed or printed) | | (typed or printed) |
| By: | | By: | |
| | (Individual's signature) | | (Individual's signature) |
| Name: | Don Gordon | Name: | |
| | (typed or printed) | | (typed or printed) |
| Title: | President | Title: | |
| | (typed or printed | | (typed or printed |
| Attest: | | Attest: | |
| | (Darrell Grooms, Secretary) | | (Individual's signature) |
| Designated | representative: | Designated | representative: |
| Name: | Thomas W. Kula | Name: | · |
| Title: | Executive Director | Title: | |
| Address: | 505 E. Brown Street | Address: | |
| | Wylie, Texas 75098 | | |
| Phone: | 972-442-5405 | Phone: | |
| Flione. | | Facsimile: | |
| Facsimile: | 972-295-6440 | Facsimile. | |
| | 972-295-6440 tkula@ntmwd.com | E-mail: | - |

Agreement NTMWD #490 – Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements May 2020

00 61 13.13 PERFORMANCE BOND

| Contractor as Principal | Surety |
|--|---|
| Name: . | Name: |
| Mailing address (principal place of business): | Mailing address (principal place of business): |
| | |
| | |
| | |
| Owner | Physical address (principal place of business): |
| Name: North Texas Municipal Water District | |
| Mailing address (principal place of business): | |
| | Surety is a corporation organized and existing |
| 505 E. Brown Street, Wylie, Texas 75098 | under the laws of the state of: |
| | By submitting this bond, Surety affirms their |
| | authority to do business in the State of Texas and |
| Contract | their license to execute bonds in the State of |
| Project name and location: | Texas. |
| Wylie-Rockwall-Farmersville 36"/48" Pipeline, | Telephone (main number): |
| Phase 2 Improvements | Telenhane (fer netice of eleim): |
| Wylie, Texas | Telephone (for notice of claim): |
| Effective Date of the Agreement: | |
| | Local Agent for Surety |
| Contract Amount: | Name: |
| | Address: |
| | |
| Bond | Telephone: |
| Date of Bond (Date of Bond cannot be earlier than Effective | The address of the surety company to which any notice of claim should be sent may be |
| Date of Agreement) | obtained from the Texas Department of |
| Bond Amount: | Insurance by calling the following toll-free |
| | telephone number: 1-800-252-3439 |
| Surety and Contractor, intending to be legally bo | und and obligated to Owner do each cause this |
| Performance Bond to be duly executed on its bel | |
| representative. The Principal and Surety bind the | |
| executors, successors and assigns, jointly and s | |
| obligation is such that if the Contractor as Princi | |
| | id; otherwise the obligation is to remain in full force |
| | ant to the terms and provisions of Chapter 2253 of |
| the Texas Government Code as amended and all accordance with the provisions of said Chapter to | |
| herein. Venue shall lie exclusively in Collin Coun | |
| Contractor as Principal | |
| | Surety |
| Signature: | Signature: |
| Name and | Name and |
| Title: | Title: |
| | (Attach Power of Attorney) |
| | |

00 61 13.16 PAYMENT BOND

| Contractor as Principal | Surety |
|--|--|
| Name: . | Name: |
| Mailing address (principal place of business): | Mailing address (principal place of business): |
| | |
| | |
| | Physical address(principal place of business): |
| Owner | |
| Name: North Texas Municipal Water District | |
| Mailing address (principal place of business): | |
| | Surety is a corporation organized and existing |
| 505 E. Brown Street, Wylie, Texas 75098 | under the laws of the state of: |
| | By submitting this bond, Surety affirms their |
| Contract | authority to do business in the State of Texas and their license to execute bonds in the State of |
| Project name and location: | Texas. |
| Wylie-Rockwall-Farmersville 36"/48" Pipeline, | Telephone (main number): |
| Phase 2 Improvements | |
| Wylie, Texas | Telephone (for notice of claim): |
| Effective Date of the Agreement: | |
| <u>j</u> | Local Agent for Surety |
| Contract Amount: | Name: |
| | Address: |
| Bond | Telephone: |
| Date of Bond | The address of the surety company to which |
| (Date of Bond cannot be earlier than Effective | any notice of claim should be sent may be |
| Date of Agreement) Bond Amount: | obtained from the Texas Department of Insurance by calling the following toll-free |
| Bond Antount. | telephone number: 1-800-252-3439 |
| Surety and Contractor, intending to be legally bo | |
| Payment Bond to be duly executed on its behalf l | |
| The Principal and Surety bind themselves, and th | |
| and assigns, jointly and severally to this bond. The | |
| in the prosecution of the work required by the Co | ing labor or materials to him or to a subcontractor ntract then this obligation shall be null and void: |
| otherwise the obligation is to remain in full force | |
| pursuant to the terms and provisions of Chapter | |
| | d in accordance with the provisions of said Chapter erein. Venue shall lie exclusively in Collin County, |
| Texas for any legal action. | ereni. venue shan ne exclusively in Collin County, |
| Contractor as Principal | Surety |
| | |
| Signature: | Signature: |
| Name and | Name and |
| Title: | Title: (Attach Power of Attorney) |
| | (Allacit Fower of Allottiey) |
| | |

00 62 16 CERTIFICATE OF INSURANCE

If awarded the contract, provide the Certificate(s) of Insurance to the Owner prior to conforming of documents for execution. Certificate(s) will be included in the documents to be executed by the Owner and in the conformed construction contract documents.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by









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ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

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Endorsed by



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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
 - 1. *Addenda* Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 - 2. *Agreement* The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 - 3. *Application for Payment* The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 - 4. *Asbestos* Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 - 5. *Bid* The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 - 6. Bidder The individual or entity who submits a Bid directly to Owner.
 - 7. *Bidding Documents* The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 - 8. *Bidding Requirements* The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 - 9. *Change Order* A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 - 10. *Claim* A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 - 11. *Contract* The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

- 12. *Contract Documents* Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
- 13. *Contract Price* The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
- 14. *Contract Times* The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
- 15. Contractor The individual or entity with whom Owner has entered into the Agreement.
- 16. Cost of the Work See Paragraph 11.01 for definition.
- 17. *Drawings* That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
- 18. *Effective Date of the Agreement* The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
- 19. Engineer The individual or entity named as such in the Agreement.
- 20. *Field Order* A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
- 21. General Requirements Sections of Division 1 of the Specifications.
- 22. *Hazardous Environmental Condition* The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
- 23. *Hazardous Waste* The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
- 24. *Laws and Regulations; Laws or Regulations* Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

- 25. *Liens* Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
- 26. *Milestone* A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
- 27. *Notice of Award* The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
- 28. *Notice to Proceed* A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
- 29. *Owner* The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
- 30. PCBs Polychlorinated biphenyls.
- 31. *Petroleum* Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
- 32. *Progress Schedule* A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
- 33. *Project* The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
- 34. *Project Manual* The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
- 35. *Radioactive Material* Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
- 36. *Resident Project Representative* The authorized representative of Engineer who may be assigned to the Site or any part thereof.
- 37. *Samples* Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
- 38. *Schedule of Submittals* A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

- 39. *Schedule of Values* A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
- 40. *Shop Drawings* All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- 41. *Site* Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
- 42. *Specifications* That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- 43. *Subcontractor* An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
- 44. *Substantial Completion* The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
- 45. Successful Bidder The Bidder submitting a responsive Bid to whom Owner makes an award.
- 46. *Supplementary Conditions* That part of the Contract Documents which amends or supplements these General Conditions.
- 47. *Supplier* A manufacturer, fabricator, supplier, distributor, materialman, or Supplier having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
- 48. Underground Facilities All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
- 49. Unit Price Work Work to be paid for on the basis of unit prices.
- 50. *Work* The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce

such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. Work Change Directive - A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*:

- 1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:
- a. does not conform to the Contract Documents; or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).
- E. Furnish, Install, Perform, Provide:
 - 1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

- 2.01 Delivery of Bonds and Evidence of Insurance
 - A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
 - B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.
- 2.02 *Copies of Documents*
 - A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.
- 2.03 Commencement of Contract Times; Notice to Proceed
 - A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the

Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

- 2.04 *Starting the Work*
 - A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.
- 2.05 Before Starting Construction
 - A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 Preconstruction Conference; Designation of Authorized Representatives

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 Initial Acceptance of Schedules

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

- 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
- 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
- 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

- 3.01 Intent
 - A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
 - B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
 - C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.
- 3.02 Reference Standards
 - A. Standards, Specifications, Codes, Laws, and Regulations
 - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 Reporting and Resolving Discrepancies

- A. Reporting Discrepancies:
 - 1. *Contractor's Review of Contract Documents before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
 - 2. Contractor's Review of Contract Documents During Performance of Work: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
 - 3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.
- B. Resolving Discrepancies:
 - 1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Amending and Supplementing Contract Documents

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 - 1. A Field Order;

- 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
- 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 - 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.
- 3.06 Electronic Data
 - A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to electronic files submitted to the project delivery management system. Documents in hard copy format are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such hard copy documents will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the electronic copies govern.
 - B. Electronic documents and submittals submitted through the project delivery management system cannot be modified as a new record after submittal. Therefore, all documents and submittals into the project delivery management system are deemed record on file upon receipt.
 - C. All electronic records will be archived upon project delivery completion.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

- 4.01 Availability of Lands
 - A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must

comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 Subsurface and Physical Conditions

- A. Reports and Drawings: The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 Differing Subsurface or Physical Conditions

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
 - 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

- 2. is of such a nature as to require a change in the Contract Documents; or
- 3. differs materially from that shown or indicated in the Contract Documents; or
- 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.
- C. Possible Price and Times Adjustments:
 - 1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
 - 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
 - 3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer,

or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 Underground Facilities

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.
- B. Not Shown or Indicated:
 - 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
 - 2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with

reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 Reference Points

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 Hazardous Environmental Condition at Site

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall

immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate

Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 Certificates of Insurance

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 Contractor's Insurance

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:

- 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
- 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
- 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
- 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
- 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
- 6. include completed operations coverage:
- a. Such insurance shall remain in effect for two years after final payment.
- b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 Owner's Liability Insurance

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- 5.06 Property Insurance
 - A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

- 1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
- 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
- 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
- 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
- 5. allow for partial utilization of the Work by Owner;
- 6. include testing and startup; and
- 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 Waiver of Rights

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 Receipt and Application of Insurance Proceeds

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 Acceptance of Bonds and Insurance; Option to Replace

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 Partial Utilization, Acknowledgment of Property Insurer

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 Supervision and Superintendence

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 Progress Schedule

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.
- 6.05 Substitutes and "Or-Equals"
 - A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. "Or-Equal" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

- 2. Substitute Items:
- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.
- 6.06 *Concerning Subcontractors, Suppliers, and Others*
 - A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
 - B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 Patent Fees and Royalties

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its

use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 Permits

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 Laws and Regulations

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner

and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 Taxes

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas:

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
- 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
- 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 Record Documents

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts

any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 Safety Representative

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 Hazard Communication Programs

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 Emergencies

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 Shop Drawings and Samples

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
 - 1. Shop Drawings:
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 - 2. Samples:
 - a. Submit number of Samples specified in the Specifications.

- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. Submittal Procedures:
 - 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 - 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 - 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
- D. Engineer's Review:
 - 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 - 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method,

technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;

- 2. recommendation by Engineer or payment by Owner of any progress or final payment;
- 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
- 4. use or occupancy of the Work or any part thereof by Owner;
- 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
- 6. any inspection, test, or approval by others; or
- 7. any correction of defective Work by Owner.
- 6.20 Indemnification
 - A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
 - B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
 - C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 Delegation of Professional Design Services

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

- 7.01 Related Work at Site
 - A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 Coordination

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

- 8.01 *Communications to Contractor*
 - A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 Replacement of Engineer

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 Furnish Data

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 Pay When Due

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.
- 8.05 Lands and Easements; Reports and Tests
 - A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 8.06 Insurance
 - A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.
- 8.07 Change Orders
 - A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.
- 8.08 Inspections, Tests, and Approvals
 - A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.
- 8.09 Limitations on Owner's Responsibilities
 - A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws

and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- 8.10 Undisclosed Hazardous Environmental Condition
 - A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.
- 8.11 Evidence of Financial Arrangements
 - A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.
- 8.12 Compliance with Safety Program
 - A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

- 9.01 *Owner's Representative*
 - A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.
- 9.02 Visits to Site
 - A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
 - B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 Project Representative

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 Authorized Variations in Work

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 Rejecting Defective Work

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.
- 9.06 Shop Drawings, Change Orders and Payments
 - A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
 - B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
 - C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
 - D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 Determinations for Unit Price Work

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations

on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 Decisions on Requirements of Contract Documents and Acceptability of Work

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 Limitations on Engineer's Authority and Responsibilities

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of,

and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.
- 9.10 *Compliance with Safety Program*
 - A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

- 10.01 Authorized Changes in the Work
 - A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
 - B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.
- 10.02 Unauthorized Changes in the Work
 - A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.
- 10.03 Execution of Change Orders
 - A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 Notification to Surety

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 Claims

- A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

- 11.01 Cost of the Work
 - A. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any

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subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

- 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
- 5. Supplemental costs including the following:
- a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
- b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.
- B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
 - 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. Cash Allowances:
 - 1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. Contingency Allowance:
 - 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

- 12.01 Change of Contract Price
 - A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
 - B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
 - C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a

deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 Change of Contract Times

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 Delays

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article13.
- 13.02 Access to Work
 - A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.
- 13.03 Tests and Inspections
 - A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
 - B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
 - C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
 - D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in

the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.
- 13.04 Uncovering Work
 - A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
 - B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
 - C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
 - D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- 13.05 Owner May Stop the Work
 - A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 Correction or Removal of Defective Work

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 Correction Period

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect

to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 Acceptance of Defective Work

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties

are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

- 14.01 Schedule of Values
 - A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.
- 14.02 Progress Payments
 - A. Applications for Payments:
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipments to protect Owner's interest therein, all of which must be satisfactory to Owner.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
 - B. Review of Applications:
 - 1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for

refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

- 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
- a. the Work has progressed to the point indicated;
- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
- c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
- 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
- b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
- 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
- b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
- c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
- d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
- e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

- 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.
- D. *Reduction in Payment:*
 - 1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
 - 2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

- 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.
- 14.03 Contractor's Warranty of Title
 - A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.
- 14.04 Substantial Completion
 - A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
 - B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
 - C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
 - D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
 - E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 Partial Utilization

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04. A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 Final Inspection

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 Final Payment

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

- 2. The final Application for Payment shall be accompanied (except as previously delivered) by:
- a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
- b. consent of the surety, if any, to final payment;
- c. a list of all Claims against Owner that Contractor believes are unsettled; and
- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.
- B. Engineer's Review of Application and Acceptance:
 - 1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. Payment Becomes Due:
 - 1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 Final Completion Delayed

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment

(for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

- A. The making and acceptance of final payment will constitute:
 - 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 - 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

- 15.01 Owner May Suspend Work
 - A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.
- 15.02 Owner May Terminate for Cause
 - A. The occurrence of any one or more of the following events will justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 - 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 - 3. Contractor's repeated disregard of the authority of Engineer; or

- 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
 - 1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 - 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 - 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.
- 15.03 Owner May Terminate For Convenience
 - A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

- 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
- 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
- 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
- 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

- 16.01 Methods and Procedures
 - A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.
- 17.04 Survival of Obligations
 - A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the

Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

- 17.05 Controlling Law
 - A. This Contract is to be governed by the law of the state in which the Project is located.
- 17.06 Headings
 - A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

00 73 00 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement Section 00 72 00 – Standard General Conditions of the Construction Contract prepared by the Engineers Joint Contract Documents Council (EJCDC C-700, 2007 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

- SC-1.01 Make the following modifications to 1.01 Defined Terms
 - A. Delete Paragraph 1.01 A. 5. entirely and insert the following in its place:
 - "5. Bid The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices and schedule for the Work to be performed."
 - B. Modify 1.01 A. 19. Add the following:

"For this Agreement the *Engineer* is Kyle Sanderson, P.E. Kimley-Horn and Associates, Inc. 13455 Noel Road Two Galleria Office Tower, Suite 700 Dallas, TX 75240 (972) 770-1300"

C. Add a new paragraph 1.01 A. 52:

"52. Construction Manager – The authorized representative of Owner who may be assigned to the Site or any part thereof. The individual or entity will be responsible for administration of the Contract as a representative of the Owner. This individual may also serve as the Resident Project Representative. For this project the Owner will designate a member of their staff to serve as Construction Manager

- SC-1.02 Make the following modifications to 1.02 *Terminology*.
 - A. Add a new paragraph "B.2" as follows:
 - "2. At no additional cost to Owner", "With no extra compensation to Contractor", "At Contractor's own expense", or similar words mean that the Contractor will perform or provide specified operation of work without any increase in the Contract Amount. It is understood that the cost for performing all work is included in the amount bid and will be performed at no additional cost to the Owner unless specifically stated otherwise.
 - B. Delete Paragraph C. Add the following:
 - "C. Day
 - 1. A "calendar day" shall be a day of twenty-four hours measured from midnight to the next midnight, and is any day of the year, with no days being excluded.
 - 2. A "working day" shall be a day which permits construction of the principal units of the work for a period of not less than seven hours between 7:00 a.m. and 6:00 p.m. Working days do not include days on which weather or other

conditions not under the control of the Contractor prevent Contractor from working the seven hours defining a working day. Working days do not include Saturdays, Sundays or any of the following holidays: New Year, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the day after Thanksgiving and Christmas Eve and Christmas Day.

- C. Add new paragraphs "E.5 and E.6" as follows:
 - "5. Specifications are written in modified brief style. Requirements apply to all work of the same kind, class, and type even though the word "all" is not stated.
 - 6. Simple imperative sentence structure is used which places a verb as the first word in the sentence. It is understood that the words "furnish", "install", "provide", or similar words include the meaning of the phrase "The Contractor shall..." before these words.
- SC-2.02 Make the following modifications to 2.02 Copies of Documents.
 - A. Amend the first sentence of paragraph GC-2.02 A. by deleting "ten" and inserting "three".
- SC-2.05 Make the following modifications to 2.05 Before Starting Construction
 - A. Add a new paragraph immediately after paragraph 2.05.A.3
 - B. Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to the Engineer any conflict, error, ambiguity or discrepancy which the Contractor may discover and shall obtain a written interpretation from the Engineer before proceeding with any work affected thereby. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Document which were not reported prior to the Award of the Contract, the Contractor shall be deemed to have included the most expensive item in their bid."
- SC-3.01 Make the following modifications to 3.01 *Intent*.
 - A. Add the following to 3.01 A

"Drawings and specifications do not indicate or describe all of the work required to complete the project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials or equipment required for a complete and functional system even if they are not detailed or specified."

- 1. The contract requirements described in the General Conditions, Supplementary Conditions and General Requirements apply to each and all specification sections unless specifically noted otherwise.
- 2. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing work among Subcontractors, or to establish the extent of work to be performed by any trade, Subcontractor or Supplier. Specifications or details do not need to be indicated or specified in each specification or drawing. Items shown in the contract documents are applicable regardless of location in the Contract Documents.
- 3. Standard paragraph titles and other identifications of subject matter in the specifications are intended to aid in locating and recognizing various requirements of the specifications. Titles do not define, limit, or otherwise restrict specification text.
- B. Add new paragraphs "D F" as follows:

- "D. Comply with the most stringent requirements where compliance with two (2) or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, unless Contract Documents indicate otherwise.
 - 1. Quantity or quality level shown or indicated shall be minimum to be provided or performed in every instance.
 - 2. Actual installation may comply exactly with minimum quality indicated, or it may exceed that minimum within reasonable limits.
 - 3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.
 - 4. Refer instances of uncertainty to the Engineer for a decision before proceeding.
- E. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the drawings but are not included in the specifications.
- F. The Contract Documents comprise the entire Agreement between Owner and Contractor. The Contract Documents may be modified only by Field Order or Change Order."
- SC-3.02 Make the following modifications to 3.02 *Reference Standards*.
 - A. Add a new paragraph "B" as follows:
 - "B. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract Documents where Contract Documents include more stringent requirements than the referenced standards.
 - 1. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.
 - 2. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the work except as otherwise limited by the Contract Documents. The Engineer determines whether code or standard is applicable, or which of several are applicable.
 - 3. Make copies of reference standards available as requested by Engineer or Owner."
- SC-3.03 Make the following modifications to 3.03 *Reporting and Resolving Discrepancies*.
 - A. Add the following new Subparagraph immediately after Subparagraph 3.03.A.1:

"Contractor represents that he has familiarized himself with the nature and extent of the Contract Documents, Work, location, all local conditions, and Laws and Regulations that in any manner may affect performance of the Work, and represents that he has correlated his study and observations with the requirements of the Contract Documents. Contractor also represents that he has studied all conditions referred to in the Contract Documents and will make such additional surveys and investigations as he deems necessary for the performance of the Work at the Contract price in accordance with the requirements of the Contract Documents of the requirements of the Contract Documents."

- B. Delete Paragraph 3.03.A.3 entirely and insert the following in its place:
 - 3. "In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the Bidding of the Contract,

the Contractor shall be deemed to have included the most expensive item, system, procedure, etc in his Bid."

- SC-3.05 Make the following modifications to 3.05 *Reuse of Documents*
 - A. Delete the last sentence of 3.05 B entirely and insert the following in its place:

"Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes, unless specifically prohibited in writing by the Owner for security reasons. If the Owner so directs, Contractor shall surrender all copies of the construction contract documents and other related documents, in paper or digital format and remove these documents from computer equipment or storage devices as a condition of final payment."

- SC-4.01 Make the following modifications to 4.01 Availability of Lands
 - A. Delete Paragraphs 4.01.C entirely and insert the following in its place:

"Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment. A copy of the written agreements for the use of such land shall be provided to the Owner for record purposes."

- SC-4.02 Make the following modifications to 4.02 Subsurface and Physical Conditions
 - A. Add the following new paragraphs immediately after Paragraph 4.02.B:
 - "C. The following reports of explorations and tests of subsurface conditions at or contiguous to the Site are known to Owner:
 - CMJ Engineering Inc. Geotechnical Engineering Study Report 103-18-286 48-Inch Pipeline Improvements WRF Phase 2 Wylie, Texas October 2019
 - Stone Point Services
 Cultural Resources Survey
 Project SPS 18C0623
 North Texas Municipal Water District Wylie-Rockwall-Farmersville 36"/48"
 Pipeline Improvements, Phase 2
 Collin County, Texas
 - a. None of the contents of such drawings is "technical data" on which Contractor may rely.
 - D. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:
 - 1. Project 337: Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 1
 - 2. Project CF 88-2: 36-Inch Treated Water Pipeline
 - 3. Project CF 88-3: 30-Inch Treated Water Pipeline
 - 4. Project WCF 00-11: Royse City Pipeline
 - 5. Project WCF 02-13: Wylie to Lavon Pipeline
 - 6. Wylie Rockwall Pipeline
 - 7. Bear Creek Special Utility District Improvements

- 8. TxDOT SH 205 Improvements
- 9. Cimarron Estates Phase A Offsite Sanitary Sewer
- 10. Hunter's Cove
- 11. Avalon Addition Phase 1
 - a. None of the contents of such drawings is "technical data" on which Contractor may rely.
- E. The reports and drawings identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.
- F. Copies of reports and drawings identified in SC-4.02.C and SC-4.02.D that are not included with the Bidding Documents may be examined at the Owner's and Engineer's offices during regular business hours."
- SC-4.03 Make the following modifications to 4.03 *Differing Subsurface or Physical Conditions*.
 - A. Amend paragraph 4.03 A. by deleting "promptly" and inserting "promptly but no later than within three (3) days."
- SC-4.04 Make the following modifications to 4.04 Underground Facilities.
 - A. Amend paragraph 4.03.B. by deleting "promptly" and inserting "promptly but no later than within three (3) days."
- SC-4.06 Make the following modifications to 4.06 Hazardous Environmental Conditions at Site
 - A. Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:
 - "A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner."
 - B. Delete Paragraphs 4.06.G. entirely and insert the following in its place:
 - "G. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, SUBCONTRACTORS, AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO A HAZARDOUS ENVIRONMENTAL CONDITION, PROVIDED THAT SUCH HAZARDOUS ENVIRONMENTAL CONDITION: (I) WAS NOT SHOWN OR INDICATED IN THE DRAWINGS OR SPECIFICATIONS OR IDENTIFIED IN THE CONTRACT DOCUMENTS TO BE INCLUDED WITHIN THE SCOPE OF THE WORK, AND (II) WAS NOT CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 4.06.G SHALL OBLIGATE OWNER TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE."
 - B. Delete Paragraphs 4.06.H. entirely and insert the following in its place:
 - **"H.** TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES

(INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 4.06.H SHALL OBLIGATE CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE."

- SC-5.01 Make the following modifications to 5.01 Performance, Payment and Other Bonds
 - A. Add the following to Paragraph 5.01.C."

"Failure of the Contractor to provide a satisfactory replacement bond may be considered an event of default under Article 15, Paragraph 15.02."

- SC-5.02 Make the following modifications to 5.02 *Licensed Sureties and Insurers*
 - A. Add a new paragraph "B." as follows:
 - "B. Insurance companies providing insurance required by Contract Documents shall have a minimum rating of A-VIII according to A.M. Best Company."
- SC-5.03 Make the following modifications to 5.03 Certificates of Insurance
 - A. Add the following to the end of the last sentence of Paragraph 5.03.A:

"in accordance with Paragraph 5.04 and as amended in these Supplementary Conditions."

- B. Delete Paragraph 5.03.B entirely.
- SC-5.04 The following additional information is provided as required by paragraph 5.04 *Contractor's Liability Insurance.*
 - A. Worker's Compensation and Employer's Liability Insurance required by Paragraph 5.04.A.1 and 5.04.A.2 is to provide coverage for not less than the following amounts or greater where required by Laws and Regulations.

| Workers' Compensation, etc., | | | |
|--|--|-----------|--|
| 1) | State: | Statutory | |
| 2) | Applicable Federal (e.g., Longshore) | Statutory | |
| Employers' Liability | | | |
| 1) | Bodily Injury by Accident | \$500,000 | |
| 2) | Bodily Injury by Disease - Each Employee | \$500,000 | |
| 3) | Bodily Injury by Disease - Policy Limit | \$500,000 | |
| 4) | 4) Maritime Coverage Endorsement | | |
| Insurance shall include a waiver of subrogation in favor of the Additional Insured identified in Paragraph 5.04 B.1. | | | |

B. Contractor's Liability Insurance required by Paragraph 5.04.A.3, through 5.04.A.5 is to provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

| Insurance for Claims of Damages | | | |
|--|---|--|--|
| 1) General Aggregate (Except Products - Completed Operations) | \$1,000,000 / Occurrence \$2,000,000 / Aggregate | | |
| 2) Products - Completed Operations Aggregate | \$1,000,000 / Occurrence \$2,000,000 / Aggregate | | |
| 3) Personal and Advertising Injury (One Person/Organization) | \$1,000,000 | | |
| 4) Each Occurrence (Bodily Injury and Property Damage) | \$1,000,000 | | |
| 5) Limit Per Person - Medical Expense | \$5,000 | | |
| 6) Personal Injury Liability coverage will include claims arising out of Employment Practices Liability, limited to coverage provided under standard contract. | \$1,000,000 | | |
| 7) Property Damage Liability insurance will provide explosion, collapse and underground coverage where applicable | \$1,000,000 | | |
| 8) Watercraft Liability Policy. Coverage shall apply to all self propelled vessels | \$1,000,000 | | |
| 9) Excess Liability, Umbrella Form to include coverage of Watercraft Liability. General Aggregate - Each Occurrence | \$1,000,000 | | |

Contractor's Liability Insurance shall also include completed operations and product liability coverage, and eliminate the exclusion with respect to property under the care, custody and control of Contractor. In lieu of elimination of the exclusion, Contractor may provide and maintain Installation Floater insurance for property under the care, custody, or control of Contractor. The Installation Floater insurance shall be a broad form or "All Peril" policy providing coverage for all materials, supplies, machinery, fixture, and equipment which will be incorporated into the Work. Coverage under the Contractors Installation Floater will include:

- faulty or defective workmanship, materials, maintenance or construction,
- cost to remove defective or damaged Work from the project site or to protect it from loss or damage,
- cost to cleanup and remove pollutants,
- coverage for testing and start up,
- any loss to property while in transit,
- any loss at the Project Site,
- any loss while in storage, both on-site and off-site, and

• any loss to temporary project works if their value is included in the Contract Price. Coverage cannot be contingent on an external cause or risk or limited to property for which the Contractor is legally liable. Contractor's Installation Floater will provide limits of insurance adequate to cover the value of the installation. The Contractor will be solely responsible for any deductible carried under this coverage and claims on materials, supplies, machinery, fixture, and equipment which will be incorporated into the Work while in transit or in storage. This policy will include a waiver of subrogation for those listed as additional insured in these Supplemental Conditions.

C. Contractor's Automobile Liability Insurance required by Paragraph 5.04.A.6 is to provide coverage for not less than the following amounts or greater where required by Laws and Regulations.

| Bodily Injury: | | | |
|--|-------------|--|--|
| 1) Each Person | \$1,000,000 | | |
| 2) Each Accident | \$1,000,000 | | |
| Property Damage: | | | |
| 1) Each Accident | \$1,000,000 | | |
| Or | | | |
| 2) Combined Single Limit (Bodily Injury and Property Damage) | \$1,000,000 | | |

D. Additional insured on all insurance policies in accordance with Paragraph 5.04 B.1 include:

North Texas Municipal Water District Kimley-Horn and Associates, Inc. CMJ Engineering, Inc. Brittain and Crawford, LLC Bambei Engineering Services, LLC Court House Research Specialists, Inc. Corrpro Companies, Inc. DAS, Inc. Freese and Nichols, Inc. Gorrondona & Associates, Inc. The Rios Group Stone Point Services, LLC

E. Contractor's Contractual Liability Insurance required by Paragraph 5.04.B.3 is to provide coverage for not less than the following amounts or greater where required by Laws and Regulations.

| Contractor's Contractual Liability Insurance | | | |
|--|-------------|--|--|
| 1) General Aggregate | \$1,000,000 | | |
| 2) Each Occurrence (Bodily Injury and Property Damage) | \$1,000,000 | | |

SC-5.05 Make the following modifications to 5.05 Owner's Liability Insurance

A. Delete Paragraph 5.05.A entirely and insert the following in its place:

" A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Contractor shall purchase and maintain for Owner, at no additional cost, Owner's Protective Liability insurance naming Owner as the named insured with insurance that will protect said parties against claims which may arise from operations under the Contract Documents. This coverage shall be from the same company that provides Contractor's liability insurance coverage, and in the same minimum amounts. The Engineer and Engineer's consultants are additional insured as their interest may appear including their officers, directors, agents and employees."

SC-5.06 Make the following modifications to 5.06 *Property Insurance*.

A. Delete Paragraph 5.06.A entirely and insert the following in its place; Subparagraphs 1 through 7 shall remain:

" A. Contractor shall purchase and maintain property insurance upon the work at the site in the amount of the full replacement cost thereof (subject to deductible amounts as may be provided by the Supplementary Conditions or required by Laws and regulations). The policies of insurance required to be purchased and maintained by Contractor in accordance with this Paragraph 5.06 shall comply with requirements of Paragraph 5.08. This insurance shall:"

B. Amend paragraph 5.06.A.4 by inserting the following language after the word "location" in the second line:

"and in transit for incorporation in the Work from such storage locations"

- C. Delete Paragraph 5.06.B entirely and insert the following in its place:
 - "B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of those listed as an insured or listed as an additional insured in Paragraph 5.04 B.1."
- D. Delete Paragraph 5.06.D entirely.
- E. Delete Paragraph 5.06.E entirely.
- SC-5.07 Make the following modifications to 5.07 *Waiver of Rights*.
 - A. Delete Paragraph 5.07.B entirely.
- SC-5.08 Make the following modifications to 5.08 Receipt and Application of Insurance Proceeds
 - A. Delete Paragraph 5.08 entirely.
- SC-5.11 Make the following modifications to ARTICLE 5 BONDS AND INSURANCE
 - A. Add a new paragraph "5.11" as follows:
 - "5.11 Owner's Insurance for Project
 - A. Owner shall not be responsible for purchasing and maintaining any insurance to protect the interest of the Contractor, Subcontractors, or others in the Work. The stated limits of insurance required are minimum only. Contractor shall determine the limits that are adequate. These limits may be basic policy limits or any combination of basic limits and umbrella limits. In any event, Contractor is fully responsible for all losses arising out of, resulting from or connected with operations under this contract whether or not said losses are covered by insurance. The acceptance of certificates or other evidence of insurance by the Owner, Engineer, and/or others listed as additional insured in Paragraph 5.04 B.1 that in any respect do not comply with the Contract requirements does not release the Contractor from compliance herewith."
- SC-6.01 Make the following modifications to 6.01 Supervision and Superintendence
 - A. Amend paragraph 6.01.A by inserting the following language after the word "Documents" in the last sentence:

"and properly executed by the Contractor."

SC-6.02 Make the following modifications to 6.02 *Labor; Working Hours*

- A. Delete paragraph 6.02 B. and insert the following in its place:
 - "B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, no Work shall be performed at the Site between 7:00 p.m. and 6:00 a.m. Contractor will not permit the performance of Work on a Saturday, Sunday, or any District holiday without Owner's written consent. Should Contractor desire to work on these days, he shall contact the Owner, in writing, for approval at least 48 hours in advance. Emergency work may be done without prior permission. Tie-ins and connections to existing facilities will be made at time authorized by the Owner.
- SC-6.05 Make the following modifications to 6.05 Substitutes and "Or-equals"
 - A. Delete paragraph 6.05 A. and insert the following in its place:
 - "A. Where equipment and products are specified by name, no substitutes or "or-equal" will be considered or approved unless the term "or-equal" is included in the individual Specification. If substitutes or "or equals" are specifically permitted for consideration by the individual Specifications, they must be submitted and will be reviewed and evaluated in accordance with the provisions established in Paragraph 6.05 and in the General Requirements of the Specifications."

Subparagraphs 6.05.A.1 and 6.05.A.2 remain intact.

B. Amend paragraph 6.05 C. by deleting the fourth sentence and inserting the following in its place:

"No "or-equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order or Field Order."

- C. Amend paragraph 6.05 E. by deleting the word "substitute" in all locations and replacing it with the phrase "substitute or "or-equal"".
- SC-6.06 Make the following modifications to 6.06 Concerning Subcontractors, Suppliers and Others
 - A. Amend paragraph 6.06 B. by deleting the words "Supplementary Conditions" and inserting the words "Contract Documents" it their place.
 - C. Add a new paragraph "H." as follows:
 - "H. Owner or Engineer may furnish to any such Subcontractor, Supplier, or other person or organization, to the extent practicable, information about amounts paid to Contractor in accordance with Contractor's Application for Payment on account of the particular Subcontractor's, Supplier's, other person's or other organization's Work."
- SC-6.07 Make the following modifications to 6.07 Patent Fees and Royalties
 - A. Delete Paragraphs 6.07.B. entirely and insert the following in its place:
 - "B. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, AND ITS OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE SPECIFIED IN THE CONTRACT

DOCUMENTS, BUT NOT IDENTIFIED AS BEING SUBJECT TO PAYMENT OF ANY LICENSE FEE OR ROYALTY TO OTHERS REQUIRED BY PATENT RIGHTS OR COPYRIGHTS.

- B. Delete Paragraphs 6.07.C. entirely and insert the following in its place:
 - **"C.** To the fullest extent permitted by laws and regulations, contractor shall indemnify and hold harmless owner and engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the work or resulting from the incorporation in the work of any invention, design, process, product, or device not specified in the contract documents."
- SC-6.09 Make the following modifications to 6.09 *Laws and Regulations*
 - A. Delete paragraph 6.09 B. and insert the following in its place:
 - "B. If Contractor performs any Work that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work."
 - B. Add a new paragraph "D" as follows:
 - "D. All Bidders are required to complete and submit with their Bid the Vendor Compliance to State Law form, which follows the proposal."
 - C. Add a new paragraph "E" as follows. Definitions included in this paragraph pertain only to this paragraph which is included verbatim as a statutory requirement of the State of Texas. The paragraph is to read as follows:
 - "E. Workers Compensation Statement for Building or Construction Projects for Government entities in Texas
 - A. Definitions:

Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project for the duration of the project.

Duration of the project - includes the time from the beginning of the work on the project until the Contractor's/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project ("Subcontractor" in 406.096) - includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent Contractors, Subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include

activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

- B. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.
- C. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.
- D. If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.
- E. The Contractor shall obtain from each person providing services on a project, and provide to the governmental entity:
 - a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
 - (2) no later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.
- F. The Contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.
- G. The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.
- H. The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.
- I. The Contractor shall contractually require each person with whom it contracts to provide services on a project, to:
 - provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;
 - (2) provide to the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;
 - (3) provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
 - (4) obtain from each other person with whom it contracts, and provide to the Contractor:

- (a) a certificate of coverage, prior to the other person beginning work on the project; and
- (b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
- (7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.
- J. By signing this contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the governmental entity that all employees of the Contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.
- K. The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.
- SC-6.10 Make the following modifications to 6.10 *Taxes*
 - A. Add the following to Paragraph 6.10.A."

"The Owner qualifies as an exempt agency as defined by the statutes of the State of Texas. The Contractor shall comply with all statutes and rulings of the State Comptroller."

- SC-6.11 Make the following modifications to 6.11 Use of Site and Other Areas
 - A. Delete Paragraphs 6.11.A.3 entirely and insert the following in its place:
 - **"3.** TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED BY OR BASED UPON CONTRACTOR'S PERFORMANCE OF THE WORK.

SC-6.13 Make the following modifications to 6.13 Safety and Protection.

A. Add the following to Paragraph 6.13.F."

"The Contractor's duties and responsibilities for the safety or protection of persons or the Work or property at the Site or adjacent thereto shall be reinstated when any additional efforts are required during the one year correction period to correct defects in the Work."

- SC-6.16 Make the following modifications to 6.16 *Emergencies*
 - A. Amend paragraph 6.16.A by deleting the third sentence and inserting the following in its place:

"If Engineer determines that the incident giving rise to the emergency action was not the responsibility of the Contractor and that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Change Order, Field Order or Work Change Directive will be issued."

- SC-6.17 Make the following modifications to 6.17 Shop Drawings and Samples
 - A. Delete paragraph 6.17.C.3. entirely and insert the following in its place:
 - "3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents on a Shop Drawing Deviation Request form provided by the Engineer and request that a Field Order or Change Order be issued for each of the specific variations submitted for approval. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation. "
 - B. Delete paragraph 6.17.D.3. entirely and insert the following in its place:
 - "3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation issuing a Field Order or Change Order. If the proposed modification is approved by the Engineer, the submittal will be considered to be in strict compliance with the Contract Documents and it will be reviewed in accordance with the Contract Documents. If the proposed Modification is not approved, the submittal will be returned to the Contractor with appropriate comments. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1."
 - C. Delete paragraph 6.17 E.1. entirely and insert the following in its place:
 - "1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Re-submittals shall reference and respond directly to Engineer's previous comments. Any variations from strict compliance with the Contract Documents will be identified in the same manner as required in paragraph 6.17.C.3 and will require the same approvals."
 - D. Add the following new paragraphs immediately after Paragraph 6.17.E:

- "F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than two submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor."
- SC-6.18 Make the following modifications to 6.18. *Continuing the Work*
 - A. Add the following to Paragraph 6.18.A.

"Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents."

- SC-6.20 Make the following modifications to 6.20 Indemnification
 - A. Delete paragraph 6.20.A entirely and insert the following in its place:
 - "A. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE PERFORMANCE OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, COST, LOSS, OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO INJURY TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE."
 - B. Delete paragraph 6.20.C entirely.
- SC-9.04 Make the following modifications to 9.04 *Authorized Variations in Work*
 - A. Add the following to Paragraph 9.04.A:

"The Contractor shall notify the Engineer in writing prior to beginning any Work addressed in a Field Order if the Contractor does not agree that the Work involved represents no additional cost and/or time change in the Contract Documents."

- SC-10.03 Make the following modifications to 10.03 Execution of Change Orders
 - A. Add a new paragraph "B" as follows:
 - "B. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents unless the variation is specifically approved by Change Order."
- SC-10.05 Make the following modifications to 10.05 *Claims*

- A. Amend paragraph 10.05.B. by deleting "30" and inserting "7" in its place and by deleting "60" and inserting "30" in its place.
- SC-11.01 Make the following modifications to 11.01 Cost of the Work
 - A. Amend paragraph 11.01.A by deleting the following words in the third sentence:

" those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:"

and insert the following in its place:

"those paid for the Work included in the Contract Price, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01 B. Contractor shall provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated under paragraph 11.01 B, and shall include only the following items:"

B. Amend paragraph 11.01.A.1 by deleting the following words in the second sentence:

"without limitation superintendents, foreman"

and inserting the following in its place:

"one foreman (unless agreed upon prior to beginning Work)"

C. Amend paragraph 11.01.A.1 by deleting the following words in the last sentence:

"be included in the above"

and inserting the following in its place:

"not exceed 1.5 times regular pay and shall be included in the above"

- D. Amend paragraph 11.01.B.1 by adding "superintendents" to the list of excluded personnel in the first sentence:
- E. Amend paragraph 11.01.D by inserting "and at intervals" in the last sentence as shown below:

"..... and submit in a form and at intervals acceptable to Engineer ..."

- SC-11.03 Make the following modifications to 11.03 Unit Price Work
 - A. Delete paragraph 11.03.D entirely and insert the following in its place:
 - "D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
 - If the total cost of a particular item of Unit Price Work amounts to twenty percent (20%) or more of the total Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than twenty percent (20%) from the estimated quantity of such item indicated in the Agreement; and
 - 2. if there is no corresponding adjustment with respect to any other item of Work; and

- 3. if Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the Unit Price, either the Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the effect of any such variation in the quantity of the Unit Price Work performed."
- SC-12.03 Make the following modifications to 12.03 *Delays*
 - A. Add the following to Paragraph 12.03.A.

"No time extensions will be allowed for weather conditions for Projects using calendar days for the Contract Time."

- SC-12.04 Make the following modifications to ARTICLE 12 CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIME
 - A. Add a new paragraph "12.04" as follows:
 - "12.04 No Damage for Delays
 - A. The Contractor agrees to make no claims for damage for delay in the performance of the Contract occasioned by any act or omission to act of the Owner, Engineer, or any of the Engineer's or Owner's agents, and agrees that any such claim shall be fully compensated by an extension of time, as set forth in a Change Order, to complete performance of the work as provided herein."
- SC-13.03 Make the following modifications to 13.03 *Tests and Inspections*
 - A. Delete paragraph 13.03 B entirely and insert the following in its place:
 - "B. Employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents. The Contractor is solely responsible for maintaining that the quality of work is in accordance with the Contract Documents. The Contractor shall be responsible for the notification and scheduling required assuring that a certified technician from the testing laboratory is present during all sampling and testing procedures required in the Contract Documents. The Contractor shall not proceed with construction work requiring such testing without the presence of the laboratory's certified technician. The Owner, at his option, may perform additional tests as quality monitoring. Quality monitoring activities of the Owner and Engineer, or failure on the part of the Owner or Engineer to perform tests on constructed works, in no way relieves the Contractor of the obligation to perform work and furnish materials conforming to the Contract Documents.
 - 1 Contractor's Responsibilities
 - a. Control the quality of work produced and verify that the work performed meets the standards of quality established in the Contract Documents.
 - 1. Inspect and verify conformance of all materials furnished and work performed, whether by the Contractor, its subcontractors or its suppliers.
 - 2. Provide and pay for the services of a testing laboratory approved by Owner to insure that products proposed for use fully comply with the Contract Documents.
 - 3. Perform tests as indicated in this and other sections of the specifications. Schedule the time and sequence of testing with the Owner and Engineer. Testing is to be observed by the Owner, Engineer, or designated representative.

- 4. Promptly replace any defective materials and/or construction work incorporating defective materials or workmanship.
- 5. Provide Certified Test Reports as required by the SUBMITTALS section. Reports are to indicate that materials and construction are in compliance with the Contract Documents.
- b. Assist the Engineer, Owner, and Owner's testing organization to perform quality monitoring activities.
- 2. Quality Monitoring Activities by the Owner
 - a. Quality Monitoring activities of the Owner and Engineer through their own forces or through contracts with materials testing laboratories and survey crews are for the Owner's use in monitoring the results of the Contractor's work and quality control activities, if deemed necessary by the Owner and Engineer. The Quality Monitoring activities of the Owner do not relieve the Contractor of its responsibility to provide testing in accordance with the requirements of the Contract Documents or to provide materials and construction work complying with the Contract Documents.
- 3. Submittals
 - a. Submittals shall be accordance with the SUBMITTALS section, and shall include:
 - The name of the proposed primary and secondary testing laboratories along with documentation of qualifications, a list of tests that can be performed, and a list of the certified laboratory technicians and the licensed engineers who will be performing the sampling and testing for the Construction Work along with their certifications and licenses.
 - 2. Test reports per Paragraph 7, TEST REPORTS of this supplementary condition.
- 4. Standards
 - Provide a testing laboratory that complies with the ASTM (American Society of Testing Materials) and/or ACIL (American Council of Independent Laboratories) "Recommended Requirements for Independent Laboratory Qualifications", or other specified testing organizations.
 - b. Perform tests listed in the specifications.
- 5. Delivery and Storage

Handle and protect test specimens of products and construction materials at the construction site in accordance with ASTM or other applicable testing procedures.

- 6. Verification Testing
 - a. Provide verification testing when tests performed by the Owner indicate that materials or the results of construction activities are not in conformance with Contract Documents.
 - Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made.
 - c. Tests must comply with recognized methods or with methods recommended by the Owner's testing laboratory and approved by the Engineer.

- 7. Test Reports
 - A. Test reports are to be prepared for all tests.
 - 1. Tests performed by testing laboratories may be submitted on their standard test report forms. These reports must include the following:
 - a. Name of the Owner, project title and number, equipment installer and general contractor.
 - b. Name of the laboratory, address, and telephone number.
 - c. Name and signature of the certified laboratory personnel performing the sampling and testing.
 - d. Date and time of sampling, inspection, and testing.
 - c. Date the report was issued.
 - d. Description of the test performed.
 - e. Weather conditions and temperature at time of test or sampling.
 - f. Location at the site or structure where the test was taken.
 - g. Standard or test procedure used in making the test.
 - h. A description of the results of the test.
 - i. Statement of compliance or non-compliance with Contract Documents.
 - j. Interpretations of test results, if appropriate.
 - B Distribute copies of the test reports to:

| Owner | 2 copies |
|---------------------------------|----------|
| Resident Project Representative | 1 copy |
| Engineer | 1 copy |
| Contractor | 1 copy |

- 8. Non-Conforming Work
 - a. Contractor shall promptly correct any work that is not in compliance with the Contract Documents and shall immediately notify the Owner when the corrective work will be performed.
 - b. Payment for non-conforming work shall be withheld until such work is corrected or replaced with work complying with the Contract Documents.
- SC-13.07 Make the following modifications to 13.07 Correction Period
 - A. Amend paragraph 13.07.A by adding:

"When early acceptance of a Substantially Completed portion of the Work is accomplished in the manner indicated, the correction period for that portion of the Work shall commence at the time of substantial completion of that Work."

- SC-14.02 Make the following modifications to 14.02 Progress Payments
 - A. Amend paragraph 14.02.A.1 by deleting "At least 20 days before the date established in the agreement for each progress payment (but no more than once a month)" and inserting "On the first Work Day following the 25th day of the month" in its place.
 - B. Amend paragraph 14.02 C.1. by deleting "Ten" and inserting "Thirty" in its place.
 - C. Amend paragraph 14.02.D.1. by deleting "or" in paragraph 14.02.D.1.c. and adding new paragraphs "e", "f", "g", and "h" as follows:

- "e. Owner has been notified of failure to make payments to Subcontractors or Suppliers or for labor, or
- f. failure to submit up-to-date record documents as required by GC-6.12, or
- g. failure to submit monthly progress schedule updates or revised schedules as requested by the Owner or Engineer, or
- h. failure to provide Project photographs required by Specifications."
- D. Amend paragraph 14.02.D.2. by adding "to Owner's satisfaction."
- E. Amend paragraph 14.02.D.3 by deleting "and subject to interest as provided in the Agreement."
- F. Add a new paragraph "14.04.D.4" as follows:
 - "4. Owner may permanently withhold payment from Contract Price for
 - a. liquidated damages incurred by Contractor, or
 - b. compensation for Engineer for third review of submittals, review of substitutions, reinspection fees, inspections or designs related to correction of defective Work, or other Services identified as requiring payment by the Contractor. Compensation will be based on the following rates:

| Position | Hourly Rate | |
|--|-------------|--|
| Principal in Charge | \$280 | |
| Project Manager | \$210 | |
| Project Engineer | \$150 | |
| Design Engineer | \$120 | |
| Engineering Technician | \$110 | |
| Clerk | \$95 | |
| Expenses will be billed at the actual cost multiplied by 1.15. | | |

- c. Costs for tests performed by the Owner to verify that work previously tested and found to be defective has been corrected. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made."
- SC-15.02 Make the following modifications to 15.02 Owner May Terminate for Cause
 - A. Add a new paragraph "A.5" as follows:
 - "5. If Contractor fails to provide the replacement bond required by General Conditions, Section 5.01.C or insurance coverage as required by General Conditions Article 5 and as amended by Supplemental Conditions."
 - B. Add a new paragraph "A.6" as follows:
 - "6. If any petition of bankruptcy is filed by or against Contractor, or if Contractor is adjudged as bankrupt or insolvent or makes a general assignment for the benefit of

creditors, or if a receiver is appointed for the benefit of Contractor's creditors, or if a receiver is appointed on account of Contractor's insolvency, upon the occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions hereof. Failure to comply with such request within seven (7) days of delivery of the request shall entitle Owner to terminate this agreement and to the accompanying rights set forth in Paragraphs 15.02 and 15.03 hereof. In all events pending receipt of adequate assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the Work with its own forces or with other Contractors on a time and material or other appropriate basis. The cost of work by Owner or other Contractors will be back charged against the Contract Sum hereof."

- C. Delete paragraph 15.02.F. entirely.
- SC-15.04 Make the following modifications to 15.04 Contractor May Stop Work or Terminate
 - A. Add a new paragraph "C" as follows:
 - "C. This Contract may not be assigned in whole or in part by the Contractor without the previous written consent of the Owner."
- SC-16.01 Make the following modifications to 16.01 Methods and Procedures
 - A. Delete paragraph 16.01 entirely and insert the following in its place:
 - "16.01 *Methods and Procedures*
 - A. Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law."
- SC-17.02 Make the following modification to 17.02 Computation of Times
 - A. Add a new paragraph "B" as follows:
 - "B. All references and conditions for a "calendar day contract" in the General Conditions and Supplementary Conditions shall apply for a "Fixed Date Contract." A "Fixed Date Contract" is one in which the calendar dates for reaching substantial completion and/or final completion are specified in lieu of identifying the actual calendar days involved.

END OF SECTION

01 11 00 SUMMARY OF WORK

1.00 GENERAL

1.01 WORK INCLUDED

- A. Construct work as described in the Contract Documents.
 - 1. Provide the materials, equipment, and incidentals required to make the project completely operable.
 - 2. Provide the labor, equipment, tools, and consumable supplies required for a complete project.
 - 3. Provide the civil, architectural, structural, mechanical, electrical, instrumentation and all other work required for a complete and operable project.
 - 4. Test and place the completed project in operation.
 - 5. Provide the special tools, spare parts, lubricants, supplies, or other materials as indicated in Contract Documents for the operation and maintenance of the Project.
 - 6. Install Owner provided products and place in operation.
 - 7. Drawings and specifications do not indicate or describe all of the work required to complete the project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer.

1.02 JOB CONDITIONS

- A. The General Conditions, the Supplementary Conditions, and General Requirements apply to each specification sections.
- B. Comply with all applicable state and local codes and regulations pertaining to the nature and character of the work being performed.

1.03 DESCRIPTION OF WORK

- A. Work is described in general, non-inclusive terms as:
 - Furnishing all labor, materials, and equipment, and performing all work necessary for the construction of approximately 20,130 linear feet of 48-inch water line, 650 linear feet of tunnel with 66-inch I.D. tunnel liner plate, and all associated water line appurtenances. The 48-inch water line generally parallels an existing Oncor transmission line beginning at the intersection of Kreymer Lane and Brown Street and terminating at County Road 484.

1.04 WORK UNDER OTHER CONTRACTS

- A. The following items of work are not included in this contract, but may impact construction scheduling, testing, and start up:
 - 1. Project 521: Wylie to Rockwall Pipeline Relocation
 - 2. TXDOT SH 205 Widening
 - 3. Bear Creek SUD Pump Station #2 Improvements
 - 4. Bear Creek SUD SH-205 Utility Relocations

In the case of a disagreement between the above list and those specified elsewhere in the Contract Documents, the Contractor is to base his bid on the most expensive listing.

B. Completion of the work described in this contract may impact the construction and testing of the items listed above.

1.05 WORK BY OWNER

- A. The Owner plans to perform the following items of work which are not included in this contract, but may impact construction scheduling, testing, and start up:
 - 1. None
- B. Completion of the work described in this contract may impact the construction and testing of the items listed above.
 - 1. Coordinate construction activities through the Owner.
 - 2. Pay claims for damages which result from the late completion of the project or any specified milestones.
- C. Owner will provide normal operation and maintenance of the existing facilities during construction, unless otherwise stated.

1.06 OWNER-SELECTED PRODUCTS

A. Owner will not select the Suppliers for any products:

1.07 OWNER-PROVIDED PRODUCTS

A. Owner will not purchase or provide to the Contractor for installation any products:

1.08 CONSTRUCTION OF UTILITIES

- A. Existing utilities will be used for this project. Coordinate with others performing work connected to this project.
- B. Power and Electrical Services
 - 1. If temporary power is required, Contractor shall pay for temporary power, including but not limited to construction cost, meter connection, fees and permits.
- C. Telephone Services
 - 1. Permanent telephone service is not required on this project.

1.09 OCCUPANCY

- A. As soon as any portion of the structure and equipment are ready for use, the Owner shall have the right to operate the portion upon written notice to the Contractor.
- B. Testing of equipment and appurtenances including specified test periods, training, and start-up does not constitute acceptance for operation.
- C. Owner may accept the facility for continued use after start-up and testing at the option of the Owner. If acceptance is delayed at the option of the Owner, shut down facilities per approved Operation and Maintenance procedures.
- D. The execution of bonds is understood to indicate the consent of the surety to these provisions.
- E. Provide an endorsement from the insurance carrier permitting occupancy of the structures and use of equipment during the remaining period of construction.
- F. Conduct operations to insure the least inconvenience to the Owner and general public.

2.00 PRODUCTS

2.01 MATERIALS

Provide materials and products per the individual sections of the specifications.

END OF SECTION

01 23 10 ALTERNATES AND ALLOWANCES

1.0 GENERAL

1.1 REQUIREMENTS

- A. Alternates:
 - 1. This Section describes each alternate by number and describes the basic changes to be incorporated into the Work when this alternate is made a part of the Work in the Agreement.
 - 2. Drawings and Specifications will outline the extent of Work to be included in the alternate Contract Price.
 - 3. Coordinate related Work and modify surrounding Work as required to properly integrate the Work under each alternate, and provide a complete and functional system as required by the Contract Documents.
 - 4. Alternates will be accepted or rejected at the option of the Owner.
 - 5. Owner has 120 days from the date of the Notice of Award (or effective Date of Agreement) to elect to modify the Contract Documents by Change Order to add Alternate items at the cost indicated in Section 00 42 23.01 BID FORM EXHIBIT A.
- B. Allowances:
 - 1. Include specified allowance amount in Contract Price.
 - 2. The amount of each allowance includes:
 - a. The cost of the product to the Contractor less any applicable trade discounts.
 - b. Delivery to the Site.
 - c. Applicable taxes.
 - 3. Include in the Contract Price all costs for:
 - a. Handling at the Site, including unloading, uncrating, and storage per Section 01 31 00 PROJECT MANAGEMENT.
 - b. Cost for labor and equipment for installation and finishing.
 - c. Cost for related products not specifically listed in the allowance but required for installation, including consumable supplies and materials.
 - d. All overhead, profit, and related costs.
 - 4. Assist Owner in the selection of products.
 - a. Determine qualified Suppliers.
 - b. Obtain proposals from qualified Suppliers.
 - c. Present available alternates to the Owner through the Engineer. Notify Engineer of:1). Any objections to a particular Supplier or product.
 - 2). Effect on the Construction Schedule anticipated by the selection of each option.
 - 3). Cost of each option.
 - 5. Upon selection of the product:
 - a. Purchase and install the product.
 - b. Contractor's responsibilities for products shall be the same as for products selected by the Contractor.
 - Submit a Contract Modification Request per Section 01 31 13 PROJECT COORDINATION to adjust Contract Price if the net cost of the product is more or less than the specified amount.
 - a. For products specified as Unit Price Work, the unit cost shall apply to the quantities installed per the method of payment described in Section 01 29 00 PAYMENT PROCEDURES.
 - b. Do not perform Work until selection of alternate has been approved in writing by the Owner.
 - c. Provide actual invoices for the materials.

- 1.2 SUBMITTALS
 - A. Provide submittals for materials furnished as part of the alternate in accordance with Section 01 33 00 SUBMITTALS.
- 1.3 DESCRIPTION OF ALTERNATES
 - 1. No alternates are included in the Project.
- 1.4 DESCRIPTION OF ALLOWANCES
 - A. Permitting Fees
 - 1. This bid item shall be an allowance for costs associated with city and county fees including permit and inspection fees.
- 1.5 GUARANTEES
 - A. Provide guarantees for products furnished under alternate bids / proposals or purchased by allowances as required by the Contract Documents.
- 2.00 PRODUCTS (NOT APPLICABLE)
- 3.00 EXECUTION (NOT APPLICABLE)

END OFSECTION

01 29 00 PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Payments for Work shall conform to the provisions of the General Conditions, the Supplementary Conditions, the Agreement, and this Section.
- B. Submit Applications for Payment at the prices indicated in the Agreement
 - 1. Prices for each item in the Agreement shall include but not be limited to cost for:
 - a. Mobilization, demobilization, cleanup, bonds, and insurance,
 - b. Professional services including but not limited to engineering and legal fees,
 - c. The products to be permanently incorporated into the project,
 - d. The products consumed during the construction of the project,
 - e. The labor and supervision to complete the project,
 - f. The equipment, including tools, machinery, and appliances required to complete the project,
 - g. The field and home office administration and overhead costs related directly or indirectly to the project, and
 - h. Any and all kinds, amount or class of excavation, backfilling, pumping or drainage, sheeting, shoring and bracing, disposal of any and all surplus materials, permanent protection of all overhead, surface or underground structures; removal and replacement of any poles, conduits, pipelines, fences, appurtenances and connections, cleaning up, overhead expense, bond, public liability and compensation and property damage insurance, patent fees, and royalties, risk due to the elements, and profits, unless otherwise specified.
 - 2. Provide work not specifically set forth as an individual payment item but required to provide a complete and functional system. These items are a subsidiary obligation of the Contractor and are to be included in the Contract Price.
 - 3. Payment will be made for materials on hand.
 - a. Store materials properly on site per Section 01 31 00, PROJECT MANAGEMENT.
 - 1) Payment will be made for the invoice amount less the specified retainage.
 - 2) Provide invoices at the time materials are included on the materials-on-hand tabulation.
 - b. Provide documentation of payment for materials-on-hand with the next payment request. Adjust payment to the amount actually paid if this differs from the invoice amount. Remove items from the materials on hand tabulation if this documentation is not provided so payment will not be made.
 - c. Payment for materials-on-hand is provided for the convenience of the Contractor and does not constitute acceptance of the product.
 - 4. The work covered by progress payments becomes the property of the Owner at the time of payment.

1.2 SCHEDULE OF VALUES AND PAYMENTS

- A. Submit a detailed Schedule of Values to the Engineer and Owner for review and approval for the Work to be performed on the project.
 - 1. Submit schedule within 10 days prior to submitting the first Application for Payment.
 - Line items in the Bid Form Exhibit A are to be used as line items in the schedule. Contractor shall provide sub-items under each lump sum line item, as required, to provide a more detailed breakdown of the costs associated with each lump sum item.
 - 3. Payment will be made on the quantity of Work completed per Contract Documents during the payment period and as measured per this Section.
 - a. Payment amount is the Work quantity measured multiplied by the unit prices for that line item in the Bid Form Exhibit A.

- b. Payment on a unit price basis will not be made for work outside finished dimensions shown in the Contract Documents.
- c. Partial payments will be made for lump sum line items in the Bid Form Exhibit A.
 - 1) Lump sum line items in the Bid Form Exhibit A are to be divided into smaller unit prices to allow more accurate determination of the percentage of the item that has been completed.
 - a) Provide adequate detail to allow more accurate determination of the percentage of work completed for each item.
 - b) Provide prices for items that do not exceed \$50,000.00. An exception may be made for equipment packages that cannot be subdivided into units or subassemblies.
 - c) Separate product costs and installation costs.
 - 1. Product costs include cost for product, delivery and unloading costs, royalties and patent fees, taxes, and other cost paid directly to the Subcontractor or Supplier.
 - 2. Installation costs include cost for the supervision, labor and equipment for field fabrication, erection, installation, start-up, initial operation and Contractor's overhead and profit.
 - d) Lump sum items may be divided into an estimated number of units.
 - 1. The estimated number of units times the cost per unit must equal the lump sum amount for that line item.
 - 2. Contractor will receive payment for all of the lump sum line item.
 - e) Include a directly proportional amount of Contractor's overhead and profit for each line item.
 - f) Divide principal subcontract amounts into an adequate number of line items to allow determination of the percentage of work completed for each item.
 - 2) These line items may be used to establish the value of work to be added or deleted from the project.
 - 3) Correlate line items with other administrative schedules and forms:
 - a) Progress schedule,
 - b) List of Subcontractors,
 - c) Schedule of allowances,
 - d) Schedule of alternatives,
 - e) List of products and principal Suppliers, and
 - f) Schedule of Submittals
 - 4) Costs for mobilization shall be listed as a separate line item and shall be actual cost for:
 - a) Bonds and insurance,
 - b) Transportation and setup for equipment,
 - c) Transportation and/or erection of all field offices, sheds and storage facilities,
 - d) Salaries for preparation of submittals required before the first Application for Payment,
 - e) Salaries for field personnel assigned to the project related to the mobilization of the project,

Mobilization may not exceed 3 percent of the total contract amount. Cost for mobilization may be submitted only for work completed

- 5) The sum of all values listed in the schedule must equal the total contract amount.
- 4. Submit a schedule indicating the anticipated schedule of payments to be made by the Owner. Schedule shall indicate:
 - a. The Application for Payment number,
 - b. Date the request is to be submitted, and
 - c. Anticipated amount of payment to be requested.
- 5. Update the Schedule of Values quarterly or more often if necessary to provide a reasonably accurate indication of the funds that the Owner will need to have available to make payment to the Contractor for the Work performed.

B. Provide written approval of the Schedule of Values, Application for Payment form, and method of payment by the Surety Company providing performance, and payment bonds prior to submitting the first Application for Payment. Payment will not be made without this approval.

1.3 PAYMENT PROCEDURES

- A. Submit Applications for Payment per the procedures indicated in Section 01 33 00, SUBMITTALS. Submit a Schedule of Values in the Application for Payment format to be used.
- B. Applications for Payment may be submitted on a pre-printed form or may be generated by computer. Computer generated payment requests must have the same format and information indicated in the pre-printed form and be approved by the Engineer.
 - a. Indicate the total contract amount and the work completed to date on the Tabulation of Values for Original Contract Performed (Attachment "A".)
 - b. Include only approved Change Order items in the Tabulation of Extra Work on Approved Change Orders (Attachment "B".)
 - c. List all materials on hand that are presented for payment on the Tabulation of Materials on Hand (Attachment "C".) Once an item has been entered on the tabulation it is not to be removed.
 - d. Include the Project Summary Report (Attachment "D") with each Application for Payment. Data included in the Project Summary Report are to be taken from the other tabulations. Include a completed summary as indicated in with each Applications for Payment submitted.
 - 1) Number each application sequentially and indicate the payment period.
 - 2) Show the total amounts for value of original contract performed, extra work on approved Change Orders, and materials on hand on the Project Summary Report. Show total amounts that correspond to totals indicated on the attached tabulation for each.
 - 3) Note the number of pages in tabulations in the blank space on the Project Summary Report to allow a determination that all sheets have been submitted.
 - 4) Execute Contractor's certification by the Contractor's agent of authority and notarize for each Application for Payment.
 - 5. Do not alter the schedule of values and the form for the submission of requests without the written approval of the Engineer once these have been approved by the Engineer.
 - 6. Final payment requires additional procedures and documentation per Section 01 70 00, EXECUTION AND CLOSEOUT REQUIREMENTS.
- C. Progress payments shall be made as the work progresses on a monthly basis.
 - 1. End the payment period on the day indicated in the Agreement and submit an Application for Payment for Work completed and materials received since the end of the last payment period.
 - 2. At the end of the payment period, submit a draft copy of the Application for Payment for that month to the Engineer. Agreement is to be reached on:
 - a) The percentage of work completed for each lump sum item,
 - b) The quantity of work completed for each unit price item,
 - c) The percentage of work completed for each approved Change Order item, and
 - d) The amount of materials on hand.
 - 3. On the basis of these agreements, the Contractor is to prepare a final copy of the Application for Payment and submit it to the Engineer for approval.
 - 4. The Engineer will review the payment request and if appropriate will recommend payment of the request to the Owner.
- D. Provide a revised and up-to-date progress schedule per Section 01 32 16 CONSTRUCTION PROGRESS SCHEDULES with each Application for Payment.
- E. Provide project photographs per Section 01 32 33, PHOTOGRAPHIC DOCUMENTATION with each Application for Payment.

1.4 ALTERNATES AND ALLOWANCES [NOT USED]

1.5 MEASUREMENT PROCEDURES

A. Measure the Work described in the Agreement for payment. Payment will be made only for the actual measured and/or computed length, area, solid contents, number and weight, unless otherwise specifically provided. No extra or customary measurements of any kind will be allowed.

1.6 BASIS OF PAYMENT

A. Base Bid – Description of Base Bid Items

Item 1 – Mobilization, Bonds, and Insurance

The Work under this item shall include the establishment of offices and other facilities on the Site and the movement of personnel, construction equipment and supplies to the Site or to the vicinity of the Site in order to enable the Contractor to begin the Work. The cost of all bonds and insurance for the Project will also be considered part of this specification.

Mobilization will be measured as a lump sum item as the Work progresses. Partial payments for mobilization shall be paid for at the Total Unit Price as shown in the Proposal with the regular monthly estimates as follows: The adjusted contract amount for construction items as used below is defined as the total contract amount less the lump sum bid for Mobilization, Bonds, and Insurance.

- a. When 1% and less than 5% of the adjusted contract amount for construction items is completed, 50% of the mobilization lump sum bid will be paid.
- b. When 5% and less than 10% of the adjusted contract amount for construction items is completed, 75% of the mobilization lump sum bid will be paid. Previous payments under this section will be deducted from this amount.
- c. When 10% or more of the adjusted contract amount for construction items is completed, 95% of the mobilization lump sum bid will be paid. Previous payments under this section will be deducted from this amount.
- d. Payment for the remainder of the lump sum bid for "Mobilization, Bond and Insurance" will be made on the final estimate.

Item 2, 3 – 30", 36" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe (Install by Open Cut)

The bid price for this item shall include site preparation; furnishing, hauling and laying of water line and fittings; joint restraint; water line markers; coating; lining; bolts and nuts; trench excavation, backfilling and embedment material as specified; removal and disposal of excavated concrete, flex base, and HMAC; removal and disposal of existing water line as required; replacement of topsoil; protecting existing structures or utilities (where applicable); disposal of surplus materials and excess excavation; clean-up and maintenance; sign replacement, surveying and replacement of monuments; property restoration; removal of mud from roadways; maintaining access to existing residences; and any incidental work and materials not otherwise provided for in these specifications, all in accordance with embedment details and Sections 31 23 33 and 33 11 13.

The water line will be measured and paid for by linear foot. Measurement for payment purposes will be done horizontally from the center of the fitting to the center of the fitting, or end of water line without deduction for intermediate fittings.

Payment will be made at the applicable unit price bid in Section 00 42 23.01 as it corresponds in size to the constructed facility. Payment for water line shall include any and all extra precautions or construction requirements necessary to adequately protect and support existing utilities. Payment for water line shall include all costs required to have utility companies, or other parties, repair any damage inflicted to their lines by the Contractor and any cleanup, property damages, fines, etc.

resulting from damage inflicted to any utility line by the Contractor. The Contractor is responsible for any damage to existing fences.

Item 4, 5 – 42", 48" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe or AWWA C-200 Steel Water Line (Install by Open Cut)

The bid price for this item shall include site preparation; furnishing, hauling and laying of water line and fittings; joint restraint; water line markers; coating; lining; bolts and nuts; trench excavation, backfilling and embedment material as specified; removal and disposal of excavated concrete, flex base, and HMAC; replacement of topsoil; removal and disposal of existing water line; protecting existing structures or utilities (where applicable); disposal of surplus materials and excess excavation; clean-up and maintenance; sign replacement, surveying and replacement of monuments; property restoration; removal of mud from roadways; maintaining access to existing residences; and any incidental work and materials not otherwise provided for in these specifications, all in accordance with embedment details and Sections 31 23 33, 33 11 13 and 33 11 14.

The water line will be measured and paid for by linear foot. Measurement for payment purposes will be done horizontally from the center of the fitting to the center of the fitting, or end of water line without deduction for intermediate fittings.

Payment will be made at the applicable unit price bid in Section 00 42 23.01 as it corresponds in size to the constructed facility. Payment for water line shall include any and all extra precautions or construction requirements necessary to adequately protect and support existing utilities. Payment for water line shall include all costs required to have utility companies, or other parties, repair any damage inflicted to their lines by the Contractor and any cleanup, property damages, fines, etc. resulting from damage inflicted to any utility line by the Contractor. The Contractor is responsible for any damage to existing fences.

<u>Item 6 – 48" AWWA C-303 Bar Wrapped Concrete Cylinder Pipe with Mortar Bands or AWWA C-200 Welded Steel Water Line with Stainless Steel Casing Spacers/Mortar Bands</u>

The bid price for this item shall include site preparation; furnishing, hauling and laying of water line inside the tunnel liner plate with mortar bands; casing spacers; cellular grouting; joint restraint; end seals; disposal of excess material; clean-up; and all other incidental work, in strict accordance with Detail 1/D6 and Section 33 05 24.

The water line will be measured and paid for by linear foot. Measurement for payment purposes will be done horizontally from the beginning of casing pipe to the end of the casing pipe.

Payment will be made at the applicable unit price bid in Section 00 42 23.01 as it corresponds in size to the constructed facility. Payment for water line shall include any and all extra precautions or construction requirements necessary to adequately protect and support existing utilities. Payment for water line shall include all costs required to have utility companies, or other parties, repair any damage inflicted to their lines by the Contractor and any cleanup, property damages, fines, etc. resulting from damage inflicted to any utility line by the Contractor. The Contractor is responsible for any damage to existing fences.

Item 7 - Tunnel and 66" I.D. Tunnel Liner Plate

Installation of tunnel with steel tunnel liner plate will be measured and paid for by the linear foot horizontally along the pipe centerline, in place, and shall include all equipment; steel tunnel liner plate; launching shaft; receiving shaft; pavement removal; excavation; hauling; dewatering; settlement monitoring; disposal of surplus or unsuitable materials; contact grouting; furnishing, placement, and compaction of backfill including CLSM; clean-up; and all other incidental work, in accordance with Detail 1/D6 and Sections 33 05 21 and 33 05 23.

Support and protection of existing utilities will not be measured or paid for separately and shall be included in this bid item.

The carrier pipe is not included in this bid item.

Item 8 – Post Construction CCTV 48" Water Line Installation

This item shall consist of furnishing all the labor, materials, tools and equipment to perform a television inspection on the entire length of the pipe post-construction in accordance with Section 33 01 31. Payment will be on a per linear foot basis.

Item 9 – Locate Existing Water Line

This item shall consist of furnishing all the labor, materials, tools and equipment necessary to locate an existing water line and confirm pipe material. The bid price shall include all excavation and disposal of excavated soil, pavement and concrete; grade survey; furnishing, placing and compaction of backfill; property restoration; pavement repair, clean-up; and any incidental work and materials not otherwise provided for in these specifications. A water line locate will be required at every connection location as well as any other locations identified in the plans. Measurement for payment for this item shall be per each locate.

Item 10 - Connect to Existing 36" WRF Phase 1 Water Line (337)

This item shall consist of furnishing all the labor, materials, tools and equipment necessary to connect the proposed water line to an existing C-303 water line. The bid price shall include all excavation and disposal of excavated soil, pavement and concrete; dewatering; furnishing, hauling, and laying of pipe fittings; thrust restraint on proposed and existing water line; protection of existing structures and utilities; property restoration including any additional pavement or landscaping repair required to weld joints on existing water lines; coordination and notification; remobilization; temporary lighting; make-up pieces; clean-up; and any incidental work and materials not otherwise provided for in these specifications. All the work associated with the connection due to location shall be included in the bid price. Measurement for payment for this item shall be per each connection.

Item 11 - Connect to Existing 30" Treated Water Pipeline (CF 88-3)

This item shall consist of furnishing all the labor, materials, tools and equipment necessary to cut and connect the proposed water line to an existing C-303 water line. The bid price shall include all excavation and disposal of excavated soil, pavement and concrete; dewatering; furnishing, hauling, and laying of pipe fittings; thrust restraint on existing water line; protection of existing structures and utilities; property restoration including any additional pavement or landscaping repair required to weld joints on existing water lines; coordination and notification; remobilization; temporary lighting; make-up pieces; clean-up; and any incidental work and materials not otherwise provided for in these specifications. All the work associated with the connection due to location shall be included in the bid price. Measurement for payment for this item shall be per each connection.

Item 12 – Connect to Existing 36" Royse City Pipeline (WCF 00-11)

This item shall consist of furnishing all the labor, materials, tools and equipment necessary to cut and connect the proposed water line to an existing C-303 water line. The bid price shall include all excavation and disposal of excavated soil, pavement and concrete; dewatering; furnishing, hauling, and laying of pipe fittings; thrust restraint on proposed and existing water line; protection of existing structures and utilities; property restoration including any additional pavement or landscaping repair required to weld joints on existing water lines; coordination and notification; remobilization; temporary lighting; make-up pieces; clean-up; and any incidental work and materials not otherwise provided for in these specifications. All the work associated with the connection due to location shall be included in the bid price. Measurement for payment for this item shall be per each connection.

Item 13,14,15,16 - 48", 42", 36", 30" Butterfly Valve and Vault

The bid price for butterfly valves should include connections as noted on the plans, petrolatum tape system, extension bonnet, concrete manhole and other associated concrete structures, fabricated manhole cover, and all other items described in Detail 1/D4 in accordance with Section 33 12 21. The cost of the valve markers shall be included in the unit price for the butterfly valve bid item. The Contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. Butterfly valves shall be measured and paid for per each, grouped by size.

Item 17 - 30" Butterfly Valve

The bid price for butterfly valves should include connections as noted on the plans, petrolatum tape system, concrete cradle, valve box, concrete pad, and all other items described in Detail 3/D4 in accordance with Section 33 12 21. The cost of the valve markers shall be included in the unit price for the butterfly valve bid item. The Contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. Butterfly valves shall be measured and paid for per each, grouped by size.

Item 18,19 - 4", 8" Combination Air Release / Vacuum Valve and Vault

Air Release/Vacuum valves shall be measured and paid for per each, grouped by size. The bid price for air release/vacuum valves should include mechanical restraint, connections as noted on the plans, piping, fittings, polywrap, gate valve with miter gearing, concrete manhole and other associated concrete structures, fabricated manhole cover, and all other items described in Detail 2/D3 and Section 33 12 18. Piping shall be ductile iron special thickness class 53. The cost of the valve markers shall be included in the unit price for the air release/vacuum valve bid item. The contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work.

Item 20,21 - 8", 12" Blowoff Valve and Vault

The bid price for blow off valves should include mechanical restraint, connections as noted on the plans, piping, fittings, polywrap, gate valve with miter gearing, concrete manhole and other associated concrete structures, fabricated manhole cover, splash pad and all other items described in Detail 1/D3. Piping shall be ductile iron special thickness class 53. The cost of the valve markers shall be included in the unit price for the blow off valve bid item. The contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. Blow off valves shall be measured and paid for per each, grouped by size.

Item 22 - 36" Manway and Vault

This item consists of furnishing and placing the manway and vault and includes fabricated manhole cover, precast concrete manhole, concrete base, grout, and all incidental work required to construct manway and vault in accordance with Detail 4/D5. Payment for this item shall be per each manway and vault, complete in place.

Item 23 - Bollards

This item shall include all labor, materials, tools and equipment to install the bollards shown on Sheets W15. Work shall include all work associated with bollard installation, including but not limited to delivery, excavation, installation of the bollard, concrete backfill and concrete fill inside the bollard, and painting.

Measurement and payment shall be on a per each basis.

Item 24 - Seeding

This item shall consist of the work, labor and materials necessary for revegetation in areas disturbed by construction. The Contractor shall revegetate unpaved areas disturbed by construction prior to acceptance of the project. Revegetation shall consist of seed sowing, straw mulching, fertilizing, and watering. All revegetation shall be installed as shown on the plans in accordance with Sections 32 92 19. This item will be measured and paid for per linear foot of open cut water line installed.

Item 25 – Sodding

This item shall consist of all work, labor and materials necessary for installation of sodding. Sodding areas shall be determined during construction by the Owner, contractor shall <u>not</u> be authorized to determine which areas require sod. In the event sod is installed without Owner's direction and/or permission the contractor shall not be compensated. All sod shall be installed in accordance with Section 32 92 19. Measurement and payment for this item shall be on a square yard basis.

Item 26 - Dewatering

The bid price for this item shall include all labor, tools, equipment and materials to provide dewatering throughout pipeline construction including engineering costs associated with developing the plan, installation of dewatering system and removal following construction. Payment for this item shall be on a lump sum basis.

Item 27 - Trench Safety

This bid item shall include all necessary activities required to provide a trench safety system in accordance with Section 31 41 33. Measurement and payment shall be per linear foot of trench safety installed. Payment made at the unit price bid shall be full compensation for all trench safety.

Item 28 - Traffic Control

This item shall consist of all the work, labor, equipment, materials and superintendence necessary to furnish, install, operate, maintain, erect and remove traffic control devices as shown on Sheets T1 through T5 and in accordance with TMUTCD and the local governing agencies design standards. This item shall also include preparing and implementing any traffic control required which was not identified in the plans. Temporary asphalt installation and removal, concrete curb removal and replacement, striping installation and removal, and all incidental work and materials not otherwise provided for in these specifications shall also be included in this item. Any additional traffic control plans shall be submitted to and approved by the local governing agency prior to the beginning of work. Measurement for payment shall be on a lump sum basis.

Item 29 - Cathodic Protection

This item shall consist of furnishing all the labor, materials, tools and equipment necessary to provide corrosion protection for all buried pipe, fittings and appurtenances used in this project, including joint bonding and electrical isolation, corrosion control test stations, and zinc ribbon cathodic protection systems. Cathodic protection shall be in accordance with the plans and Sections 33 04 10, 33 04 11, and 33 04 12. Measurement for payment of this item shall be on a lump sum basis.

Item 30 - Hydrostatic Test and Disinfection

This item shall consist of furnishing all the labor, materials, tools and equipment to hydrostatically test and disinfect the pipeline. The hydrostatic testing and disinfection shall be performed in

accordance with Section 01 45 16.16. The bid price shall include the cost of water necessary to test and disinfect the line. Measurement and payment for this item shall be on a lump sum basis.

Item 31 – Storm Water Pollution Prevention Plan and Erosion Control

This item shall consist of all work, labor and materials necessary for preparing and implementing a Storm Water Pollution Prevention Plan in accordance with Section 01 57 00. This item shall include the work associated with preparing and submitting all permits required including but not limited to Notice of Intent and Notice of Termination. Additionally, the bid price shall include silt fence, straw bale dikes, rock check dams, erosion control blankets, and any other device necessary to control erosion during the construction of the project in accordance with the plans. Maintenance of erosion control devices shall also be included in this bid item. Measurement and pavement for this item shall be on a lump sum basis.

Item 32 - Tree Removal

This item shall consist of the work, labor, materials and tools necessary to remove and dispose of existing trees and protect existing trees intended to remain. Included shall be the work associated with excavation, trimming, fencing, haul off, cleaning, site restoration and any incidental work and materials not otherwise provided for in these specifications, all in accordance with Section 31 10 00 and Detail 3/D4. Measurement and payment shall be on a per acre basis. The trees shown in the plans are approximate and in locations are only identified by the edge of tree line. No additional payment will be made if additional trees are required to be removed than anticipated during bidding.

Item 33 - Remove and Replace 5' x 3' Type B Headwall

This item shall include all labor, equipment and materials necessary to provide complete replacement of an existing headwall at locations designated on plans including excavation; removal and disposal of existing headwall; replacement of rock rip rap damaged during construction; property restoration; clean-up; and any incidental work and materials not otherwise provided for in these specifications. Measurement shall be on a per each basis.

Item 34 - Remove and Replace 5' x 3' RCB

This item shall include all labor, equipment, and materials necessary for removal and replacement of existing storm sewer including connection of new pipe to existing pipe and any fittings necessary to make this connection; furnishing, hauling, and laying new pipe; disposal of existing pipe; embedment and backfill; clean-up; and any incidental work and materials not otherwise provided for in these specifications. Removal and replacement of the existing storm sewer will not be allowed to take place during rainfall events. Measurement for payment for this item shall be on a per linear foot basis, grouped by size.

Item 35 - Remove and Replace Asphalt Pavement

This item shall consist of all the labor, materials, tools and equipment required to provide complete replacement of the existing asphalt pavement to a complete and functional unit in accordance with the plans and Section 32 01 20. This item includes providing pavement markings on all replaced pavement; and removal and disposal of excavated asphalt and temporary HMAC. Markings shall consist of any traffic buttons, pavement striping, pavement painting or any other markings present on existing pavement. Markings shall match existing conditions and be subject to approval by governing agency. This item shall also include furnishing and installing temporary HMAC surface and base courses as required. All asphalt pavements shall be neatly saw cut. Measurement for payment for these items shall be on a square yard basis.

Item 36 - Remove and Replace Flex Base Pavement

This item shall consist of all the labor, materials, tools and equipment required to provide complete replacement of the existing flex base pavement to a complete and functional unit in accordance with the plans and Section 32 01 20. The Contractor shall match or exceed existing flex base pavement conditions and thicknesses. Measurement for payment for this item shall be on a square yard basis.

Item 37 – Remove and Replace Concrete Sidewalk

This item shall consist of all the labor, materials, tools and equipment required to provide complete replacement of the existing concrete sidewalk to a complete and functional unit in accordance with the plans and Detail 5/D7. The Contractor shall match or exceed existing concrete sidewalk conditions and thicknesses. Replacement limits shall extend to nearest sidewalk joint. All concrete sidewalks shall be neatly saw cut. Measurement for payment for this item shall be on a square yard basis.

Item 38 - Remove and Replace Concrete Pavement

This item shall consist of all the labor, materials, tools and equipment required to provide complete replacement of the existing concrete pavement to a complete and functional unit in accordance with the plans and Section 32 01 20. This item shall also include replacement of concrete curb and gutters; pavement headers; furnishing and installing temporary HMAC surface and base courses; and providing pavement markings on all replaced pavement. Markings shall consist of any traffic buttons, pavement striping, pavement painting or any other markings present on existing pavement. Markings shall match existing conditions and be subject to approval by the governing agency. Concrete repair thicknesses are as specified in the plans and details and shall at a minimum match existing pavement thickness. All concrete pavements shall be neatly saw cut. Measurement for payment for these items shall be on a square yard basis.

Item 39 - Temporary Flex Base Pavement

This item shall consist of all the labor, materials, tools and equipment required to install temporary flex base pavement in both permanent and temporary access easements to aid in construction access. Contractor may or may not elect to utilize flex base pavement. All temporary pavement shall be removed following construction. Item shall also include temporary culverts and silt fence as required per Sheet G6. Measurement for payment for these items shall be on a lump sum basis.

Item 40 - Controlled Low Strength Material (CLSM) for Proposed Water Line

This item includes all labor, equipment, and materials necessary for placement of Controlled Low-Strength Material as embedment material for the proposed water lines as shown in the plans or as directed by the Owner's Inspector. The bid price shall include all incidental work and materials and all other items described in accordance with Section 03 34 13. CLSM embedment associated with existing utilities shall be covered in Bid Item No. 38. Measurement and payment for this item shall be on a linear foot basis.

Item 41 - Controlled Low Strength Material (CLSM) for Existing Utilities

This item includes all labor, equipment, and materials necessary for placement of Controlled Low-Strength Material as embedment material for existing utilities uncovered during construction. This bid item is intended to be used in location where the embedment of an existing utility is disturbed and cannot be properly recompacted. Use of this bid item shall be at the sole discretion of the Owner's Inspector. The bid price shall include all incidental work and materials and all other items described in accordance with Section 03 34 13. CLSM embedment associated with the proposed water lines shall be covered in Bid Item No. 37. Measurement and payment for this item shall be on a linear foot basis.

Item 42 - Miscellaneous Structure Demolition

This item shall consist of the work, labor, materials and tools necessary to remove and dispose of existing structures identified for removal and disposal in the plans. Contractor shall remove all existing structures as indicated on the plans along with any foundations, piers and/or underground objects associated with said structures. Any object to be removed, other than the items specified to be salvaged and delivered the Owner, shall become the property of the Contractor and shall be disposed of properly. Measurement and payment shall be lump sum. No additional payment shall be made if additional items are required to be removed for alignment shown on plans.

Item 43 - Remove and Replace Barbed Wire Fence

This item shall consist of the work, labor, materials and tools necessary to remove the existing barbed wire fence during construction and replace it with a fence of equal or better than preconstruction conditions following construction. The bid price shall include posts and post foundations, cross bracing, removal and disposal of existing fence, and all other items required to remove and replace an existing barbed wire fence in accordance with Detail 5/D8. Installation of fence will be measured and paid for by the linear foot of fence removed and replaced.

Item 44 - Remove and Replace Chain Link Fence

This item shall consist of the work, labor, materials and tools necessary to remove the existing chain link fence during construction and replace it with a fence of equal or better than pre-construction conditions following construction. The bid price shall include posts and post foundations, cross bracing, barbed wire, removal and disposal of existing fence, and all other items required to remove and replace an existing chain link fence in accordance with Section 32 31 13 and Detail 4/D8. If existing fence has a concrete mow strip, this bid item shall include replacing the mow strip as well. Installation of chain link fence will be measured and paid for by the linear foot of fence removed and replaced.

Item 45 – Remove and Replace Steel Tube Fence

This item shall consist of the work, labor, materials and tools necessary to remove the existing steel tube fence during construction and replace it with a steel tube fence of equal or better than preconstruction conditions following construction. Contractor shall match the existing style fence with the replacement fence. The bid price shall include posts and post foundations, removal and disposal of existing fence, and all other items required to remove and replace the existing steel tube fence in accordance with Section 32 31 14. If existing fence has a concrete mow strip, this bid item shall include replacing the mow strip as well. Installation of the fence shall be paid for on a per linear foot of fence removed and replaced.

Item 46 - Remove and Replace Wood Fence

This item shall consist of the work, labor, materials and tools necessary to remove the existing wood fence during construction and replace it with a wood fence of equal or better than pre-construction conditions following construction. Contractor shall match the existing style fence with the replacement fence. The bid price shall include posts and post foundations, removal and disposal of existing fence, and all other items required to remove and replace the existing wood fence. Installation of the fence shall be paid for on a per linear foot of fence removed and replaced.

Item 47 – Temporary Fence

The Contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. The bid price shall include posts and post foundations, cross bracing, and all other items necessary, assuming 3-strand barb wire is sufficient. The fence shall be of sufficient strength to contain livestock of adjacent property owners.

Contractor may be required to utilize a different fence material to achieve required strength. If a different fence material is required, no additional payment will be made. Additionally, if a cattle guard is required, it shall be included in this bid item. The fence shall be completely removed and disposed of after completion of the Project. Installation of temporary fence will be measured and paid for by the linear foot of fence.

Item 48 – Temporary Gate

The Contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. The bid price shall include posts and post foundations, cross bracing, and all other items described in Detail 2/D8. Temporary fence shall not be paid for under this bid item. Installation of temporary gates will be measured and paid for per each gate.

Item 49, 50, 51 - Permanent Chain Link. Wrought Iron, Steel Tube Gate

The Contract unit price shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the Work. The bid price shall include posts and post foundations, cross bracing, and all other items described in Detail 1/D8, 2/D8, and 5/D8. Installation of permanent gates will be measured and paid for per each gate.

Item 52 - Staking, Surveying, and GPS

The bid price for this item shall include all work and equipment necessary to stake the permanent and temporary easements, water line centerline, floodplain, and provide GPS x, y, and z coordinates as specified in the plans. Surveying and staking activities shall be performed by an RPLS licensed in the State of Texas. Payment for this item shall be on a lump sum basis.

Item 53 – Plug Existing Water Well

The bid price for this item shall include all work and equipment necessary to plug the existing water well including plugging the well, submitting plugging report to State, removing and disposing of existing above ground well components and all other items required to abandon an existing water well in accordance with State of Texas requirements. Payment for this item shall be on a vertical foot basis.

Item 54 - Permitting Fees (Allowance)

This bid item shall be an allowance for costs associated with any permitting fees associated with completing the project. This shall include City and/or County permit fees, inspection fees and general site development fees. The allowance is provided to pay as a pass through cost from the permitting organization to the Contractor to the Owner. Contractor shall not be allowed to recover any markup or additional costs under the payment of this item. Any markup or additional costs associated with this item shall be included in Items 2-6.

PART 2 - PRODUCTS [NOT USED]

PART 3 - EXECUTION [NOT USED]

END OF SECTION

01 31 00 PROJECT MANAGEMENT

1.00 GENERAL

1.01 WORK INCLUDED

- A. Furnish equipment, manpower, products, and other items necessary to complete the Project with an acceptable standard of quality and within the Contract Time. Construct Project in accordance with current safety practices.
- B. Manage Site to allow access to Site and control construction operations.
- C. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.
- D. Utilize Internet Based Construction Management system for record keeping with NTWMD as specified in Section 01 31 24, INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM.

1.02 QUALITY ASSURANCE

- A. Employ competent workmen, skilled in the occupation for which they are employed. Provide Work meeting quality requirements of the Contract Documents as determined by the Construction Manager.
- B. Remove defective Work from the Site immediately unless provisions have been made and approved by the Construction Manager to allow repair of the product at the Site. Clearly mark the Work as "defective" until it is removed or allowable repairs have been completed.

1.03 SUBMITTALS

- A. Provide submittals in accordance with Section 01 33 00, SUBMITTALS:
 - 1. Provide copies of Supplier's printed storage instructions prior to furnishing materials or products and installation instructions prior to beginning the installation. Maintain one copy of these documents at the Site until the Project is complete. Incorporate this information into submittals. Place these documents into Projectmates.
 - 2. Incorporate field notes, sketches, recordings, and computations made by the Contractor into the Project Record Drawings. Place Project Record Drawings into Projectmates for permanent record keeping.
- B. At the preconstruction conference, Contractor shall provide a list of all shop drawings anticipated to be submitted during construction.

1.04 STANDARDS

- A. Perform Work to comply with local, State and Federal ordinances and regulations.
- C. Provide materials and equipment that has National Science Foundation 60/61 approval for use in potable water supply systems. Advise the Construction Manager of any material requirements in these Contract Documents that conflict with National Science Foundation 60/61 requirements.

1.05 PERMITS

- A. Place all Permit documents, once attained into Projectmates for permanent document retention.
- B. Obtain and pay for construction permits and licenses for highway and railroad crossings and other permits.

- C. Retain copies of permits and licenses at the Site and observe and comply with all regulations and conditions of the permit or license, including additional insurance requirements. Place all documents into Projectmates for permanent document retention.
- D. Obtain and pay for all other necessary permits including any and all necessary highway, street and road permits for transporting pipe and/or heavy equipment necessary for construction of the Project.
- D. Obtain and pay for other permits necessary to conduct any part of the Work.
- E. Arrange for inspections and certification by agencies having jurisdiction over the Work.
- F. Make arrangements with private utility companies and pay for fees associated with obtaining services, or for inspection fees.

1.06 COORDINATION

- A. Coordinate the Work of various trades having interdependent responsibilities for installing, connecting to, and placing equipment in service.
- B. Coordinate requests for substitutions to provide compatibility of space, operating elements, effect on the Work of other trades, and on the Work scheduled for early completion.
- C. Coordinate the use of Project space and the sequence of installation of equipment, walks, mechanical, electrical, plumbing, or other Work that is indicated diagrammatically on the Drawings.
 - 1. Follow routings shown for tubes, pipes, ducts, conduits, and other items as closely as practical, with due allowance for available physical space.
 - 2. Utilize space efficiently to maximize accessibility for Owner's maintenance and repairs.
 - 3. Schematics are diagrammatic in nature. Adjust routing of piping, ductwork, utilities, and location of equipment as needed to resolve spatial conflicts between the various trades. Document changes in the indicated routings on the Record Drawings.
- D. Conceal ducts, pipes, wiring, and other non-finish items within construction in finished areas, except as otherwise shown. Coordinate locations of concealed items with finish elements.
- E. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
- F. Make adequate provisions to accommodate items scheduled for later installation, including:
 - 1. Accepted alternates,
 - 2. Installation of products purchased with allowances,
 - 3. Work by others, and
 - 4. Owner-supplied, Contractor-installed items.
- G. Sequence, coordinate, and integrate the various elements of mechanical, electrical, and other systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical and electrical systems, equipment, and materials installation with other components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings during progress of construction.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.
 - 5. Install systems, materials, and equipment as permitted by codes to provide the maximum headroom possible where mounting heights are not detailed or dimensioned.
 - 6. Coordinate the connection of systems with exterior underground and overhead utilities and services. Comply with the requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to the greatest extent possible. Conform to

arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Adjust routing of piping, ductwork, utilities, and location of equipment as needed to resolve spatial conflicts between the various trades at no additional cost. Document changes in the indicated routings on the Record Drawings.

- 8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to structure's surfaces.
- 9. Install systems, materials, and equipment to facilitate servicing, maintenance, and repair or replacement of components. As much as practical, connect for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to accessible locations.
- 10. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

1.07 SAFETY REQUIREMENTS

- A. Assume sole responsibility for safety at the Site. Protect the safety and welfare of persons at the Site.
- B. Provide safe access to move through the Site. Provide and maintain barricades, guard rails, covered walkways, and other protective devices to warn and protect from hazards at the Site.
- C. Comply with latest provisions of the Occupational Health and Safety Administrations and other regulatory agencies in performing Work.
- D. Cooperate with accident investigations related to the Site. Provide two copies of all reports prepared concerning accidents, injury, or death on the Site to the Engineer as Record Data per Section 01 33 00, SUBMITTALS.

1.08 CONTRACTOR'S USE OF SITE

- A. Limit the use of Site for Work and storage to those areas designated on the Drawings or approved by the Construction Manager. Coordinate the use of the premises with the Construction Manager.
- B. Repair or correct any damage to existing facilities, including contamination, caused by the Contractor's personnel, visitors, materials, or equipment.
- C. Do not permit alcoholic beverages or illegal substances on the Site. Do not allow persons under the influence of alcoholic beverages or illegal substances to enter or remain on the Site at any time. Persons on Site under the influence of alcoholic beverages or illegal substances will be permanently prohibited from returning to the Site. Criminal or civil penalties may also apply.
- D. Park construction equipment in designated areas only and provide spill control measures as discussed in Section 01 57 00, Paragraph 1.06 POLLUTION CONTROL.
- E. Park employees' vehicles in designated areas only.
- F. Obtain written permission of the Owner before entering privately-owned land outside of the Owner's property, rights-of-way, or easements.
- G. Do not allow the use of loud radios, obnoxious, vulgar or abusive language, or sexual harassment in any form. These actions will cause immediate and permanent removal of the offender from the premises. Criminal or civil penalties may apply.
- H. Require Workers to wear clothing that is inoffensive and meets safety requirements. Do not allow sleeveless shirts, shorts, exceedingly torn, ripped or soiled clothing to be worn on the project.
- I. Do not allow firearms or weapons of any sort to be brought on to the Site under any conditions. No exception is to be made for persons with concealed handgun permits.

Remove any firearms or weapons and the person possessing these firearms or weapons permanently and immediately from the Site.

1.09 POINTS OF ACCESS TO THE SITE

- A. Restrict entry into Site to points where the easements cross state and county roads and highways or other publicly owned roads and streets. Keep operations within the easement.
- B. Use State, County, or City roadways for construction traffic only with written approval of the appropriate representatives of each entity. State, County, or City roadways may not all be approved for construction traffic. Obtain written approval to use State, County, City or private roads to deliver pipe and/or heavy equipment to the Site. Copies of the written approvals must be furnished to the Owner as Record Data before Work begins. No additional compensation will be paid because the Contractor is unable to gain access to the easement from public roadways.
- C. Maintain access to the facilities at all times. Do not obstruct roads, pedestrian walks, or access to the various buildings, structures, stairways, or entrances. Provide safe temporary walks or other structures to allow access for normal operations during construction.
- D. Provide adequate and safe access for inspections. Leave ladders, bridges, scaffolding and protective equipment in place until inspections have been completed. Construct additional safe access if required for inspections.
- E. Provide security at the construction Site as necessary to protect against vandalism and loss by theft.
- F. Maintain security of the Site and access leading to it.
 - 1. Close gates and keep locked.
 - 2. Obtain permission of any landowners whose property must be crossed in gaining access to the Site.
 - 3. Install a gate lock consisting of a chain with two locks. Give one lock and key to the landowner. Use one lock for the Contractor, Construction Manager and Owner. Provide keys to the Contractor's lock to Owner and Construction Manager.
 - 4. At the end of the Project, remove the Contractor's lock from the assembly.

1.10 PROPERTY PROVISIONS

- A. Make adequate provisions to maintain the flow of storm sewers, drains and water courses encountered during the construction. Restore structures which may have been disturbed during construction to their original position as soon as construction in the area is completed.
- B. Protect trees, fences, signs, poles, guy wires, and all other property unless their removal is authorized. Restore any property damaged to equal or better condition per Paragraph 1.11 of this Section.
- C. Provide temporary fencing, with gates, to restrain livestock in areas where livestock are pastured unless the Contractor makes satisfactory arrangements with the property owner and/or tenant. Install temporary fence on the easement lines and removed after the trench has been backfilled. Pay damages for losses resulting from failure to maintain such barriers or failure of barriers to exclude livestock. Install temporary fencing on any tract in order to contain construction activities within easement limits if directed by the Owner.

1.11 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show existing piping, valves, manholes, electrical conduits, utility poles, and other facilities based on information from available records. Examine the Site and review the available information concerning the Site.
 - 1. Verify the type, size and location of all existing piping, valves, electrical conduit, telephone cable, and other utilities in the construction area prior to preparation of pipe

shop drawings. Advise the Construction Manager of any utilities not shown or incorrectly shown.

- 2. Verify the type, size and location of streets, driveways, fences, drainage structures, sidewalks, curbs, and gutters. Verify the elevations of the structures adjacent to excavations. Report discrepancies between these elevation and elevations shown on the Drawings to the Construction Manager before beginning construction.
- B. Determine if existing structures, poles, piping, or other utilities at excavations will require relocation or replacement. Prepare a Plan of Action per Section 01 35 00, SPECIAL PROCEDURES. Coordinate Work with Construction Manager, local utility company and others. Include cost of demolition and replacement, restoration or relocation of these structures in the Contract Price.
- C. Protect buildings, utilities, street surfaces, driveways, sidewalks, curb and gutter, fences, wells, drainage structures, piping, valves, manholes, electrical conduits, and other systems or structures unless they are shown to be replaced or relocated on the Drawings. Restore damage to items to be protected to the satisfaction of the Construction Manager utility owner or governing city without additional compensation from the Owner.
- D. Carefully support and protect all structures and/or utilities so that there will be no failure or settlement where excavation or demolition endangers adjacent structures and utilities. Do not take existing utilities out of service unless shown in the Contract Documents or approved by the Construction Manager. Notify and cooperate with the utility owner if it is necessary to move services, poles, guy wires, pipelines or other obstructions. Include the cost of relocation of existing utilities in the Contract Price.
- E. Protect existing trees and landscaping at the Site.
 - 1. Visit Site with Engineer to identify trees that may be removed during construction.
 - 2. Mark trees to be removed with paint.
 - 3. Protect trees to remain from damage in accordance with Drawings.

1.12 DISRUPTION TO SERVICES / CONTINUED OPERATIONS

- A. Existing facilities are to continue in service as usual during the construction unless noted otherwise. Owner or utilities must be able to operate and maintain the facilities. Disruptions to existing utilities, piping, process piping, or electrical services shall be kept to a minimum.
 - 1. Do not restrict access to critical valves, operators, or electrical panels.
 - 2. Do not store material or products inside structures.
 - 3. Limit operations to the minimum amount of space needed to complete the specified Work.
 - 4. Maintain storm sewers and sanitary sewers in service at all times. Provide temporary service around the construction or otherwise construct the structure in a manner that the flow is not restricted.
- B. Provide a Plan of Action in accordance with Section 01 35 00, SPECIAL PROCEDURES if facilities must be taken out of operation.

1.13 CLEARING AND GRUBBING

A. Reference Section 31 10 00 Site Clearing.

1.14 FIELD MEASUREMENTS

- A. Perform complete field measurements for products required to fit existing conditions prior to purchasing products or beginning construction.
- B. Verify property lines, control lines, grades, and levels indicated on the Drawings.
- C. Verify pipe class, equipment capacities, existing electrical systems and power sources for existing conditions.

- D. Check Shop Drawings and indicate the actual dimensions available where products are to be installed.
- E. Include field measurements in record drawings as required in Section 01 31 13, PROJECT COORDINATION.

1.15 REFERENCE DATA AND CONTROL POINTS

- 1. Control points shall be as provided in the drawings. If additional control needs to be set, contractor shall do so at no additional cost to the Owner.
- F. Locate and protect control points prior to starting the Work and preserve permanent reference points during construction. Do not change or relocate points without prior approval of the Construction Manager. Notify Construction Manager when the reference point is lost, destroyed, or requires relocation. Replace Project control points on the basis of the original survey.
- G. Provide complete engineering layout of the Work needed for construction.
 - 1. Provide competent personnel. Provide equipment including accurate surveying instruments, stakes, platforms, tools, and materials.
 - 2. Provide surveying with accuracy meeting the requirements established for Category 5 Construction Surveying as established in the <u>Manual of Practice of Land Surveying in</u> <u>Texas</u> published by the Texas Society of Professional Surveyors, latest revision.
 - 3. Record data and measurements per standards.

1.16 CHANGE OF PIPELINE LOCATION

- A. The alignment of the pipeline is shown on the Drawings, and no change is contemplated. It may be necessary to change the alignment due to utility conflicts, unanticipated variations in existing conditions, or for any other reason prior to the time pipe is actually installed.
- B. No additional compensation will be paid to the Contractor except as provided by unit prices, unless excessive cost is incurred that is directly applicable to such changes and this cost is documented in accordance with the General / Supplemental Conditions. No compensation will be paid for specials, field cuts, field welds, or other incurred cost resulting from failure to locate existing utilities prior to manufacture of pipe.

1.17 DELIVERY AND STORAGE

- A. Deliver products and materials to the Site in time to prevent delays in construction.
- B. Deliver packaged products to Site in original undamaged containers with identifying labels attached. Open cartons as necessary to check for damage and to verify invoices. Reseal cartons and store until used. Leave products in packages or other containers until installed.
- C. Deliver products that are too large to fit through openings to the Site in advance of the time enclosing walls and roofs are erected. Set in place, raised above floor on cribs.
- D. Assume full responsibility for the protection and safekeeping of products stored at the Site.
- E. Store products at locations acceptable to the Engineer and to allow Owner access to maintain and operate existing facilities.
- F. Store products in accordance with the Supplier's storage instructions immediately upon delivery. Leave seals and labels intact. Arrange storage to allow access for maintenance of stored items and for inspection. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
- G. Obtain and pay for the use of any additional storage areas as needed for construction. Store products subject to damage by elements in substantial weather-tight enclosures or storage sheds. Provide and maintain storage sheds as required for the protection of products. Provide temperature, humidity control and ventilation within the ranges stated in the Supplier's instructions. Remove storage facilities at the completion of the Project.

- H. Protect the pipe interior. Keep all foreign materials such as dirt, debris, animals, or other objects out of the pipe during the Work. Cap or plug ends of installed pipe in an approved manner when pipe is not being installed. Wash out pipe sections that become contaminated before continuing with installation. Take precautions to prevent the pipe from floating or moving out of the proper position during or after laying operations. Immediately correct any pipe that moves from its correct positions.
- I. Provide adequate exterior storage for products that may be stored out-of-doors.
 - 1. Provide substantial platforms, blocking, or skids to support materials and products above ground; slope to provide drainage. Protect products from soiling or staining.
 - 2. Cover products subject to dislocation or deterioration from exposure to the elements, with impervious sheet materials. Provide ventilation to prevent condensation below covering.
 - 3. Store loose, granular materials on clean, solid surfaces, or on rigid sheet materials, to prevent mixing with foreign matter.
 - 4. Provide surface drainage to prevent erosion and ponding of water.
 - 5. Prevent mixing of refuse or chemically injurious materials or liquids with stored materials.
 - 6. Pipes and conduits stored outdoors are to have open ends sealed to prevent the entrance of dirt, moisture, and other injurious materials. Protect PVC pipe from ultraviolet light exposure.
 - 7. Store light weight products to prevent wind damage.
- J. Protect and maintain mechanical and electrical equipment in storage.
 - 1. Provide Supplier's service instructions on the exterior of the package.
 - 2. Service equipment on a regular basis as recommended by the Supplier. Maintain a log of maintenance services. Submit the log as Record Data at the completion of the Project.
 - 3. Provide power to and energize space heaters for all equipment for which these devices are provided.
 - 4. Provide temporary enclosures for all electrical equipment, including electrical systems on mechanical devices. Provide and maintain heat in the enclosures until equipment is energized.
- K. Maintain storage facilities. Inspect stored products on a weekly basis and after periods of severe weather to verify that:
 - 1. Storage facilities continue to meet specified requirements.
 - 2. Supplier's required environmental conditions are continually maintained.
 - 3. Surfaces of products exposed to the elements are not adversely affected.
- L. Replace any stored item damaged by inadequate protection or environmental controls.
- M. Payment may be withheld for any products not properly stored.

1.18 BLASTING

A. Blasting for excavations is not allowed.

1.19 ARCHAEOLOGICAL REQUIREMENTS

- A. Cease operations immediately and contact the Owner for instructions if a historical or archaeological find is made during construction.
- B. Conduct all construction activities to avoid adverse impact on the Sites where significant historical or archaeological Sites have been identified at the Site.
 - 1. Obtain details for Working in these areas.
 - 2. Maintain confidentiality regarding the Site.
 - 3. Adhere to the requirements of the Texas Historical Commission.
- C. Do not disturb Archaeological Sites.
 - 1. Obtain the services of a qualified archaeological specialist to instruct construction personnel on how to identify and protect archaeological finds on an emergency basis.

- 2. Coordinate activities to permit Archaeological Work to take place within the area.
 - a. Attempt to archaeologically clear areas needed for construction as soon as possible.
 - b. Provide a determination of priority for such areas.
- D. Assume responsibility for any unauthorized destruction that might result to such Sites by construction personnel, and pay all penalties assessed by the State or Federal agencies for non-compliance with these requirements.
- E. Contract time will be modified to compensate for delays caused by such archaeological finds. No additional compensation shall be paid for delays.

1.20 STORM WATER POLLUTION CONTROL

F. Reference Section 01 57 00, TEMPORARY CONTROLS.

1.21 CLEANING DURING CONSTRUCTION

- A. Provide positive methods to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from disbursing into the atmosphere. Control dust and dirt from demolition, cutting, and patching operations.
- B. Comply with codes, ordinances, regulations, and anti-pollution laws. Do not burn or bury waste materials. Remove waste materials, rubbish and debris from the Site and legally dispose of these at public or private dumping areas.
- C. Reference Section 01 74 23, FINAL CLEANING for additional information.

1.22 MAINTENANCE OF ROADS, DRIVEWAYS, AND ACCESS

- A. Maintain roads and streets in a manner that is suitable for safe operations of public vehicle during all phases of construction unless the Owner approves a street closing. Submit a written request for Owner's approval of a street closing. The request shall state:
 - 1. The reason for closing the street.
 - 2. How long the street will remain closed.
 - 3. Procedures to be taken to maintain the flow of traffic.

Do not close public roads overnight unless otherwise shown in the plans.

- B. Construct temporary detours, including by-pass roads around construction, with adequately clear width to maintain the free flow of traffic at all times. Maintain barricades, signs, and safety features around the detour and excavations.
- C. Maintain road and driveway access to occupied buildings. Coordinate temporary closures or blockage with property owners, utilities, emergency service providers, Owner and Engineer. Property owners must be notified a minimum of two weeks or other time established by Owner prior to closure. Limit the time road or driveways are out of service to between 9:30 AM and 3:30 PM.
- D. Maintain barricades, signs, and safety features around the Work in accordance with all provisions of the latest edition of the <u>Manual on Uniform Traffic Control Devices</u> (MUTCD.)
- E. Assume responsibility for any damage resulting from construction along roads or drives.

1.23 CUTTING AND PATCHING

- A. Perform cutting, fitting, and patching required to complete the Work or to:
 - 1. Uncover Work to provide for installation of new Work or the correction of defective Work.
 - 2. Provide routine penetrations of non-structural surfaces for installation of mechanical, electrical, and plumbing Work.
 - 3. Uncover Work that has been covered prior to observation by the Engineer.
- B. Submit written notification to the Engineer in advance of performing any cutting which affects:

- 1. Work of any other contractors or the Owner.
- 2. Structural integrity of any structure or system of the Project.
- 3. Integrity or effectiveness of weather exposed or moisture resistant structure or systems.
- 4. Efficiency, operational life, maintenance, or safety of any structure or system.
- 5. Appearance of any structure or surfaces exposed occasionally or constantly to view.
- C. The notification shall include:
 - 1. Identification of the Project.
 - 2. Location and description of affected Work.
 - 3. Reason for cutting, alteration, or excavation.
 - 4. Effect on the Work of any separate contractor or Owner.
 - 5. Effect on the structural or weatherproof integrity of the Project.
 - 6. Description of proposed Work, including:
 - a. Scope of cutting, patching, or alteration.
 - b. Trades that will perform the Work.
 - c. Products proposed for use.
 - d. Extent of refinishing to be performed.
 - e. Cost proposal, when applicable.
 - 7. Alternatives to cutting and patching.
 - 8. Written authorization from any separate contractor whose Work would be affected.
 - 9. Date and time Work will be uncovered or altered.
- D. Examine the existing conditions, including structures subject to damage or to movement during cutting or patching.
 - 1. Inspect conditions affecting installation of products or performance of the Work after uncovering the Work.
 - 2. Provide a written report of unacceptable or questionable conditions to the Engineer. The Contractor shall not proceed with Work until Engineer has provided further instructions. Beginning Work will constitute acceptance of existing conditions by the Contractor.
- E. Protect the structure and other parts of the Work and provide adequate support to maintain the structural integrity of the affected portions of the Work. Provide devices and methods to protect adjacent Work and other portions of the Project from damage. Provide protection from the weather for portions of the Project that may be exposed by cutting and patching Work.
- F. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs.
- G. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- H. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to, the removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the modified Work.
- I. Restore Work which has been cut or removed. Install new products to provide completed Work per the Contract Documents.
- J. Fit Work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through the surfaces. Where fire rated separations are penetrated, fill the space around the pipe or insert with materials with physical characteristics equivalent to fire resistance requirements of penetrated surface.
- K. Patch finished surfaces and building components using new products specified for the original installation.
- L. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to the nearest intersection.

2. For an assembly, refinish the entire unit.

PRELIMINARY OCCUPANCY 1.24

- A. Owner may deliver, install and connect equipment, furnishings, or other apparatus in buildings or other structures. These actions do not indicate acceptance of any part of the building or structure and does not affect the start of warranties or correction periods.
- B. Protect the Owner's property after installation is complete.
- C. Owner or Engineer may use any product for testing or determine that the product meets the requirements of the Contract Documents. This use does not constitute acceptance by either the Owner or Engineer. These actions do not indicate acceptance of any part of the product and does not affect the start of warranties or correction periods.

1.25 INITIAL MAINTENANCE

- A. Maintain equipment until the Project is accepted by the Owner. Ensure that mechanical equipment is properly maintained as recommended by the Supplier.
- B. Prior to acceptance of equipment, provide maintenance and start-up services per Section 01 75 00, STARTING AND ADJUSTING.
- C. Remove and clean screens and strainers in piping systems.
- D. Clean insects from intake louver screens.

PRODUCTS 2.00

2.01 MATERIALS

Provide materials in accordance with the requirements of the individual Sections.

EXECUTION 3.00

Perform the Work per the Supplier's published instructions. Do not omit any preparatory step or installation procedure unless specifically exempted or modified by Field Order.

END OF SECTION

01 31 13 PROJECT COORDINATION

1.00 GENERAL

1.01 WORK INCLUDED

A. Administer contract requirements to construct the project. Provide documentation per the requirements of this Section. Provide information as requested by the Construction Manager, Engineer, or Owner.

1.02 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00, SUBMITTALS.

1.03 COMMUNICATION DURING THE PROJECT

- A. The Construction Manager is to be the first point of contact for all parties on matters concerning this project.
- B. The Construction Manager will coordinate correspondence concerning:
 - 1. Submittals, including Applications for Payment,
 - 2. Clarification and interpretation of the Contract Documents,
 - 3. Contract modifications,
 - 4. Observation of work and testing, and
 - 5. Claims.
- C. The Construction Manager and Engineer will normally communicate only with the Contractor. Any required communication with Subcontractors or Suppliers will only be with the direct involvement of the Contractor.
- D. Direct written communications to the Engineer at the address indicated at the Preconstruction Conference. Include the following with communications as a minimum:
 - 1. Name of the Owner
 - 2. Project name
 - 3. Contract title
 - 4. Project number
 - 5. Date
 - 6. A reference statement
- E. Submit communications on the forms referenced in this Section or in Section 01 33 00, SUBMITTALS.

1.04 PROJECT MEETINGS

- A. Pre-construction Conference
 - 1. Attend a pre-construction meeting.
 - 2. The location of the conference will be determined by the Construction Manager.
 - 3. The time of the meeting will be determined by the Construction Manager but will be after the Notice of Award is issued and not later than fifteen (15) days after the Notice to Proceed is issued.
 - 4. The Owner, Construction Manager, Engineer, representatives of utility companies, the Contractor's project manager and superintendent, and representatives from major Subcontractors and Suppliers may attend the meeting.
 - 5. Provide and be prepared to discuss:
 - a. Preliminary construction schedule per Section 01 32 16 CONSTRUCTION PROGRESS SCHEDULE.
 - b. Preliminary submittal schedule per Section 01 33 00, SUBMITTALS.
 - c. Schedule of values and anticipated schedule of payments per Section 01 29 00, PAYMENT PROCEDURES.

- d. List of Subcontractors and Suppliers.
- e. Contractor's organizational chart as it relates to this project.
- f. Letter indicating the agents of authority for the Contractor and the limit of that authority with respect to the execution of legal documents, contract modifications and payment requests.
- B. Progress Meetings
 - 1. Attend meetings with the Construction Manager, Engineer and Owner.
 - a. Meet on a monthly basis or as requested by the Construction Manager to discuss the project.
 - b. Meet at the project site or other location as designated by the Construction Manager.
 - c. Contractor's superintendent and other key personnel are to attend the meeting. Other individuals may be requested to attend to discuss specific matters.
 - 2. Provide information as requested by the Engineer or Owner concerning this project.
 - a. Prepare to discuss:
 - 1) Status of overall project schedule.
 - 2) Contractor's detailed schedule for the next month.
 - 3) Anticipated delivery dates for equipment.
 - 4) Coordination with the Owner.
 - 5) Status of submittals.
 - 6) Information or clarification of the Contract Documents.
 - 7) Claims and proposed modifications to the contract.
 - 8) Field observations, problems, or conflicts.
 - 9) Maintenance of quality standards.
 - b. Notify the Engineer of any specific items to be discussed a minimum of one week prior to the meeting.
 - 3. Review minutes of meetings and notify the Construction Manager of any discrepancies within ten days of the date of the memorandum.
 - a. Following that date, the minutes will stand as shown or as corrected.
 - b. Corrections will be reflected in the minutes of the following meeting. Issues discussed will be documented and old issues will remain on minutes of subsequent meetings until the issue is resolved.
- C. Pre-submittal and Pre-installation Meetings
 - 1. Attend pre-submittal and pre-installation meetings as required in the individual technical specifications or as determined necessary by the Construction Manager (for example, instrumentation, roofing, concrete mix design, etc.).
 - 2. The location of the meeting will be determined by the Construction Manager.
 - 3. The time of the meeting will be determined by the Contractor when ready to proceed with the associated work, subject to submission of a Notification by Contractor (NBC) on the form shown in Section 01 31 13 13 FORMS and acceptance by the Construction Manager, Engineer and Owner of the proposed time.
 - 4. The Owner, Construction Manager, Engineer, the Contractor's project manager and superintendent, and representatives from affected Subcontractors and Suppliers shall attend the meeting.

1.05 REQUESTS FOR INFORMATION

- A. Submit Request for Information (RFI) to the Engineer to obtain additional information or clarification of the Contract Documents.
 - 1. Submit a separate RFI for each item in the Contractor's standard format.
 - 2. Attach adequate information to permit a written response without further clarification. Construction Manager or Engineer will return requests that do not have adequate information to the Contractor for additional information. Contractor is responsible for all delays resulting from multiple submittals due to inadequate information.

- 3. A response will be made when adequate information is provided. Response will be made through Projectmates.
- B. Response to an RFI is given to provide additional information, interpretation, or clarification of the requirements of the Contract Documents, and does not modify the Contract Documents.
- C. Owner will initiate a Preliminary Contract Modification in Projectmates per Paragraph 1.07 if the RFI indicates that a contract modification is required.

1.06 NOTIFICATION BY CONTRACTOR

- A. Notify the Construction Manager of:
 - 1. Need for testing,
 - 2. Intent to work outside regular working hours,
 - 3. Request to shut down facilities or utilities,
 - 4. Proposed utility connections,
 - 5. Required observation by Engineer or inspection agencies prior to covering work and
 - 6. Training.
- B. Provide notification a minimum of two weeks in advance in order to allow Owner, Construction Manager, and / or Engineer time to respond appropriately to the notification.

1.07 REQUESTS FOR MODIFICATIONS

- A. Submit a request to the Construction Manager for any change in the Contract Documents.
 - 1. Assign a number to the Preliminary Contract Modification when issued.
 - 2. Include with the Preliminary Contract Modification:
 - a. A complete description of the proposed modification.
 - b. The reason the modification is requested.
 - c. A detailed breakdown of the cost of the change (necessary only if the modification requires a change in contract amount). The itemized breakdown is to include:
 - 1) list of materials and equipment to be installed,
 - 2) man hours for labor by classification,
 - 3) equipment used in construction,
 - 4) consumable supplies, fuels, and materials,
 - 5) royalties and patent fees,
 - 6) bonds and insurance,
 - 7) overhead and profit,
 - 8) field office costs, and
 - 9) home office cost,
 - 10) other items of cost.
 - d. Provide the level of detail outline in the paragraph above for each Subcontractor or Supplier actually performing the Work if work is to be provided by a Subcontractor or Supplier. Indicate appropriate Contractor mark ups for Work provided through Subcontractors and Suppliers. Provide the level of detail outline in the paragraph above for self performed Work.
 - e. Provide a revised schedule indicating the effect on the critical path for the project and a statement of the number of days the project may be delayed by the modification.
 - 3. A Preliminary Contract Modification is required for all substitutions or deviations from the Contract Documents that involve potential project cost impacts.
 - 4. The Owner and the Engineer will evaluate the request for a preliminary contract modification.
- B. Owner will initiate changes through the Engineer.
 - 1. The Owner or Engineer will prepare a description of proposed modifications to the Contract Documents.
 - 2. Owner will assign a number to the Preliminary Contract Modification when issued.

- C. Engineer will issue a Field Order or a Change Order per the General Conditions if a contract modification is appropriate.
 - 1. Modifications to the contract can only be made by a Change Order.
 - 2. Changes in the project will be documented by a Field Order or by a Change Order.
 - 3. Field Orders may be issued by the Engineer for contract modifications that do not change the Contract Price or Contract Time.
 - 4. Any modifications that require a change in Contract Price or Contract Time can only be approved by Change Order.
 - a. Proposals issued by the Contractor in response to a Preliminary Contract Modification will be evaluated by the Engineer.
 - b. If the Preliminary Contract Modification is acceptable, the Contractor will be notified in writing. This will constitute the authorization to proceed with the work.
 - c. Depending on the amounts involved, several Preliminary Contract Modifications may be collected into a contract Change Order.
 - d. Change Orders can only be approved by the North Texas Municipal Water District Board of Directions. Upon approval, the Owner will prepare the Change Order for execution between the Contractor and the Owner.
- D. The Contractor may be informed that the Preliminary Contract Modification is not approved and construction is to proceed in accordance with the Contract Documents.

1.08 RECORD DRAWINGS

- A. Maintain at the Site one complete record copy of:
 - 1. Drawings,
 - 2. Specifications,
 - 3. Addenda,
 - 4. Contract modifications,
 - 5. Approved Shop Drawings and record data,
 - 6. Test records,
 - 7. Clarifications and other information provided in Request for Information responses, and
 - 8. Reference standards
- B. Store documents and samples in the Contractor's field office.
 - 1. Documents are to remain separate from documents used for construction. Do not use these documents for construction.
 - 2. Provide files and racks for the storage of documents.
 - 3. Provide a secure storage space for the storage of samples.
 - 4. Maintain documents in clean, dry, legible conditions, and in good order.
 - 5. Make documents and samples available at all times for inspection by the Construction Manager, Engineer and Owner.
- C. Marking Drawings:
 - 1. Label each document as "Project Record" in large printed letters.
 - 2. Record information as construction is being performed.
 - a. Do not conceal any Work until the required information is recorded.
 - b. Mark drawings to record actual construction, including the following:
 - 1) Depths of various elements of the foundation in relation to finished first floor datum or the top of walls.
 - 2) Horizontal and vertical locations of underground utilities and appurtenances constructed and existing utilities encountered during construction.
 - Location of internal utilities and appurtenances concealed in the construction. Refer measurements to permanent structure on the surface. Include the following equipment:
 - a) Piping,
 - b) Ductwork,
 - c) Equipment and control devices requiring periodic maintenance or repair,

- d) Valves, unions, traps, and tanks,
- e) Services entrance,
- f) Feeders, and
- g) Outlets.
- 4) Changes of dimension and detail,
- 5) Changes made by Field Order and Change Order,
- Details not on the original Drawings. Include field verified dimensions and clarifications, interpretations, and additional information issued in response to Requests for Information.
- c. Mark Specifications and Addenda to identify products provided.
 - 1) Record product name, trade name, catalog number, and each Supplier (with address and phone number) of each product and item of equipment actually installed.
 - 2) Record changes made by Field Order and Change Order.
- d. Mark additional work or information in erasable pencil.
 - 1) Use red for new or revised indication.
 - 2) Use purple for Work deleted or not installed (lines to be removed).
 - 3) Highlight items constructed per the Contract Documents in yellow.
- e. Submit record documents to Engineer for review and acceptance 30 days prior to final completion of the project.
 - 1) Provide one set of marked up drawings.
- D. Applications for Payment will not be recommended for payment if record documents are found to be incomplete or not in order. Final payment will not be recommended without complete record documents.

END OF SECTION

01 31 13.13 FORMS

- 1.00 GENERAL
- 1.01 WORK INCLUDED
 - A. Use the forms shown in Projectmates or as provided in this section for contract administration, submittals and documentation of test results. Forms included are listed below:
 - 1. Application for Payment forms
 - 2. Authorization Request for System Shut-Down and Tie-In
 - 3. Testing forms
 - a. Pressure Pipe Test Report
 - b. Protective Coating Test Report
 - 4. Equipment installation and documentation forms
 - a. Equipment Installation Report
 - b.O&M Manual Review Report
 - 5. Project closeout forms
 - a. Consent of Surety Company to Final Payment
 - b. Consent of Surety Company to Reduction of or Partial Release of Retainage.
 - c. Contractor's Affidavit of Payment of Debts and Claims
 - d.Contractor's Affidavit of Release of Liens
 - B. The following forms shall be provided, as needed, in the Contractor or Manufacture's standard format, subject to approval:
 - 1. Request for information
 - 2. Preliminary Contract Modification
 - Submittal Transmittal
 Concrete Mix Design

END OF SECTION

CONTRACTOR'S APPLICATION FOR PAYMENT

| PAY REQUEST NO: | | DATE: | | | |
|--|-----------------------|-------------------------------------|--|--|--|
| PERIOD FROM: | | ТО: | | | |
| PROJECT: | ENGI | NEER: | | | |
| OWNER: NORTH TEXAS MUNICIPAL WA DISTRICT P.O. BOX 2408 WYLIE, TEXAS 75098 | ATER CONTRA | CTOR: | | | |
| BIDS RECEIVED: | CONTRACT DATE: | NOTICE TO PROCEED: | | | |
| CONTRACT AMOUNT: | CALENDAR DAYS: | COMPLETION DATE: | | | |
| ADJUSTMENTS: | EXTENSIONS: | | | | |
| REVISED AMOUNT: | REVISED DAYS : | REVISED DATE: | | | |
| SUMMARY OF JOB STATUS: | SUBM | ITTED BY: | | | |
| Total Work Completed | | ame Title | | | |
| Material Stored on Site | | | | | |
| Subtotal | | | | | |
| Less 5% Retained | VERIF | FIED BY: NTMWD ENGINEERING FUNCTION | | | |
| Subtotal | By: | | | | |
| Less Previous Payments | N | ame Construction Mgr. | | | |
| Amount Due This Period | Date: | | | | |
| | REVIE | EWED BY: (ENGINEERING FIRM HERE) | | | |
| | By: | | | | |
| | N | ame Project Engineer | | | |
| | Date: | | | | |
| | APPRO | OVED FOR PAYMENT BY: NTMWD | | | |
| | • | | | | |
| WORK COMPLETED | | ame Executive Director | | | |
| TIME:% | Date: | | | | |

Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements Project #490

AUTHORIZATION REQUEST FOR SYSTEM SHUT-DOWN AND TIE-IN (CONTRACTOR: COMPANY NAME)

| SUBMITTED BY: | DATE: |
|----------------------------------|------------------|
| Engineering Officer | |
| REVIEWED BY: | DATE: |
| System Manager | |
| APPROVED: | DATE: |
| Executive Director | |
| 1. PROJECT : | |
| 2. LOCATION & DESCRIPTION: | |
| | |
| 3. PROPOSED DATE & DURATION: | |
| 4. PROPOSED SCHEDULE: | |
| TIME FRAME | ACTIVITY |
| | |
| | |
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| <u> </u> | |
| | |
| | |
| 5. SYSTEM DOWN TIME TOLERANG | CE: |
| A. WATER SYSTEM: | |
| 1. Latest Average Daily Demand: | |
| 2. System Storage: | |
| 3. Maximum Established Available | Down Time Frame: |
| B. WASTEWATER SYSTEM: | |
| 1. Latest Average Daily Flow: | |
| | |
| 2. Low Flow Time Period: | |

6. CONTRACTOR'S CHECKLIST

| a. Materials | : Complete & Proper Size |
|-----------------------------|---|
| b. Equipme | nt: Sufficient w/Back-up |
| c. Manpowe | er: Sufficient & Skilled |
| d. Welding e. Concrete | |
| f. Special P | |
| g. Surround | ding Utilities: |
| h. Pipe Man i. Other Rer | ufacturer Notified: marks: <u>Contractor's Project Manager & Superintendent Contact Information:</u> |
| | |
| NTMWD CH | IECKLIST |
| a. Affected | Water Systems Notified: |
| b. Operation | ns Staff Prepared: |
| c. Technica | Il Services Prepared: |
| d. Blowoffs | Located & Checked Out: |
| e. Inspectio | n By: |
| f. Other Rei | marks: |

| North Texas |
|----------------|
| Municipal |
| Water District |

| PROJE OWNEF CONTR ENGINE DATE: | R: ACTOR: | | | | | | PROJECT | NUMBER: |
|--|---|-----------------------|-----------------------|--------------------|----------------|-------------------|--------------|---------|
| No.: Specific Entitled: | REFERENCE DATA: No.: Description: Specification Section No.: Page No.: Par. No.: Sheet No.: Entitled: Detail Designation: Drawing Attached: | | | | | | | |
| | | TIFICATION | : rial: | | _ Identifica | ation No.: | | |
| Structur | LOCATION: Structure: N/S Coord.: E/W Coord.: Test Section: From: | | | | | | | |
| Test Flui Allowabl | id e Pressu | Test ire Loss/Flui | Pressure d Make-up | Те | st Time Re | quired | | |
| Test No. | Test Time | Initial Pressure | Final Pressure | Pressure Change | Fluid Added | Test Pass/Fail | Tested By | Date |
| | | | | | | | | |
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| OWNER: CONTRA | PROJECT: OWNER: CONTRACTOR: ENGINEER: DATE: | | | | JECT NU | | | |
|---|--|--|-------|---------|-----------|-------|--------|--|
| | REFERENCE DATA: Report No.: Description: | | | | | | | |
| APPLICATION AREA: Item coated (from drawings): Identification No.:Unit No.: | | | | | | | | |
| LOCATIC Structure N/S Coor | | E/W Coord.: | S | tation: | | Elev. | | |
| SURFAC | E PREPA | ARATION: | | | | | | |
| - | Shop PrimerField Blast-Commercial GrayField Blast- Near WhiteBrush BlastPower Tool & Solvent CleaningField Blast-White Metal | | | | | | | |
| COATIN | G APPLIC | CATION: | | | | | | |
| | | | NESS | | | 1 | | |
| Coat | Туре | Description (Brand, Series, Name/No.) | | Color | Req= d | Test | Retest | |
| Primer | | | | | | | | |
| Interim | | | | | | | | |
| Interim | | | | | | | | |
| Finish | | | | | | | | |
| CHECKED FOR HOLIDAYS | | | | | | | | |
| Tested and No Defects Discovered Date: | | | | | | | | |
| Testina F | Bv: | W | /ith: | | | | | |
| Testing By: Witnessed by: | | | | | | | | |



| North Texas Municipal |
|--------------------------|
| Water District |

| PROJECT: OWNER: CONTRACTOR: ENGINEER: | |
|---|---|
| REFERENCE DATA: EIR No.: Description: | |
| EIR No.: Description: Specification Section No.: Page No.: Entitled: Page No.: | Par. No.: Sheet No.: |
| Detail Designation: | Drawing Attached: |
| EQUIPMENT IDENTIFICATION: | |
| Name (from drawings): Identification Manufacturer: Capacity: | n No.: Unit No.: Model No.:Serial No.: |
| LOCATION: | |
| Structure: E/W Coord.: E/W Coord.: Date Installation Completed: | Station:Elev.: |
| OPERATOR TRAINING HAS BEEN CONDUCTED | ON: |
| □ Operation of Equipment □ Routine Mair | ntenance |
| Emergency Procedures Lubrication F | Procedures 🛛 🗌 Start up and Shutdown |
| □ Supplementary Instruction/Training Manuals □ | O&M Manual Received |
| Operator Training Conducted: | |
| Dates: | No. of Hours |
| Firm/Instructor: | |
| EQUIPMENT HAS BEEN CHECKED FOR: | |
| □ Installation □ Lubrication □ Alignment | |
| Stress Imposed by Piping and/or Anchor Bolts | |
| Operation under Full Load Conditions | |
| Other Conditions as Specified | <u>.</u> |
| I hereby certify that I was present when the equipment des inspected, checked and adjusted the equipment as neces technical representative of the equipment manufacturer, I the equipment. | sary for its proper operation. As an authorized |
| Ву: | Date: |
| Representing: | <u> </u> |
| Witnessed by: | <u>.</u> |

| North Texas Municipal |
|--------------------------|
| Water District |

| PROJECT: OWNER: CONTRACTOR: ENGINEER: | | PROJECT NUMBER: | | | |
|---|---|-------------------------------|--|--|--|
| REFERENCE DATA: O&M No.: Description: Specification Section No.: Entitled: | Page No.: Par. | No.: Sheet No.: | | | |
| Detail Designation: | | Drawing Attached: 🗌 Yes 🗌 No | | | |
| EQUIPMENT IDENTIFICATION: Name (from drawings): Identification No.: Manufacturer: Capacity: M | | Unit No.: Serial No.: | | | |
| LOCATION: Structure: E/W Coord.: | N/3 Station: | S Coord.: Elevation: | | | |
| SUBMITTAL: Preliminary O & M Final O & M Revised Final | | | | | |
| | DESCRIPTION OF OPERAT Normal Operating Characterist | tics | | | |
| | | P BY STEP PROCEDURES FOR | | | |
| Start-up | I Operations | Shut Down Regulation | | | |
| Control Emerge | ency Conditions | Limiting Operating Conditions | | | |
| | MAINTENANCE INSTRUCT | ION | | | |
| Preventive/Routine Maintenance | e Schedule | Guide to Troubleshooting | | | |
| | MAINTENANCE - LUBRICAT | ΓΙΟΝ | | | |
| Lubricant Chart Lubrica | ation Schedule | ross Reference | | | |
| | MAINTENANCE - ASSEME | BLY | | | |
| Exploded View | Cross Sectional Views | Parts List and Number | | | |
| EQUIPMENT MANUFACTU | RER'S RECOMMENDED STE | P BY STEP PROCEDURES FOR | | | |
| | | Reassembly Installation | | | |
| Alignment/Adjustment/Calibration Preventive Maintenance Procedures | | | | | |
| | | | | | |
| Generic Name | PARTS | | | | |

(Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements - Project #490)

| ELECTRICAL Operating Procedure Electrical Components (by model) Circuit Directories As-installed Wiring Diagrams Maintenance Procedures As-Installed Control Diagrams by Control Mfg. Written Description of the Sequence of Operation for Electrical Controls | | | | |
|--|---|--|--|--|
| WARRANTY | AND SERVICE | Extended Service Agreement | | |
| ☐ Manual Te ☐ Drawing 8- | ESENTATION xt and Drawings 1/2 x 11 or 11 x ent Data Delete | 17 placed in envelopes bound in Manual | | |
| Comment Number | Reviewed By | Review Comments | | |
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By:_____ Page 2 of 2



CONSENT OF SURETY COMPANY TO FINAL PAYMENT

| PROJECT: OWNER: CONTRACTOR: ENGINEER: | | | PROJECT | NUMBER: |
|--|--|--|------------------------|----------|
| The Surety Company Contract Documents, Contractor shall not re | , on bond of the Contractor listed hereby approves final payment t elieve the Surety Company of an orth in said Surety Company's bo | o the Contractor, and agr y of its obligations to the C | ees that final payment | t to the |
| In witness whereof, th | e Surety Company has hereunto | set its hand this | _day of | 20 |
| | | Surety Co | ompany | |
| | | By Authorize | ed Representative | |
| | | Title | | |
| | | Address: | | |
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CONSENT OF SURETY COMPANY TO REDUCTION OF OR PARTIAL RELEASE OF RETAINAGE

| | PROJECT NUMBER: |
|--|---|
| | |
| The Surety Company, on bond of the Contrac Contract Documents, hereby approves a the and agrees that payment of this amount to the | tor listed above for the referenced project, in accordance with the release of retainage to the Contractor in the amount of a Contractor shall not relieve the Surety Company of any of its be Contract, and as set forth in said Surety Company's bond. |
| In witness whereof, the Surety Company has h | nereunto set its hand this day of 20 |
| | Surety Company |
| | By: Authorized Representative |
| | Title: |
| | Address: |
| | |
| | |
| | |
| | |
| Attach Power of Attorney | |
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CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

7

| PROJECT: OWNER: CONTRACTOR: ENGINEER: | | PROJECT NUMBER: | | |
|---|--|-----------------|--|--|
| The Contractor, in accordance with the Contract Documents, hereby certifies that, except as listed below, all obligations for all materials and equipment furnished, for all work labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or his property might in any way be held responsible have been paid in full or have otherwise been satisfied in full. | | | | |
| EXCEPTIONS: | (If none, write "NONE". The Contractor shall furnish a bond, acceptable to the Owner, for each exception.) | | | |
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| CONTRACTOR | | | | |
| BY | | | | |
| | | | | |
| Subscribed and sw | vorn to before me this day of | , 20 | | |
| Notary Public: | | | | |
| My Commission Ex | xpires: | | | |



| PROJECT: OWNER: CONTRACTOR: | | PROJECT NUMBER: | | |
|---|-------------------------------|-----------------|--|--|
| ENGINEER: | | | | |
| The Contractor, in accordance with the Contract Documents, and in consideration for the full and final payment to the Contractor for all services in connection with the project, does hereby waive and release any and all liens, or any and all claims to liens which the Contractor may have on or affecting the project as a result of its contract(s) for the Project or for performing labor and/or furnishing materials in any way connected with the construction of any aspect of the project. The Contractor further certifies and warrants that all subcontractors of labor and/or materials for the Project, except as listed below, have been paid in full for all labor and/or materials supplied to, for, through or at the direct or indirect request of the Contractor prior to, through and including the date of this affidavit. | | | | |
| EXCEPTIONS: (If none, write "NONE". The Contractor shall furnish a bond, acceptable to the Owner, for each exception.) | | | | |
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| CONTRACTOR | | | | |
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| | vorn to before me this day of | , 20 | | |
| Notary Public: | | | | |
| My Commission Expires: | | | | |

01 31 24 INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM

1.00 GENERAL

1.01 WORK INCLUDED

- A. The Owner will utilize an Internet-based project delivery management system to manage this project.
- B. The project website will provide server space and secured access to staff members representing the Owner, Engineer, and Contractor. Each user will have a separate log-in name and password to access the website.
 - 1. Upon receipt of Notice of Award, Contractor to designate the lead person who will automatically receive notifications when responses are made to contractor postings. Contractor is allowed to request one additional user as support or back-up.
 - 2. Instruction for login and use of system will be provided prior to preconstruction meeting.
- C. Contract management related documents will be submitted, tracked, responded to, and made available to the Owner, Engineer and Contractor through the management system.

1.02 REQUIREMENTS

- A. The Contractor will be required to make all submittals in electronic format by utilizing the designated construction management system. Process will be discussed at the preconstruction meeting.
- B. The website includes a secured document management system for storing and making available to the project team the following:
 - 1. Ability to store files and correspondence.
 - 2. Latest drawings and specifications.
 - 3. Project progress photos.

All electronic documents are considered record on file upon system receipt.

- C. The website will include the following database driven applications. The system is designed to inform team members regarding new or updated documents and automatic task assignment and overdue notifications. The following items shall be entered, submitted, tracked, and responded to on-line:
 - 1. Document Management
 - 2. Construction Schedule
 - 3. Meeting Minutes
 - 4. RFIs (Requests for Information)
 - 5. Submittals
 - 6. CTRs (Certified Test Reports)
 - 7. Owner Inspector Daily Field Report.
 - 8. Contractor's Site Visit Reports
 - 9. PCMs (Preliminary Change Modifications)
 - 10. Change Orders
 - 10. Applications for Payment with Schedule of Values
 - 11. Warranty documents
 - 12. Test Reports
 - 13. Field Orders
 - 14. Work Change Directives
- 1.03 ARCHIVES
 - A. Owner's chosen web based project delivery management application is capable of archiving all files on the website.

01 31 24-1

B. All data from the website, such as RFIs, submittals, etc. will be available in the archive.

Internet Based Construction Management

NTMWD #490 – Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements May 2020

2.00 PRODUCTS

2.01 SOFTWARE

A. The actual software product to be used will be determined by the Owner.

3.00 EXECUTION

3.01 ORIENTATION

A. Contractor will receive system orientation by email. Orientation email will contain login instructions, video tutorials, user guide and access to system provided online training resources. Additional training can be done at the request of Contractor at no additional expense to the Contractor.

3.02 SUPPORT

A. Contractor shall contact Owner for initial system support. Owner will determine if Project Controls is to be contacted for further support. System support is provided at no additional expense to Contractor.

3.03 OPERATION

A. Contractor shall maintain high speed access to the internet for the Contractor and Owner to have access to and use of system at the jobsite trailers as well as on mobile devices.

3.04 DURATION

A. The website will be active for the duration of project delivery and a minimum of 3 months past final completion at which time the project file will be archived.

3.05 ARCHIVES

A. All files on the website will be archived at the end of the project. The archive file will be made available upon request by Contractor no sooner than 3 months past final completion.

END OF SECTION

01 32 16 CONSTRUCTION PROGRESS SCHEDULE

1.00 GENERAL

1.01 REQUIREMENTS

- A. Prepare and submit a progress schedule for the Work and update the schedule on a monthly basis for the duration of the Project.
- B. Provide schedule in adequate detail to allow Owner to monitor the work progress, to anticipate the time and amount of Applications for Payment, and to relate submittal processing to sequential activities of the Work.
- C. Incorporate and specifically designate the dates of anticipated submission of submittals and the dates when submittals must be returned to the Contractor into the schedule.
- D. Assume complete responsibility for maintaining the progress of the Work per the submitted schedule.
- E. Take all requirements of Section 01 35 00, SPECIAL PROCEDURES into consideration when preparing schedule.

1.02 SUBMITTALS

- A. Submit progress schedules in accordance with Section 01 33 00, SUBMITTALS. Submit schedules within the following times:
 - 1. Preliminary schedule within 10 days after the Notice of Award. The schedule is to be available at the pre-construction conference.
 - 2. Detailed schedule at least 10 days prior to the first payment request.
- B. Submit progress schedules with Applications for Payment. Schedules may be used to evaluate the Applications for Payment. Failure to submit the schedule may cause delay in the review and approval of Applications for Payment.

1.03 SCHEDULE REQUIREMENTS

- A. Schedule is to be in adequate detail to:
 - 1. Assure adequate planning, scheduling, and reporting during the execution of the Work.
 - 2. Assure the coordination of the Work of the Contractor and the various Subcontractors and Suppliers.
 - 3. Assist in monitoring the progress of the work.
 - 4. Assist in evaluating proposed changes to Contract Time and project schedule.
 - 5. Assist the Owner in review of Contractor's Application for Payment.
- B. Provide personnel with five (5) years minimum experience in scheduling construction work comparable to this project.
- C. Provide the schedule in the form of a time scaled horizontal bar chart which indicates graphically the Work scheduled at any time during the Project. The graph is to indicate:
 - 1. Complete sequence of construction by activity.
 - 2. Identification of the activity by structure, location, and type of Work.
 - 3. Chronological order of the start of each item of work.
 - 4. The activity start and stop dates.
 - 5. The activity duration.
 - 6. Successor and predecessor relationships for each activity. Group related activities or use lines to indicate relationships.
 - 7. A clearly indicated critical path. Indicate only one critical path on the schedule. The subsystem with the longest time of completion is the critical path where several subsystems each have a critical path. Float time is to be assigned to other subsystems.

- 8. Projected percentage of completion, based on dollar value of the Work included in each activity as of the day Applications for Payment are due of each month.
- D. Submit a separate submittal schedule indicating the dates when the submittals are to be sent to the Engineer.
 - 1. List specific dates submittal is to be sent to the Engineer.
 - 2. List specific dates submittal must be processed in order to meet the proposed schedule.
 - 3. Allow a reasonable time to review submittals, taking into consideration the size and complexity of the submittal, the submission of other submittals, and other factors that may affect review time.
 - 4. Allow time for re-submission of the submittals for each item. Contractor is responsible for delays associated with additional time required to review incomplete or erroneous submittals and for the time lost when submittals are submitted for products that do not meet specification requirements.
- E. Update the schedule at the end of each monthly partial payment period to indicate the progress made on the project to that date.

1.04 SCHEDULE REVISIONS

- A. Submit a written report if the schedule indicates that the Project is more than thirty (30) days behind schedule. The report is to include:
 - 1. Number of days Project is behind schedule.
 - 2. Narrative description of the steps to be taken to bring the Project back on schedule.
 - 3. Anticipated time required to bring the Project back on schedule.

Submit a revised schedule indicating the action that the Contractor proposes to take to bring the Project back on schedule.

- B. Revise the schedule to indicate any adjustments in Contract Time approved by Change Order.
 - 1. Revised schedule is to be included with Contract Modification Request for which an extension of time is requested.
 - 2. Failure to submit a revised schedule indicates that the modification shall have no impact on the ability of the Contractor to complete the project on time and that the cost associated with the change of additional plant or work force have been included in the cost proposed for the modification.
- C. Updating the project schedule to reflect actual progress is not considered a revision to the project schedule.
- D. Applications for Payment will not be recommended for payment without a revised schedule and if required, the report indicating the Contractor's plan for bringing the project back on schedule.

1.05 FLOAT TIME

- A. Define float time as the amount of time between the earliest start date and the latest start date of a chain of activities on the construction schedule.
- B. Float time is not for the exclusive use or benefit of either the Contractor or Owner.
- C. Contract time cannot be changed by the submission of this schedule. Contract Time can only be modified by approved Change Order.
- D. Schedule completion date must be the same as the contract completion date. Time between the end of construction and the contract completion date is to be indicated as float time.

END OF SECTION

01 32 33 PHOTOGRAPHIC DOCUMENTATION

1.00 GENERAL

1.01 WORK INCLUDED

- A. Provide a video recording with audio and narration of the Site prior to the beginning of construction and after the completion of construction. The narration shall describe what is being shown in the video, including building/process, manhole number, pipeline and station number, etc. as applicable.
 - 1. Record the condition of all existing facilities in or abutting the construction area (right-ofway) including but not limited to streets, curb and gutter, utilities, driveways, fencing, landscaping, etc.
 - 2. Record after construction staking is complete but prior to any clearing where possible.
 - 3. Upload the recording, with label and date into the Internet based Construction Management System before the start of construction. Provide additional recording as directed by the Construction Manager if the recording provided is not considered suitable for the purpose of recording conditions prior to construction.
- B. Furnish an adequate number of photographs of the Site to clearly depict the completed project.
 - 1. Provide a minimum of ten different views.
 - 2. Photograph a panoramic view of the entire project site.
 - 3. Photograph all significant areas of completed construction.
 - 4. Completion photographs are not to be taken until all construction trailers, excess materials, trash and debris have been removed.
- C. All photographs, video recordings are to become the property of the Owner. Photographs or recordings may not be used for publication, or public or private display without the written consent of the Owner.

1.02 QUALITY ASSURANCE

A. Provide clear photographs and recordings taken with proper exposure. View photographs and recordings in the field and take new photographs or recordings immediately if photos of an adequate print quality cannot be produced or video quality is not adequate. Provide photographs with adequate quality and resolution to permit enlargements.

1.03 SUBMITTALS

A. Submit photographic documentation as record data in accordance with Section 01 33 00, SUBMITTALS.

2.00 PRODUCTS

- 2.01 PHOTOGRAPHS
 - A. Upload photographs in digital format with a minimum resolution of 1280 X 960, accomplished without a digital zoom.
 - B. Take photographs at locations acceptable to the Construction Manager.
 - D. Identify each digital file name with:
 - 1. Date, time, location, and orientation of the exposure.
 - 2. Description of the subject of photograph.
- 2.02 VIDEO RECORDING
 - A. Upload digital format to Project Mates in format that allows playback within Windows Media player in common format in full screen. Provide digital format on DVD that can be played on Windows Media Player in common format in full screen mode.

B. Identifying project on tape by audio or visual means.

END OF SECTION

01 33 00 SUBMITTALS

1.00 GENERAL

1.01 WORK INCLUDED

- A. Submit documentation as required by the Contract Documents and as reasonably requested by the Owner, Construction Manager and Engineer to:
 - 1. Record the products incorporated into the Project for the Owner.
 - 2. Provide information for operation and maintenance of the Project.
 - 3. Provide information for the administration of the Contract.
 - 4. Allow the Engineer to advise the Owner if products proposed for the project by the Contractor conform, in general, to the design concepts of the Contract Documents.
- B. Contractor's responsibility for full compliance with the Contract Documents is not relieved by the Engineer's review of submittals. Contract modifications may only be approved by Change Order or Field Order.
- C. Contractor shall utilize the Internet Based Construction Management System (Projectmates) as stated in Section 01 31 24, INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM.

1.02 CONTRACTOR'S RESPONSIBILITIES

- A. Review all submittals prior to submission.
- B. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction requirements.
 - 3. Location of all existing structures, utilities and equipment related to the submittals.
 - 4. Submittals are complete for their intended purpose.
 - 5. Conflicts between the submittals related to the various Subcontractors and Suppliers have been resolved.
 - 6. Quantities and dimensions shown on the submittals.
- C. Submit information per the procedures described in this section and the detailed specifications.
- D. Furnish the following submittals:
 - 1. Schedules, data and other documentation as described in detail in this section or referenced in the General Conditions.
 - 2. Documentation required for the administration of the Contract per Section 01 31 13, PROJECT COORDINATION.
 - 3. Shop Drawings required for consideration of a contract modification per Paragraph 1.08.
 - 4. Submittals as required in the Specifications.
 - 5. Submittals not required will be returned without Engineer's review.
- E. Submit a schedule indicating anticipated submittals, the date submittals will be sent to the Engineer and proposed dates that the product will be incorporated into the project. Make submittals promptly in accordance with the schedule so as to cause no delay in the Project.
 - 1. Send submittals to Project Mates allowing a reasonable time for review. Include time for review of a resubmission if necessary. Allow adequate time for the submittal review process, ordering, fabrication, and delivery of the product so as to not delay progress on the Project.
 - 2. Schedule submittal to provide all information for interrelated work at one time. No review will be performed on submittals requiring coordination with other submittals. Engineer will return submittals for resubmission as a complete package.
- F. Submit information for all of the components and related equipment required for a complete and operational system in the same submittal.

- 1. Include electrical, mechanical, and other information required to indicate how the various components of the system function.
- 2. Provide certifications, warranties, and written guarantees with the submittal package for review when they are required.
- G. Fabrication or installation of any products prior to the approval of Shop Drawings is done at the Contractor's risk. Products not meeting the requirements of Contract Documents are defective and may be rejected at the Owner's option.
- H. Payment will not be made for products for which submittals are required until the submittals have been received. Payment will not be made for products for which Shop Drawings or Samples are required until these are approved by the Engineer.

1.03 QUALITY ASSURANCE

- A. Submit legible, accurate, complete documents presented in a clear, easily understood manner. Submittals not meeting these criteria will be returned without review.
- B. Demonstrate that the proposed products are in full and complete compliance with the design criteria and requirements of the Contract Documents including Drawings and Specifications as modified by Addenda, Field Orders, and Change Orders.
- C. Furnish and install products that fully comply with the information included in the submittal.
- D. Review and approve submittals prior to submitting them to the Engineer for review. Submittals will not be accepted from anyone other than the Contractor.

1.04 SUBMITTAL PROCEDURES

- A. Deliver submittals to Projectmates system unless otherwise stated at the pre-construction conference. The complete contents of each submittal, including associated drawings product data, etc., shall be submitted in Adobe Acrobat PDF format, or other format approved by Engineer.
 - 1. Assign the number consisting of a prefix, a sequence number, and a letter suffix. Prefixes shall be as follows:

| Prefix | Description | Originator |
|--------|-----------------------------------|------------|
| CO | Change Order | Owner |
| PCM | Preliminary Contract Modification | Contractor |
| EIR | Equipment Installation Report | Contractor |
| FO | Field Order | Engineer |
| O&M | Operation & Maintenance Manuals | Contractor |
| RFI | Request for Information | Contractor |
| SD | Shop Drawing | Contractor |

- 2. Issue sequence numbers in chronological order for each type of submittal.
- 3. Issue numbers for resubmittals that have the same number as the original submittal followed by an alphabetical suffix indicating the number of times the same submittal has been sent to the Engineer for processing. For example: SD-025-A represents a shop drawing that is the twenty-fifth submittal of this type and is the second time this submittal has been sent for review.
- 4. Clearly note the submittal number on each page or sheet of the submittal.
- 5. Correct assignment of numbers is essential since different submittal types are processed in different ways.
- B. Submit attachments-with uniform markings and page sizes.
 - 1. Paper size shall allow for ease of reproduction.
 - a. Submit documents on 8-1/2" X 11" paper where practical.
 - b. Use 11" X 17" paper for larger drawings and schematics.

- c. Use full size sheets for fabrications and layout drawings. Reproducible drawings may be submitted in lieu of prints.
- 2. Mark submittals to:
 - a. Indicate Contractor's corrections in green.
 - b. Highlight items pertinent to the products being furnished in yellow and delete items that are not pertinent when the Supplier's standard drawings or information sheets are provided.
 - c. Cloud items and highlight in yellow where selections by the Engineer or Owner are required.
 - d. Mark dimensions with the prefix FD to indicate field verified dimensions on the drawings.
 - e. Provide a blank space 8" x 3" for Contractor's and Engineer's stamp.
- 3. Define abbreviations and symbols used in Shop Drawings.
 - a. Use terms and symbols in Shop Drawings consistent with the Contract Drawings.
 - b. Provide a list of abbreviations and their meaning as used in the Shop Drawings.
 - c. Provide a legend for symbols used on Shop Drawings.
- C. Mark submittals to reference the Drawing number and/or section of the Specifications, detail designation, schedule or location that corresponds with the data submitted. Other identification may also be required, such as layout drawings or schedules to allow the reviewer to determine where a particular product is to be used.
 - 1. Submit items specified in different sections of the Specifications separately unless they are part of an integrated system.
- D. Deliver samples required by the Specifications to the project site. Provide a minimum of two (2) samples.
- E. Construct mock-ups from the actual products to be used in construction per Specifications.
- F. Submit color charts and Samples for every product requiring color, texture or finish selection.
 - 1. Submit all color charts and Samples at one time.
 - 2. Do not submit color charts and Samples until all record data have been submitted or Shop Drawings for the products have been approved.
 - 3. Submit color charts and Samples not less than thirty (30) days prior to when these products are to be ordered or released for fabrication to comply with the schedule for construction of the Project.
- G. Submit Preliminary Contract Modification per Section 01 31 13, PROJECT COORDINATION to request modifications to the Contract Documents.

1.05 REVIEW PROCEDURES

- A. Shop drawings are reviewed in the order received, unless Contractor request that a different priority be assigned.
- B. Mark a submittal as "Priority" to place the review for this submittal ahead of submittals previously delivered. Priority submittals will be reviewed before other submittals for this Project which have been received but not reviewed. Use discretion in the use of "Priority" submittals as this may delay the review of submittals previously submitted. Revise the Schedule of Contractor's Submittals for substantial deviations from the previous schedule.
- C. Review procedures vary with the type of submittal as described in Paragraph 1.06.
- D. Partial shop drawing approval will not be allowed.

1.06 SUBMITTAL REQUIREMENTS

- A. Shop Drawings are required for those products that cannot adequately be described in the Contract Documents to allow fabrication, erection or installation of the product without additional detailed information from the Supplier.
 - 1. Shop drawings are requested so that the Engineer can:

- a. Assist the Owner in selecting colors, textures or other aesthetic features.
- b. Compare the proposed features of the product with the specified features so as to advise the Owner that the product does, in general, conform to the Contract Documents.
- c. Compare the performance features of the proposed product with those specified so as to advise the Owner that it appears that the product will meet the designed performance criteria.
- d. Review required certifications, guarantees, warranties, and service agreements for compliance with the Contract Documents.
- 2. Certify that Contractor has reviewed the Shop Drawings and made all necessary corrections such that the products, when installed, will be in full compliance with the Contract Documents per Section 00 73 00, Supplementary Conditions. Shop Drawings submitted without this certification will be returned without review.
- 3. Submit Shop Drawings for:
 - a. Products indicated in the submittal schedule following this section.
 - b. When a substitution or equal product is proposed in accordance with Paragraph 1.08 of this Section.
- 4. Include a complete description of the material or equipment to be furnished. Information is to include:
 - a. Type, dimensions, size, arrangement, model number, and operational parameters of the components.
 - b. Weights, gauges, materials of construction, external connections, anchors, and supports required.
 - c. Performance characteristics, capacities, engineering data, motor curves, and other information necessary to allow a complete evaluation of mechanical components.
 - d. All applicable standards such as ASTM or Federal specification numbers.
 - e. Fabrication and installation drawings, setting diagrams, manufacturing instructions, templates, patterns, and coordination drawings.
 - f. Wiring and piping diagrams and related controls.
 - g. Mix designs for concrete, asphalt, or other materials proportioned for the Project.
 - h. Complete and accurate field measurements for products which must fit existing conditions. Indicate on the submittal that the measurements represent actual dimensions obtained at the site.
- 5. Provide all required statements of certification, guarantees, extended service agreements, and other related documents with the Shop Drawing. The effective date of these documents shall be the date of acceptance of the work by the Owner.
- 6. Comments will be made on items called to the attention of the Engineer for review and comment. Any marks made by the Engineer do not constitute a blanket review of the submittal or relieve the Contractor from responsibility for errors or deviations from the Contract requirements.
 - a. Submittals that are reviewed will be returned with one or more of the following designations:
 - 1) No Exceptions Taken Submittal is found to be acceptable as submitted.
 - 2) Exceptions Noted Submittal is acceptable with corrections or notations made by Engineer and may be used as corrected.
 - Revise and Resubmit Submittal has deviations from the Contract Documents, significant errors, or is inadequate and must be revised and resubmitted for subsequent review.
 - 4) Rejected Products are not acceptable.
 - 5) Filed As Received Receipt of the information is acknowledged; however, no review has been performed.
 - b. Drawings with a significant or substantial number of markings by the Contractor may be marked "Exceptions Noted" and "Revise and Resubmit". These drawings are to be revised to provide a clean record of the submittal.
 - c. Dimensions or other data that do not appear to conform to the Contract Documents will be marked as "At Variance With" (AVW) the Contract Documents or other information provided. The Contractor is to make revisions as appropriate to comply with Contract Documents.

- B. Certifications, Warranties and Service Agreements include documents as specified in the detailed specifications, as shown in the submittal schedule or as follows:
 - 1. Certified Test Reports (CTR) A report prepared by an approved testing agency giving results of tests performed on products to indicate their compliance with the specifications. (Refer to Section 01 40 00, QUALITY REQUIREMENTS.)
 - Certification of Local Field Service (CLS) A certified letter stating that field service is available from a factory or supplier approved service organization located within a 50 mile radius of the project site. List names, addresses, and telephone numbers of approved service organizations on or attach to the certificate.
 - 3. Extended Warranty (EW) A guarantee of performance for the product or system beyond the normal one year correction period described in the General Conditions. Issue the warranty certificate in the name of the Owner.
 - 4. Extended Service Agreement (ESA) A contract to provide maintenance beyond that required to fulfill requirements for warranty repairs, or to perform routine maintenance for a definite period of time beyond the warranty period. Issue the service agreement in the name of the Owner.
 - 5. Certification of Adequacy of Design (CAD) A certified letter from the manufacturer of the equipment stating that they have designed the equipment to be structurally stable and to withstand all imposed loads without deformation, failure, or adverse effects to the performance and operational requirements of the unit. The letter shall state that mechanical and electrical equipment is adequately sized to be fully operational for the conditions specified or normally encountered by the product's intended use.
 - 6. Certification of Applicator/Subcontractor (CSQ) A certified letter stating that the Subcontractor or Supplier proposed to perform a specified function is duly designated as factory authorized and trained for the application of the specified product.
- C. Submit record data to provide information to allow the Owner to adequately identify the products incorporated into the project and allow replacement or repair at some future date.
 - 1. Provide record data for all products. Record data is not required for items for which Shop Drawings and/or operations and maintenance manuals are required.
 - Provide information only on the specified products. Submit a Preliminary Contract Modification for approval of deviations or substitutions and obtain approval by Field Order or Change Order prior to submitting record data.
 - 3. Provide the same information required for Shop Drawings.
 - 4. Record data will be received by the Engineer, logged, and provided to Owner for the Project record.
 - a. Record data may be reviewed to see that the information provided is adequate for the purpose intended. Inadequate drawings will be returned as unacceptable.
 - Record data is not reviewed for compliance with the Contract Documents. Comments may be returned if deviations from the Contract Documents are noted during the cursory review performed to see that the information is adequate.
- D. Provide Samples for comparison with products delivered to the Site for use on the Project.
 - 1. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Indicate the full range of color, texture, and patterns.
 - 3. Dispose of Samples when related Work has been completed and approved, and disposal is requested by the Engineer. At Owner's option Samples will become the property of the Owner.
- E. Construct mock-ups for comparison with the work being performed.
 - 1. Construct mock-ups of the size or area indicated in the detailed Specifications.
 - 2. Construct mock-ups complete with texture and finish to represent the finished product.
 - 3. Protect mock-ups until Work has been completed and accepted by the Owner.
 - 4. Dispose of mock-ups when related Work has been completed and disposal is approved by the Engineer.

- F. Submit Operation and Maintenance manuals (O&M) for all equipment, mechanical devices, or components described in the Contract Documents per Section 01 78 23, OPERATION AND MAINTENANCE DATA. Include copies of approved Shop Drawings in the manual.
 - 1. Three hard copies of final O&M's will be required.
- G. Submit Request for Information (RFI) in accordance with Section 01 31 13, PROJECT COORDINATION.
- H. Submit a Schedule of Values and Application for Payment (AP) in accordance with Section 01 29 00, PAYMENT PROCEDURES.
- I. Submit Progress Schedules (SCH) in accordance with Section 01 32 16 CONSTRUCTION PROGRESS SCHEDULES.
- J. Submit Certified Test Reports (CTR) from independent testing laboratories in accordance with Section 01 40 00, QUALITY REQUIREMENTS.
 - 1. Submit test reports for material fabricated for this project with Shop Drawings for that product.
 - 2. Submit test reports produced at the point of production for standard production products with the record data for that product.
- K. Submit a list of Suppliers and Subcontractors as record data in accordance with Section 01 31 13, PROJECT COORDINATION.
- L. Submit Equipment Installation Reports (EIR) in accordance with Section 01 75 00, STARTING AND ADJUSTING.
- M. Submit Notifications by Contractor (NBC) in accordance with Section 01 31 13, PROJECT COORDINATION.

1.07 REQUESTS FOR DEVIATION

- A. Submit requests for deviations from the Contract Documents for any product that does not fully comply with the Contract Documents.
- B. Submit request for deviations by Preliminary Contract Modification in the Contractor's standard format per Section 01 31 13, PROJECT COORDINATION. Identify the deviations and the reason the change is requested.
- C. Include the amount if cost savings to the Owner for deviations that result in a reduction in cost.
- D. A Change Order will be issued by the Owner for deviations, if approved. Deviations from the Contract Documents require specific approval by the Owner and the Engineer.

1.08 SUBMITTALS FOR EQUAL NON-SPECIFIED PRODUCTS

- A. The products of the listed suppliers are to be furnished where detailed specifications list several manufacturers but do not specifically list "or equal" or "or approved equal" products. Use of any products other than those specifically listed is a substitution and must be approved per Paragraph 1.09.
- B. Contractor may submit other manufacturers' products that are in full compliance with the specification where detailed specifications list one or more manufacturers followed by the phase "or equal" or "or approved equal".
 - 1. Submit Shop Drawings of adequate detail to document that the proposed product is equal or superior to the specified product.
 - 2. Prove that the product is equal. It is not the Engineer's responsibility to prove the product is not equal.
 - a. Indicate on a point by point basis for each specified feature that the product is equal to the Contract Document requirements.
 - b. Make a direct comparison with the specified manufacturer's published data sheets and available information. Provide this printed material with the submittal.

- c. The decision of the Engineer regarding the acceptability of the proposed product is final.
- 3. Provide a typewritten certification that, in furnishing the proposed product as an equal, the Contractor:
 - a. Has thoroughly examined the proposed product and has determined that it is equal or superior in all respects to the product specified.
 - b. Has determined that the product will perform in the same manner as the specified product.
 - c. Will provide the same warranties and/or bonds as for the product specified.
 - d. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the product into the Work and will waive all claims for additional materials or effort which may be necessary to incorporate the product into the Project.
 - e. Will maintain or improve the delivery and installation schedule as for the specified product.
- 4. A modification request is not required for any product that is in complete compliance with the Contract Documents.

1.09 SUBMITTALS FOR SUBSTITUTIONS

- A. Substitutions are defined as any product that the Contractor proposes to provide for the Project in lieu of the specified product.
- B. Submit the following for consideration of approval of a Supplier or product which is not specified:
 - 1. Submit request for deviation from the Contract Documents per Paragraph 1.07.
 - 2. Prove that the product is acceptable as a substitute. It is not the Engineer's responsibility to prove the product is not acceptable as a substitute.
 - a. Indicate on a point by point basis for each specified feature that the product is acceptable to meet Contract Documents requirements.
 - b. Make a direct comparison with the specified Supplier's published data sheets and available information. Provide this printed material with the submittal.
 - c. The decision of the Engineer regarding the acceptability of the proposed substitute product is final.
 - 3. Provide a typewritten certification that, in making the substitution request, the Contractor:
 - a. Has determined that the substituted product will perform in substantially the same manner and result in the same ability to meet the specified performance as the specified product.
 - b. Will provide the same warranties and/or bonds for the substituted product as specified or as would be provided by the Manufacturer of the specified product.
 - c. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the substituted product into the project and will waive all claims for additional Work which may be necessary to incorporate the substituted product into the Project which may subsequently become apparent.
 - d. Will maintain the same time schedule as for the specified product.
- C. Pay engineering cost for review of substitutions.
 - Cost for additional review time will be billed to the Owner by the Engineer for the actual hours required for the review and marking of Shop Drawings by Engineer and in accordance with the rates listed in Paragraph SC-14.02, Section 00 73 00, Supplementary Conditions.
 - 2. Cost for the additional review shall be paid to the Owner by the Contractor on a monthly basis.

1.10 WARRANTIES AND GUARANTEES

A. Submit warranties and guarantees required by the Contract Documents with the Shop Drawings or record data.

- B. Provide additional copies for equipment and include this additional copy in the Operation and Maintenance Manuals. Refer to Section 01 78 23, OPERATION AND MAINTENANCE DATA.
- C. Provide a separate manual for warranties and guarantees.
 - 1. Provide a log of all products for which warranties or guarantees are provided, and for all equipment. Index the log by Specification section number on forms provided by the Engineer.
 - 2. Indicate the start date, warranty or guarantee period and the date upon which the Warranty or guarantee expires for product or equipment which a warranty or guarantee is required.
 - 3. Indicate the date for the start of the correction period specified in the General Conditions for each piece of equipment and the date on which the specified correction period expires.
 - 4. Provide a copy of the warrantee or guarantee under a tab indexed to the log.

1.11 RESUBMISSION REQUIREMENTS

- A. Make all corrections or changes in the submittals required by the Engineer and resubmit until approved.
- B. For shop drawings:
 - 1. Revise initial drawings or data and resubmit as specified for the original submittal.
 - 2. Highlight in yellow those revisions which have been made in response to the first review by the Engineer.
 - 3. Highlight in blue any new revisions which have been made or additional details of information that has been added since the previous review by the Engineer.
- C. For samples:
 - 1. Submit new samples as required for the initial sample.
 - 2. Remove samples which have been rejected.
- D. For mock-ups:
 - 1. Construct a new mock-up as initially required.
 - 2. Dispose of mock-ups which have been rejected.
- E. Engineering cost for excessive review of shop drawings will be paid by the Contractor.
 - 1. Excessive review of shop drawings is defined as any review required after the original review has been made and the first resubmittal has been checked to see that corrections have been made.
 - Cost for additional review time will be billed to the Owner by the Engineer for the actual hours required for the review and marking of shop drawings by Engineer and in accordance with the rates listed in Item SC-14.02, Section 00 73 00, Supplementary Conditions.
 - 3. Pay cost for the additional review to the Owner on a monthly basis as billed by the Owner.
 - 4. Need for more than one resubmission or any other delay of obtaining Engineer's review of submittals, will not entitle the Contractor to an extension of Contract Time. All costs associated with such delays shall be at the Contractor's expense.

1.12 ENGINEER'S DUTIES

- A. Review the submittals and return with reasonable promptness.
- B. Indicate approval, rejection, and the need for resubmittal.
- C. Distribute documents

END OF SECTION

01 35 00 SPECIAL PROCEDURES

1.00 GENERAL

1.01 SHUT DOWNS AND PLANS OF ACTION

- A. Shut-downs of operations or equipment must be planned and scheduled.
 - 1. Submit a written plan of action for approval for shutting down essential services. These include:
 - a. NTMWD Pipelines
 - b. Electrical power
 - c. Control power
 - d. Process piping
 - e. Treatment equipment
 - f. Communications equipment
 - g. Other designated functions
 - 2. Describe the following in the Plan of Action:
 - a. Construction necessary
 - b. Utilities, piping, or services affected
 - c. Length of time the service or utility will be disturbed
 - d. Procedures to be used to carry out the work
 - e. Plan of Action to handle emergencies
 - f. Contingency plan that will be used if the original schedule cannot be met
 - 3. Plan must be received by the Owner two (2) weeks prior to beginning the work.

1.02 CRITICAL OPERATIONS

A. The Owner has identified "Critical Operations" that must not be out of service longer than the designated maximum out of service time and/or must be performed only during the designated times. These have been identified in the table below:

| Item | Critical Operation | Maximum Time Out of Operation or Required Completion Date | Hours Operation Can be Shut Down | Liquidated Damages (Dollars per Hour) |
|------|--|--|---|--|
| 1. | Phase 2 Connection - 30" Wylie-Rockwall- Farmersville Pipeline Shutdown | 18 Hours | N/A | \$500 |
| 2. | Phase 3 Connection - 36" Royse City Pipeline Shutdown | 24 Hours | N/A | \$500 |
| 3. | Phase 4 Connection – 30" Wylie-Rockwall- Farmersville Pipeline Shutdown and 36" Royse City Pipeline Shutdown | 12 Hours | N/A | \$500 |

- B. Submit a written plan of action for approval for Critical Operation.
 - 1. Describe the following in the Plan of Action:
 - a. Construction necessary
 - b. Utilities, piping, or services affected
 - c. Length of time the service or utility will be disturbed
 - d. Procedures to be used to carry out the work
 - e. Plan of Action to handle emergencies
 - f. Contingency plan that will be used if the original schedule cannot be met
 - g. List of manpower, equipment, and ancillary supplies. Identify backups for key pieces of equipment such as excavators and pumps and key personnel such as welders.
 - 2. Plan must be received by the Owner two (2) weeks prior to beginning the work.

- C. Work affecting "Critical Operations" is to be performed on a 24-hour a day basis until Owner's normal operations have been restored.
- D. Provide additional work force and equipment as required to complete the work affecting "Critical Operations" within the allotted time.
- E. Include the cost for work affecting "Critical Operations" in the contract proposal.
- F. Liquidated damages will be assessed if work on "Critical Operations" is not completed within the time indicated.
 - 1. These items are critical to for operation of the existing distribution system.
 - 2. Loss of operation of the existing distribution system can subject the Owner to loss of revenue, additional operations cost, and fines from regulatory agencies.
 - 3. Liquidated damages have been established for each critical operation:
- G. Designated Critical Operations are described in more detail as follows:
 - Critical Operation 1 <u>Phase 2 Connection 30" Wylie-Rockwall-Farmersville Pipeline</u> <u>Shutdown</u> – This work includes connecting to the existing 30" Wylie-Rockwall-Farmersville Pipeline located on the east side of County Road 484 as detailed on Sheets D9-D11. Maximum time out of operation identified includes time required to dewater the existing line.
 - Critical Operation 2 <u>Phase 3 Connection 36" Royse City Pipeline Shutdown</u> This work includes connecting to the existing 36" Royse City Pipeline located on the east side of County Road 484 as detailed on Sheets D9-D11. Maximum time out of operation identified includes time required to dewater the existing line.
 - Critical Operation 3 <u>Phase 4 Connection 30" Wylie-Rockwall-Farmersville Pipeline</u> <u>Shutdown and 36" Royse City Pipeline Shutdown</u> – This work includes making final connections between the proposed 48" water line and 30" water line on the east side of CR 484. These connections require temporary shutdown of the existing 30" and 36" water lines.

1.03 OWNER ASSISTANCE

- A. The Owner will assist the Contractor in draining the existing pipelines as much as possible through existing blow-off valves, flanged fittings, or pump inspection ports. The Contractor will be responsible for providing dewatering pumps, etc. required to completely dewater the facilities and handle any leakage past closed valves.
- B. Due to the need to restore pipelines to service as quickly as possible, verification of welds is impractical. Therefore, only the following welders are approved for use during tie-ins to existing pipelines:

| Name | Phone Number | |
|---------------------|--------------|--|
| Thompson Pipe Group | 972-262-3600 | |
| Barry Fuller | 817-477-3841 | |
| Scott Fowler | 972-978-7865 | |
| Eddie Pierce | 214-909-6089 | |
| Nash Williams | 801-255-5959 | |

END OF SECTION

01 40 00 QUALITY REQUIREMENTS

1.00 GENERAL

1.01 CONTRACTOR'S RESPONSIBILITIES

- A. Control the quality of the Work and verify that the Work meets the standards of quality established in the Contract Documents.
 - 1. Inspect the Work of the Contractor, Subcontractors and Suppliers. Correct defective Work.
 - 2. Inspect products and materials to be incorporated into the Project. Ensure that Suppliers of raw materials, parts, components, assemblies, and other products have adequate quality control system to ensure that quality products are produced. Provide only products that comply with the Contract Documents.
 - 3. Provide all facilities and calibrated equipment required for quality control tests.
 - 4. Provide consumable construction materials of adequate quality to provide a finished product that complies with the Contract Documents.
 - 5. Perform tests as indicated in this and other sections of the specifications. Schedule the time and sequence of testing with the Construction Manager. All quality control testing is to be observed by the Construction Manager or designated representative.
 - 6. Maintain complete inspection and testing records at the site and make them available to Owner, Engineer and Construction Manager.
- B. Provide and pay for the services of an approved professional materials testing laboratory acceptable to the Owner to insure that Work fully complies with the Contract Documents. Provide services of a testing laboratory capable of performing a full range of testing procedures complying with the standards for testing procedures specified. Provide personnel certified to perform the test required. Obtain Owners' approval for the testing laboratory before testing is performed. All certified test results shall be delivered to the Owner.
- C. Should requirements of this Section of the specification conflict with the requirements of the technical specifications, the technical specifications shall govern.

1.02 QUALITY ASSURANCE ACTIVITIES BY THE OWNER

- A. Owner may perform its own quality assurance test independent of the Contractor's Quality Control Program or as otherwise described in the Contract Documents. Provide labor, materials, tools, equipment, and related items for testing by the Owner including, but not limited to temporary construction required for testing and operation of new and existing utilities. Assist the Owner, Engineer, Construction Manager, and testing organizations in performing quality assurance activities.
 - 1. Provide access to the Work and to the Supplier's operations at all times Work is in progress.
 - 2. Cooperate fully in the performance of sampling, inspection, and testing.
 - 3. Furnish labor and facilities to:
 - a. Provide access to the work to be tested.
 - b. Obtain and handle samples for testing at the project site or at the source of the product to be tested.
 - c. Provide calibrated scales and measuring devices for the Owner's use.
 - d. Facilitate inspections and tests.
 - e. Provide adequate lighting to allow Owner observations.
 - f. Store and cure test samples.
 - 4. Furnish copies of the tests performed on materials and products.
 - 5. Provide adequate quantities of representative product to be tested to the laboratory at the designated location.

- 6. Give the Construction Manager adequate notice before proceeding with work that would interfere with testing.
- 7. Notify the Construction Manager and the testing laboratory prior to the time that testing is required. Lead time is to be adequate to allow arrangements to be made for testing.
- 8. Do not proceed with any work until testing services have been performed and results of tests indicate that the work is acceptable.
- 9. Provide complete access to the Site and make Contract Documents available.
- 10. Provide personnel and equipment needed to perform sampling or to assist in making the field tests.
- 11. Quality assurance testing performed by the Owner will be paid for by the Owner, except for verification testing performed by the Owner, which shall be paid for by the Contractor as described in Paragraph 1.06.
- B. Quality assurance activities of the Owner, Engineer or Construction Manager through their own forces or through contracts with materials testing laboratories and survey crews are for the purpose of monitoring the results of the Contractor's work to see that it is in compliance with the requirements of the Contract Documents.
- C. Quality assurance activities of the Owner and Engineer or non-performance of quality assurance activities:
 - 1. Do not relieve the Contractor of its responsibility to perform Work and furnish materials and products and constructed Work conforming to the requirements of the Contract Documents.
 - 2. Do not relieve the Contractor of its responsibility for providing adequate quality control measures.
 - 3. Do not relieve the Contractor of responsibility for damage to or loss of the material, product or Work before Owner's acceptance.
 - 4. Do not constitute or imply Owner's acceptance.
 - 5. Do not affect the continuing rights of the Owner after Owner's acceptance of the completed Work.
- D. The presence or absence of the Owner's Resident Representative or Engineer does not relieve the Contractor from any contract requirement, nor is the Owner's Resident Representative or Engineer authorized to change any term or condition of the Contract Documents without the Owner's written authorization in a Field Order or Change Order.
- E. Failure on the part of the Owner, Engineer or Construction Manager to perform or test products or constructed works in no way relieves the Contractor of the obligation to perform work and furnish materials conforming to the Contract Documents.
- F. All materials and products are subject to Owner's quality assurance observations or testing at any time during preparation or use. Material or products which have been tested or observed or approved by Owner at a supply source or staging area may be re-observed or re-tested by Owner before or during or after incorporation into the Work, and rejected if they do not comply with the Contract Documents.

1.03 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTALS, and shall include:
 - 1. A written Quality Management Plan that establishes the methods of assuring compliance with the Contract Documents. Submit this program as Record Data
 - 2. A Statement of Qualification for the proposed testing laboratory. The statement of qualifications is to include a list of the engineers and technical staff that will provide testing services on the Project, descriptions of the qualifications of these individuals, list of tests that can be performed, equipment used with date of last certification and a list of recent projects for which testing has been performed with references for those projects.
 - 3. Test reports per Paragraph 1.07, TEST REPORTS of this specification. Reports are to certify that products or constructed Works are in full compliance with the Contract

Documents or indicate that they are not in compliance and describe how they are not in compliance.

4. Provide Certified Test Reports on materials or products to be incorporated into the Project. Reports are to indicate that material or products are in full compliance with the Contract Documents or indicate that they are not in compliance and describe how they are not in compliance.

1.04 STANDARDS

- A. Provide a testing laboratory that complies with the ACIL (American Council of Independent Laboratories) "Recommended Requirements for Independent Laboratory Qualifications".
- B. Perform testing per recognized test procedures as listed in the various sections of the specifications, standards of the State Department of Highways and Public Transportation, American Society of Testing Materials (ASTM), or other testing associations. Perform tests in accordance with published procedures for testing issued by these organizations.

1.05 DELIVERY AND STORAGE

Handle and protect test specimens of products and construction materials at the Site in accordance with recognized test procedures.

1.06 VERIFICATION TESTING

- A. Provide verification testing when tests indicate that materials or the results of construction activities are not in conformance with Contract Documents.
- B. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made.
- C. Tests must comply with recognized methods or with methods recommended by the testing laboratory and approved by the Engineer.

1.07 TEST REPORTS

- A. Test reports are to be prepared for all tests.
 - 1. Tests performed by testing laboratories may be submitted on their standard test report forms. These reports must include the following:
 - a. Name of the Owner, project title and number, equipment installer and general contractor.
 - b. Name of the laboratory, address, and telephone number.
 - c. Name and signature of the laboratory personnel performing the test.
 - d. Description of the product being sampled or tested.
 - e. Date and time of sampling, inspection, and testing.
 - f. Date the report was issued.
 - g. Description of the test performed.
 - h. Weather conditions and temperature at time of test or sampling.
 - i. Location at the site or structure where the test was taken.
 - j. Standard or test procedure used in making the test.
 - k. A description of the results of the test.
 - I. Statement of compliance or non-compliance with the Contract Documents.
 - m. Interpretations of test results, if appropriate.
 - 2. Submit reports on tests performed by Contractor or his suppliers or vendors in the Contractor's standard format, as approved by Owner.
- B. Distribute copies of the test reports to the Construction Manager within 24 hours of completing the test. Flag tests reports with results that do not comply with Contract Documents for immediate attention. PDF's of test reports shall be uploaded to Projectmates.

C. Payment for Work subject to testing may be withheld until the Contractor's quality control test reports of the Work are submitted to the Owner's Resident Representative.

1.08 NON-CONFORMING WORK

- A. Immediately correct any Work that is not in compliance with the Contract Documents or submit a written explanation of why the Work is not to be corrected immediately and when corrections to the Work will be performed.
- B. Payment for non-conforming Work shall be withheld until Work is brought into compliance with the Contract Documents.

1.09 LIMITATION OF AUTHORITY OF THE TESTING LABORATORY

- A. The testing laboratory representatives are limited to providing consultation on the test performed and in an advisory capacity.
- B. The testing laboratory is not authorized to:
 - 1. Alter the requirements of the Contract Documents.
 - 2. Accept or reject any portion of the Work.
 - 3. Perform any of the duties of the Contractor.
 - 4. Stop the work.

1.10 QUALITY CONTROL PLAN

- A. Submit Contractor's Quality Control Plan that identifies personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the Quality Control Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a Quality Control Plan or another interim plan containing the additional features of work to be started.
- B. Content of the Quality Control Plan. The Quality Control Plan shall include, as a minimum, the following to address all construction operations, both onsite and offsite, including work by Subcontractors and Suppliers:
 - 1. A description of the quality control organization, including a chart showing lines of authority and acknowledgement that the quality control staff shall implement the quality control program for all aspects of the Work specified.
 - 2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a quality control function.
 - 3. A copy of the letter to the Quality Control Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the Quality Control Manager, including authority to stop work which does not comply with the Contract Documents or will result in Work that does not comply with the Contract Documents. The Quality Control Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Construction Manager.
 - 4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of Subcontractors and Suppliers.
 - 5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, person responsible for each test, applicable industry testing standards and laboratory facilities to be used for the test.
 - 6. Procedures for tracking phases of quality control, verification, and acceptance tests including documentation.

- 7. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Indicate how verification that identified deficiencies have been corrected is to be documented.
- 8. Reporting procedures, including proposed reporting formats
- 9. The name of the proposed testing laboratory along with documentation of qualifications, a list of tests that can be performed, and a list of recent projects for which testing has been performed with references from those projects.
- C. Notification of Changes. After submittal of the Quality Control Plan, the Contractor shall notify the Owner in writing of any proposed changes.
- D. Coordination Meeting. After the Pre-construction Meeting and before start of construction, the Contractor shall meet with the Owner, Engineer and Construction Manager to discuss the Contractor's Quality Control Plan. The Quality Control Plan shall be submitted a minimum of fourteen (14) calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the Quality Control operations, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance. Revise the Quality Management Plan to reflect comments and recommended changes resulting from this meeting.

2.00 PRODUCTS

2.11 TESTING APPARATUS

A. Furnish testing apparatus and related accessories necessary to perform the tests.

3.00 EXECUTION

3.01 QUALITY CONTROL PROGRAM

A. Perform quality control observations and testing as required in each section of the specifications and where indicated on the drawings.

Provide a quality control program that includes the following phases for each definable Work task. A definable Work task is one which is separate and distinct from other tasks, has separate control requirements, may be provided by different trades or disciplines, or may be work by the same trade in a different environment.

- 1. Planning Phase. Perform the following before beginning each definable Work task: a. Review the contract drawings.
 - b. Review submittals and determine that they are complete in accordance with the Contract Documents.
 - c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.
 - d. Examine the work area to assure that all required preliminary work has been completed and is in compliance with the Contract Documents.
 - e. Examine required materials, equipment, and sample work to assure that they are on hand, conform to submittals, and are properly stored.
 - f. Review requirements for quality control inspection and testing.
 - g. Discuss procedures for controlling quality of the work. Document construction tolerances and workmanship standards for the Work task.
 - h. Check that the portion of the plan for the Work to be performed incorporates submittal comments.
 - i. Discuss results of planning with the Construction Manager. Conduct a meeting attended by the quality control manager, the Construction Manager, superintendent, other quality control personnel as applicable, and the foreman responsible for the Work task. Instruct applicable workers as to the acceptable level of workmanship required to meet the requirements of the Contract Documents. Document the results

of the preparatory phase actions by separate meeting minutes prepared by the quality control manager and attached to the quality control report.

- j. Do not move to the next phase unless results of investigations required for the planning phase indicate that requirements have been met.
- 2. Work Phase. Complete this phase after the Planning Phase:
 - a. Notify the Construction Manager at least 24 hours in advance of beginning the Work and discuss the review of the planning effort to indicate that requirements have been met.
 - b. Check the Work to ensure that it is in full compliance with the Contract Documents.
 - c. Verify adequacy of controls to ensure full compliance with Contract Documents. Verify required control inspection and testing is performed.
 - d. Verify that established levels of workmanship meet acceptable workmanship standards. Compare with required sample panels as appropriate.
 - e. Repeat the initial phase for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
- 3. Follow-up Phase. Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements:
 - a. Make checks daily and record observations in the quality control documentation.
 - b. Conduct follow-up checks to correct all deficiencies prior to the start of additional Work tasks that may be affected by the defective Work. Do not build upon nor conceal non-conforming work.
 - c. Conduct a review of the Work one month prior to the expiration of the correction period prescribed in the General Conditions with the Owner and Construction Manager. Correct defects noted during the review.
- B. Conduct additional planning and review if:
 - 1. The quality of on-going work is unacceptable
 - 2. Changes are made in applicable quality control staff, onsite production supervision or work crew
 - 3. Work on a task is resumed after a substantial period of inactivity
 - 4. Other quality problems develop.

3.02 CAST-IN-PLACE CONCRETE TESTING

A. Test cast-in-place concrete in accordance with Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.03 PROTECTIVE COATINGS

A. Test protective coatings per Section 09 96-00, PIPING AND EQUIPMENT PAINTING.

3.04 PIPING SYSTEMS

A. Test and inspect piping per Sections 01 45 16.16, HYDROSTATIC TESTING AND DISINFECTION; 33 11 10, DUCTILE IRON PIPE; 33 11 11, DUCTILE IRON FITTINGS; 33 11 13, CONCRETE PRESSURE PIPE, BAR-WRAPPED, STEEL CYLINDER TYPE; and Section 33 11 14, BURIED STEEL PIPE AND FITTINGS.

3.05 STEEL INSPECTING AND TESTING

- A. Inspection of Structural Steel
 - 1. Inspect structural steel during fabrication and during and after erection for conformance with Contract Documents and Shop Drawings.
 - 2. Inspect shop and field welds including certification of welders.
 - 3. Visually inspect welds for size and appearance.
 - 4. No burning or other field corrections of steel members are permitted without express permission of the Engineer. Immediately report violations.
- B. Inspection of Bolting

- 1. Visually examine joints to determine that bolts and washers are properly installed and have been tensioned.
- 2. Check tightness of bolts by using a calibrated torque wrench.
- 3. Torque wrench test two (2) bolts in each connection, but not less than 10% of bolts.
- C. Inspection of Open Web Steel Joists
 - 1. Inspect erection of open web steel joists for conformance with Contract Documents or Shop Drawings.
- D. Inspection of Metal Deck
- 1. Inspect all metal deck for proper installation. Include correct welds and lapping of deck. 3.06 EARTH EXCAVATION, GRADING, AND BACKFILL INSPECTING AND TESTING
 - A. Shall be in accordance with Section 31 23 33, TRENCHING, BACKFILLING AND
 - COMPACTION and Section 31 20 00, EARTH MOVING.

END OF SECTION

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SECTION 01 45 16.16 HYDROSTATIC TESTING AND DISINFECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Details for hydrostatic testing and disinfection of water lines following installation.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Owner will provide the Contractor water once for hydrostatic testing and once for purging and disinfection. If initial testing fails, Contractor shall be responsible for purchasing any additional water required for retesting from the Owner at published rates. Provide the necessary piping, connection, pressure reducing and backflow prevention equipment required to conduct the test. Fill the new pipeline through a backflow prevention device. Sequence hydrostatic testing and disinfection so that the pipeline is filled only once during testing and disinfection.
- B. All other water associated with construction activities shall be paid for by the Contractor and be considered subsidiary. Water required for seeding, sodding and all other landscaping establishment shall be the responsibility of the Contractor and shall be considered subsidiary. Contractor shall be responsible for watering necessary to maintain all replacement landscaping until Final Acceptance.

1.3 REFERENCES

- A. Definitions
 - 1. Makeup Water Quantity of water to be pumped into the pipe necessary to maintain the specified test pressure after the pipe has been filled with water and any air expelled.
- B. Reference Standards
 - 1. Except as modified or supplemented herein, hydrostatic testing shall conform to the following:
 - a. AWWA M9 Concrete Pressure Pipe Bar Wrapped Steel Cylinder Type
 - b. AWWA M11 Steel Pipe A Guide for Design and Installation
 - c. AWWA C651 Disinfecting Water Mains
 - d. AWWA C300 Reinforced Concrete Pressure Pipe, Steel-Cylinder Type
 - e. AWWA C301 Prestressed Concrete Pressure Pipe, Steel-Cylinder Type

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUMBITTALS

A. Submit Record Data for results of testing of water samples

Hydrostatic Testing and Disinfection 01 45 16.16-1 NTMWD #490 – Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements May 2020

- B. Submit Record Data for results of hydrostatic tests
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]
- 1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]
- 1.9 QUALITY ASSURANCE [NOT USED]
- 1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]
- 1.11 FIELD CONDITIONS [NOT USED]
- 1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Calcium Hypochlorite in granular form, conforming to ANSI/AWWA B300
 - 1. Must be used and must contain approximately 65 percent available chlorine by weight.
 - 2. The material should be stored in a cool, dry, and dark environment to minimize deterioration.
- B. Liquid Chlorine, conforming to ANSI/AWWA B301

PART 3 - EXECUTION

3.1 GENERAL

- A. Once pipe has been laid and backfilled according to the Contract Documents, the pipe shall be subjected to a hydrostatic pressure test by raising the pressure to the required test pressure.
 - 1. The Contractor may install plugs and bulkheads at intermediate locations for the purposes of testing shorter lengths of pipe. Contractor shall not test against any closed valves.
- B. Contractor shall be required to disinfect the pipeline in accordance with AWWA standard C651. Contractor shall be responsible for insuring that all criteria set forth in C651 are met.
- C. Perform hydrostatic test on bar-wrapped concrete cylinder pipe and steel pipe in accordance with AWWA M9 and M11, respectively, and in accordance with the pipe supplier's recommendations.
- D. The duration of the hydrostatic test shall be for four (4) hours.
- E. Test pressure shall be as specified in this Section.

3.2 PERMISSIBLE MAKEUP WATER

- A. Measure make up water required for the section of pipe being tested. Makeup water is the volume of water pumped into the test section of pipe necessary to maintain the specified test pressure after the pipe has been filled with water and the air expelled.
- B. Allowable makeup water shall not exceed criteria set forth in AWWA M9 and M11.

C. Contractor shall either utilize a meter to calculate amount of makeup water used, or use drums with a known quantity of water which can be used to calculate amount of water added to pipeline.

3.3 PIPELINE TESTING AND DISINFECTION PROCEDURE

- A. Inspect materials to be used to ensure their integrity.
- B. Prevent contaminating materials from entering the water main during storage and construction.
- C. Remove, by flushing or other means, those materials that may have entered the water main.
- D. Perform the hydrostatic test.
 - 1. Hydrostatically test the pipe after backfill over the test section of pipe has been completed for seven days. Slowly fill the line with water and vent all air from the pipeline during filling.
 - 2. Allow the pipe to stand under a slight pressure for at least 48 hours to allow the mortar lining to become saturated and/or to allow the escape of remaining air trapped in the line. Examine bulkheads, valves, manholes, flanges, and connections for leaks during this period.
 - 3. Stop leaks before continuing with the test.
 - 4. Measure water volume during the test if existing valves in the main line leak during the test. Measure the water volume leaking from the valve through a meter or by other means approved by the Construction Manager. Furnish all necessary equipment and include the cost for this effort in the Contract Price.
 - 5. Expel all air from the pipe before applying the specified test pressure. Provide taps in the line to expel air from high points where air valves are not provided. These taps must be made by the pipe manufacturer and approved by the Engineer. Tightly plug the tap after tests are complete. Include the cost for these taps in the Contract Price.
- E. Chlorinate any residual contamination that may remain in accordance with Paragraph 3.7. Any chlorinated water that is discharged from the main shall be discharged in accordance with Paragraph 3.8.
- F. Protect the existing distribution system from backflow caused by hydrostatic test and disinfection procedure.
- G. Document that an adequate level of chlorine contacted each pipe to provide disinfection.
- H. Determine the bacteriological quality by laboratory test after disinfection.
- I. Leave the pipeline full of water upon completion of the hydrostatic test, unless internal test plugs must be removed to allow construction to continue or where pipe will gravity drain
- J. Connect the approved new water main to the active distribution system.

3.4 PREVENTATIVE AND INSPECTION MEASURES

- A. Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms.
- B. Keeping pipe dry and clean.
 - 1. Openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped.

- 2. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors.
- 3. If dirt enters the pipe during storage or installation, it shall be removed and the interior surface swabbed with a 1 to 5 percent hypochlorite disinfecting solution.
- C. Connection to the existing distribution system.
 - 1. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the District's transmission system and the new main. The temporary connection shall include an appropriate cross-connection control device and shall be disconnected during the hydrostatic pressure test. Connection shall be located on a portion of the existing line which is to be removed as part of this project.
 - 2. As an alternate, a connection to the existing distribution system is permitted provided a new valve is placed at the connection point. Do not test against an existing valve in the existing system.

3.5 PURGING

- A. Purging may be accomplished by passing an appropriately sized "poly-pig(s)" through the pipe or by flushing. If Contractor elects to utilize poly-pigs, he shall be responsible of locating launching and receiving pits. Pits shall be shown on the pipe shop drawings.
- B. Flushing Method
 - 1. Prepare the main by installing blow-offs at appropriate locations, of sufficient sizes and numbers, and with adequate flushing to achieve a minimum velocity in the main of 3.0 feet per second.
 - a. Minimum blow-off sizes for various main sizes are as follows:
 - 1) 4-inch through 8-inch main ³/₄-inch blow-off
 - 2) 10-inch through 12-inch main 1-inch blow-off
 - 3) 16-inch and greater main 2-inch blow-off
 - b. Flushing shall be subject to the following limitations:
 - 1) Limit the volume of water for flushing to 3 times the volume of the water main.
 - 2) Do not unlawfully discharge chlorinated water.
 - 3) Do not damage private property.
 - 4) Do not create a traffic hazard.
 - c. Ónce Flushing is complete:
 - 1) Corporations stops used for flushing shall be plugged.
- C.Poly-Pig Method
 - 1. The "poly-pig" shall be inserted in the new conduit at the location where the new conduit is connected to the active distribution system.
 - 2. Where expulsion of the "poly-pig" is required through a dead-ended conduit, the Contractor shall make every effort to prevent back flow of the purged water into the conduit after passage of the pig. Backwater re-entry into the pipe can be prevented by the temporary installation of mechanical joint bends and pipe joints to provide a riser out of the trench.
 - 3. After passage of the "poly-pig", flushing of all backwater from the pipe, and satisfactory test results, the Contractor shall secure the test location openings and then proceed with disinfection.

3.6 HYDROSTATIC TEST

A. General

- The hydrostatic pump shall be connected to a system where the amount of leakage can be determined by measurement or gauge. The test pressure shall be maintained over the entire test period. The leakage shall be determined by comparing the quantity of water in the measuring system at the beginning of the test and quantity of water at the end of the test. The difference in these quantities shall be the leakage. An alternate method is to add water to the measuring system during the test. At the end of the test, the quantity of water added shall be the leakage.
- 2. If the tests indicate a leakage in excess of the acceptable rate, the Contractor shall be required to find and repair the leak. Even if the test requirements are met, all apparent leaks shall be stopped.
- B. Test Pressure
 - 1. No less than 1.10 minimum times the stated working pressure of the pipeline measured at the highest elevation along the test section.
 - 2. No more than 1.25 times the stated working pressure at the lowest elevation of the test section.

3.7 PIPELINE DISINFECTION

- A. The continuous feed or slug method must be used unless it is stated otherwise in the Contract Specifications. The spray method will be allowed in certain locations if the Contractor can show that neither the continuous feed nor slug method of disinfection is feasible.
 - 1. Continuous-Feed
 - a. At a point no more than ten (10) feet downstream of the beginning of the new conduit, water entering the new conduit shall receive a dose of chlorine such that the water shall have not less than 25 mg/L (ppm) free chlorine. Chlorine application shall not cease until the entire conduit is filled with heavily chlorinated water. Approximately 35 pounds of Calcium Hypochlorite (65% available chlorine) is required in 100,000 gallons of water to produce 25 mg/L (ppm) Chlorine concentration.
 - b. The chlorinated water shall be retained in the conduit for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. Every effort shall be made to prevent the flow of chlorinated water into conduits in active service. At the end of the 24-hour period, the treated water in all portions of the conduit shall have a residual of at least 10 mg/L (ppm) free chlorine.
 - 2. Slug
 - At a point no more than ten (10) feet downstream of the beginning of the new conduit, water entering the new conduit shall receive a dose of chlorine such that the water shall have not less than 100 mg/L (ppm) free chlorine.
 Approximately 125 pounds of Calcium Hypochlorite (65% available chlorine) is required in 100,000 gallons of water to produce 100 mg/L (ppm) Chlorine concentration.
 - b. The Chlorine shall be applied continuously and for a sufficient period to develop a solid column, or slug, of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/l for a least 3 hours. As chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches. Every effort shall be made to prevent the flow of chlorinated water into conduits in active service. If at any time the free chlorine drops below 50 mg/l, the flow shall be stopped; chlorination equipment shall be relocated to the head of the slug; and, as flow resumes, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/l.

- 3. Spray
 - A solution of at least 200 mg/l available chlorine shall be applied directly to the interior pipe surfaces using either suitable brushes or spray equipment. Solution shall thoroughly coat all interior pipe surfaces. The disinfected surfaces shall remain in contact with solution for a minimum of 30 minutes. Following 30 minutes, line shall be filled and bacteriologically tested.
- B. The Contractor shall install and remove all pump-in, blow-off and sampling points.
- C. Water from the existing system or other approved source shall be made to flow at a constant rate in the new main.
- D. The heavily chlorinated water shall then be flushed from the conduit and disposed in a manner meeting the requirements set out in Article 3.8.
- E. The chlorine residual shall be tested prior to flushing operations.

3.8 HEAVILY CHLORINATED WATER

- A. For any discharge of water in which the chlorine residual exceeds 0.1-mg/L (ppm), including draining of potable water from water lines for repairs or tie-ins, flushing of potable water lines, or discharge of chlorinated water used for testing of potable water lines, the Contractor shall do one of the following:
 - 1. Allow the water shall remain in the new water conduit until the chlorine residual is less than 0.1-mg/L (ppm).
 - 2. Evacuate the water into water trucks
 - 3. Discharge into an existing sanitary sewer system, or an approved storage facility (such as a detention pond until the chlorine residual is 0.1-mg/L (ppm) or less),
 - a. The heavily chlorinated water shall not be disposed of into the storm sewer system. After the specified chlorine residual is obtained, less than 0.1-mg/L (ppm), the water may then be discharged into the storm sewer system or utilized by the Contractor.
 - 4. Treat the water with Sodium Bisulfite or another dechlorination chemical (Sulfur Dioxide, Sodium Sulfite, Sodium Thiosulfate, or Ascorbic Acid) or method appropriate for potable water and approved by the Engineer until the chlorine residual is reduced to 0.1-mg/L (ppm) or less.
- B. The requirement for discharge of heavily chlorinated water is found in the TPDES General Permit to Authorize the Discharge of Storm Water and Certain Non-Storm Water Discharges from Regulated Construction Activities within the State of Texas.
- C. A minimum of five days prior to any discharge of water, including draining of potable water from water lines for repairs or tie-ins, flushing of potable water lines, or discharge of chlorinated water used for testing of potable water lines, the Contractor shall notify the NTMWD Project Manager, NTMWD Environmental Compliance Officer, and Engineer.
- D. If a fish kill occurs associated with the construction activities:
 - 1. Immediately alter activities to prevent further fish kills.
 - 2. Immediately notify Owner.
 - 3. Collect and classify fish in accordance with TCEQ requirements.
 - 4. Coordinate with Owner to properly notify TCEQ.
 - 5. Be responsible for fines assessed.

3.9 CONTRACTOR REQUIREMENTS

- A. The Contractor shall prepare the conduit for disinfection activities and secure same after chlorination is complete.
 - 1. This shall consist of furnishing all equipment, material and labor to satisfactorily prepare the conduit for disinfection. The Contractor shall also be required to provide adequate provisions for sampling.
 - 2. The Contractor shall make all necessary taps into the pipe to accomplish chlorination of a new line
 - 3. After satisfactory completion of the disinfection operation, the Contractor shall remove surplus pipe at the chlorination and sampling points, plug the remaining pipe, backfill, and complete all appurtenant work necessary to secure the conduit.

3.10 SAMPLING

- A. Unless otherwise specified, the Contractor shall inject chlorine disinfectant into the conduit and monitor the solution.
- B. The Contractor shall take water samples from a suitable tap (not through a fire hydrant) for analysis by an approved laboratory. The Contractor shall notify the Construction Manager of the results.
- C. Microbiological sampling shall be done prior to connecting the new conduit into the existing distribution system in accordance with AWWA C651 and C652. Samples shall be tested in accordance with *Standard Methods for the Examination of Water and Wastewater*. Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate.
 - 1. For pipelines, at least one sample shall be collected from every 1,000-linear-feet of new water conduit, plus one set from the end of the line and at least one set from each branch. If trench water has entered the new conduit during construction or, if in the opinion of the District's inspector, excessive quantities of dirt or debris have entered the new conduit, samples shall be taken at intervals of approximately 200-linear-feet. Samples shall be taken of water that has stood in the new conduit for at least 16-hours.
- D. Unsatisfactory test results shall require a repeat of the disinfection process and resampling as required above until a satisfactory sample is obtained.

END OF SECTION

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01 50 00 TEMPORARY FACILITIES

1.00 GENERAL

1.01 WORK INCLUDED

- A. Contractor may elect to furnish temporary facilities including storage sheds and temporary utilities needed to complete the work. A temporary field office will not be required for this project.
- B. Furnish, install, and maintain temporary project identification signs. Provide temporary onsite informational signs to identify key elements of the construction facilities. Do not allow other signs to be displayed.

1.02 QUALITY ASSURANCE

A. DESIGN CRITERIA

Furnish a total electrical heating and cooling system for the Owner and Engineer's field office capable of maintaining the following minimum design criteria:

- 1. Heating: Minimum 75 degrees ID temp @ 10 ambient.
- 2. Cooling: Minimum 75 degrees ID temp @ 105 ambient.
- 3. Relative humidity: 48 to 54%
- B. TESTING
 - 1. Inspect and test each service before placing temporary utilities in use. Arrange for all required inspections and tests by regulatory agencies, and obtain required certifications and permits for use.

1.03 DELIVERY AND STORAGE

A. Arrange transportation, loading, and handling of temporary buildings and sheds.

1.04 JOB CONDITIONS

- A. Locate buildings and sheds at the job site as indicated or as approved by the Owner.
- B. Prepare the site by removing trees, brush, or debris and performing demolition or grubbing needed to clear a space adequate for the structures.
- C. Pay for the utilities used by temporary facilities during construction.
- D. Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in the performance of the Work. If a field office is required, provide it completely installed and ready for occupancy and use within seven (7) days of the Notice to Proceed.
- E. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work.
- F. Do not remove services and facilities until they are no longer needed.
- G. Operate temporary facilities in a safe and efficient manner.
 - 1. Do not overload temporary services or facilities.
 - 2. Do not let temporary services or facilities interfere with the progress of the work.
 - 3. Do not allow unsanitary conditions, public nuisance, or hazardous conditions to develop or exist at the site.
 - 4. Do not permit freezing of pipes, flooding, or the contamination of water.
 - 5. Maintain site security and protection of the facilities.

2.00 PRODUCTS

2.01 SIGN MATERIALS

- A. Provide new or used signs, wood or metal with structure and framing in sound condition. Materials are to be structurally adequate and suitable for the indicated finish.
- B. Provide 3/4" exterior grade A/D face veneer plywood with medium density overlay for sign surface.
- C. Bolts, brackets, fasteners, and other hardware are to be galvanized or stainless steel.
- D. Provide exterior quality coatings.

2.02 TEMPORARY OFFICES

- A. Maintain office in good repair and appearance.
- B. Furnish a field office for Contractor's use of adequate size to allow meetings of fifteen (15) people.
 - 1. Contractor's field office shall have a separate office designated solely for use by District personnel. Space shall include desk, chair, and layout table.
- C. Office shall be equipped with electrical service and internet connection for the duration of the project.
- D. Other trades may provide their own offices only when space is available on the site, and both the Owner and the Contractor agree.
- E. Construction offices may be prefabricated buildings on skids or mobile trailers.

2.03 TEMPORARY STORAGE BUILDINGS

- A. Furnish storage buildings of adequate size to store any materials or equipment delivered to the site that might be affected by weather.
 - 1. Storage sheds may be prefabricated buildings on skids or truck trailers.

2.04 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities at the job site from the Notice to Proceed until project conclusion. Maintain these facilities in a clean and sanitary condition at all times, and comply with the requirements of the local health authority.
 - 1. On large sites, provide portable toilets at such locations that no point in the work-site shall be more than 600' from a toilet.
 - 2. Number of portable toilets provided shall be in accordance with Section 1910.141 of the Occupational Safety & Health Administration (OSHA) Standards.
- B. Use these sanitary facilities. Do not use restrooms within existing or Owner occupied buildings.

2.05 TEMPORARY HEAT

- A. Provide heating devices needed to protect the building during construction.
 - 1. Provide fuel needed to service the heating devices.
 - 2. Attend heating devices at all times.
 - 3. Do not allow heaters to operate overnight without someone in attendance.

2.06 TEMPORARY UTILITIES

- A. Provide all temporary utilities needed during construction, testing, disinfection, and start-up of the Work, including electrical power, water, and telephone. Include costs associated with furnishing temporary utilities in the Contract Price.
 - 1. Provide a source of temporary electrical power of adequate size for the construction procedures.
 - a. Provide electrical pole and service that complies with OSHA and other safety requirements and the requirements of the power company
 - b. Make the electrical power available to the trades as needed.
 - c. Provide extensions to the various parts of the buildings as needed.
 - d. Provide junction boxes in such an arrangement that distribution boxes are available within 75' of any part of the structure.
 - 2. Provide for temporary water. Extend water to the construction site and maintain source until such time that the permanent water supply can be extended to the site. Include the cost of water, costs for construction, testing, disinfection, and start-up of the Work in the Contract Price.
 - 3. Provide telephone service to the site and install telephones inside the temporary office.
- B. Make arrangements with the local utility company, comply with utility company's requirements and pay for the utility costs during construction, testing, disinfection, and start-up of the Work.
- C. Make utilities available to the trades during construction, testing, disinfection, and start-up.

3.00 EXECUTION

3.01 LOCATION OF TEMPORARY FACILITIES

- A. Locate all temporary facilities in an area that will not interfere with any Work to be performed under this contract.
- B. Construct and install signs at locations as required by applicable regulatory agencies or as selected by the Owner. Install informational signs at the height of optimum visibility, on ground-mounted poles or attached to temporary structural surfaces.

3.02 PROJECT IDENTIFICATION AND SIGNS

A. Provide project identification signs of the size, lettering, and construction indicated by the Owner and in accordance with specified requirements.

3.03 TEMPORARY LIGHTING

- A. Once a building is "shelled-in", provide temporary lighting inside the building.
 - 1. Lighting shall be adequate to perform work within any space.
 - 2. Lights shall be left in position in such a manner that every space has temporary light at all times.
 - 3. Temporary lights may be removed once the permanent lighting is in service.
- B. Provide portable flood lights at any time that work will be performed outside the structure at night. Provide adequate lighting to provide sufficient light at any location work is being performed.

3.04 DRINKING WATER

- A. Provide field offices with potable water.
- B. Pay for services and maintain daily.

3.05 CONSTRUCTION FENCE

A. Install and maintain a construction fence around the construction site and/or around the storage yard as indicated. Fence may be wood picket or chain link construction. Provide gates with padlocks.

3.06 REMOVAL OF TEMPORARY FACILITIES

- A. Remove temporary buildings, sheds, and utilities at the conclusion of the project and restore the site to original condition or finished in accordance with the drawings.
- B. Remove informational signs upon completion of construction.
- C. Remove project identification signs, framing, supports, and foundations upon completion of the project.

3.07 MAINTENANCE AND JANITORIAL SERVICE

- A. Provide janitorial service (sweeping/mopping) for the Owner's and Engineer's office on a weekly basis or as requested. Trash receptacles are to be emptied daily.
- B. Maintain signs and supports in a neat, clean condition. Repair damage to structures, framings, or signs.
- C. Repair any damage to permanent structures or finishes caused by placement or removal of temporary signage.

END OF SECTION

01 57 00 TEMPORARY CONTROLS

1.00 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.
- B. Construct temporary impounding works, channels, diversions, furnishing and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project.
- C. Provide a Storm Water Pollution Prevention Plan in accordance with TCEQ General Permit TXR150000, file required legal notices and obtain required permits prior to beginning any construction activity.
- D. Provide labor, materials, equipment, and incidentals necessary to prevent storm water pollution for the duration of the Project. Provide and maintain erosion and sediment control structures as required to preventive sediment and other pollutants from the Site from entering any storm water system, including open channels. Remove pollution control structures when no longer required to prevent storm water pollution.

1.02 QUALITY ASSURANCE

- A. Construct storm water pollution prevention measures prior to the beginning of construction and maintain these during construction until final stabilization has been achieved for the area protected.
- B. Plan and conduct all land-disturbing activities to minimize the area to be exposed at any one time. Minimize the time of exposure, off-site erosion, sedimentation, and adverse water quality impacts.
- C. Manage surface water runoff originating upgrade of an exposed area to minimize erosion and sediment loss during the period of exposure.
- D. Install measures to control both the velocity and rate of release to minimize erosion and sedimentation of the receiving water body (i.e., ditch, channel, stream) in accordance with regulatory requirements and as directed by the Owner, Construction Manager or the Engineer.
- E. Periodically clean out and dispose of all sediment and other pollutants as necessary to maintain the treatment capacity of each pollution control feature. Clean out and properly dispose of all sediment and other storm water pollutants at the time of completion of the Work.

1.03 SUBMITTALS

A. Provide copies of notices, records and reports required by Paragraph 1.05 as Record Data in accordance with Section 01 33 00, SUBMITTALS.

1.04 PERMITS

- A. Submit the following to the TCEQ and the Operator of any Municipal Separate Storm Sewer System (MS4) receiving construction site discharge from the Site:
 - a. Notice of Intent (NOI) at least 48 hours prior to beginning construction activity. Construction activity may commence 24 hours after the submittal of an electronic NOI.

- b. Notice of Change (NOC) letter when relevant facts or incorrect information was submitted in the NOI, or if relevant information in the NOI changes during the course of construction activity.
- c. Notice of Termination (NOT) when the construction project has been completed and stabilized.
- B. Post a copy of the NOI at the construction site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.
- C. Maintain copies of a schedule of major construction activities, inspection reports, and revision documentation with the storm water pollution prevention plan (SWPPP) required under the TPDES General Permit (TXR150000) for Storm Water Discharges from Construction Activities for all projects.

1.05 STORM WATER POLLUTION CONTROL

- A. Comply with the current requirements of TPDES General Permit No. TXR15000 (General Storm Water Permit) set forth by the Texas Commission on Environmental Quality for the duration of the Project:
 - 1. Develop a Storm Water Pollution Prevention Plan meeting all requirements of the General Storm Water Permit.
 - 2. Submit of a Notice of Intent to the Texas Commission on Environmental Quality.
 - 3. Develop and implement appropriate Best Management Practices as established by local agencies of jurisdiction.
 - 4. Provide all monitoring and/or sampling required for reporting to the Texas Commission on Environmental Quality
 - 5. Submit reports to the Texas Commission on Environmental Quality as required as a condition of the permit
 - 6. Submit copies of the reports to the Construction Manager as Record Data in accordance with Section 01 33 00 Submittals
 - 7. Retain copies of these documents on site at all times for review and inspection by the Owner or regulatory agencies. Post a copy of the permit as required by regulations.
 - 8. Pay all costs associated with complying with the provisions of the General Storm Water Permit. Assume solely responsible for implementing, updating, and modifying the General Storm Water Permit per regulatory requirements the Storm Water Pollution Prevention Plan and Best Management Practices.
- B. Use forms required by the Texas Commission on Environmental Quality to file the Notice of Intent. Submit the Notice of Intent at least two days prior to the start of construction. Develop the Storm Water Pollution Prevention Plan prior to submitting the Notice of Intent. Provide draft copies of the Notice of Intent, Storm Water Pollution Prevention Plan, and any other pertinent Texas Commission on Environmental Quality submittal documents to Owner for review prior to submittal to the Texas Commission on Environmental Quality.
- C. Return any property disturbed by construction activities to either specified conditions or preconstruction conditions as set forth in the Contract Documents. Provide an overall erosion and sedimentation control system that will protect all undisturbed areas and soil stockpiles/spoil areas. Implement appropriate Best Management Practices and techniques to control erosion and sedimentation and maintain these practices and techniques in effective operating condition during construction. Permanently stabilize exposed soil and fill as soon as practical during the Work.
 - 1. Perform Work to comply with "Best Practice" as established by the North Central Texas Council Of Governments (NCTCOG) integrated Storm Water Management (iSWM) Design Manual for Construction or the local agency of jurisdiction.

- D. Assume sole responsibility for the means, methods, techniques, sequences, and procedures for furnishing, installing, and maintaining erosion and sedimentation control structures and procedures and overall compliance with the General Storm Water Permit. Modify the system as required to effectively control erosion and sediment.
- E. Retain copies of reports required by the General Storm Water Permit for three years from date of final completion.

1.06 POLLUTION CONTROL

- A. Prevent the contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Provide adequate measures to prevent the creation of noxious air-borne pollutants. Prevent dispersal of pollutants into the atmosphere. Do not dump or otherwise discharge noxious or harmful fluids into drains or sewers, nor allow noxious liquids to contaminate public waterways in any manner.
- B. Provide equipment and personnel and perform emergency measures necessary to contain any spillage.
- C. Contain chemicals in protective areas and do not dump on soil. Dispose of such materials at off-Site locations in an acceptable manner.
- D. Excavate contaminated soil and dispose at an off-Site location if contamination of the soil does occur. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.
- E. Provide documentation to the Owner which states the nature and strength of the contaminant, method of disposal, and the location of the disposal Site.
- F. Comply with local, State and Federal regulations regarding the disposal of pollutants.
- G. Groundwater or run-off water which has come into contact with noxious chemicals, sludge, or sludge-contaminated soil is considered contaminated. Contaminated water must not be allowed to enter streams or water courses, leave the Site in a non-contained form or enter non-contaminated areas of the Site.
- H. Pump contaminated water to holding ponds constructed by the Contractor for this purpose, or discharge to areas on the interior of the Site, as designated by the Engineer.
- I. Construct temporary earthen dikes or take other precautions and measures as required to contain the contaminated water and pump to a designated storage area.
- J. Wash any equipment used for handling contaminated water or soil within contaminated areas three times with uncontaminated water prior to using such equipment in an uncontaminated area. Dispose of wash water used to wash such equipment as contaminated water.

1.07 EARTH CONTROL

- A. Remove excess soil, spoil materials and other earth not required for backfill within four weeks of completing excavation Work. Control stock pile material to eliminate interference with Contractor and Owner's operations.
- B. Dispose of excess earth off the Site. Pay cost for disposal unless otherwise noted. Provide written approval by the property owner for all disposal on private property, and approval by the Owner if such disposal affects the use of Site or other easements.
 - 1. Where the property owner requests such material and the Construction Manager approves, excess excavated material may be neatly spread on tracts of land on which the pipeline is being constructed.

1.08 MAINTENANCE OF WATER

- A. Manage water resulting from rains or ground water at the Site. Maintain trenches and excavations free of water at all times.
- B. Lower the water table in the construction area by acceptable means if necessary to maintain a dry and workable condition at all times. Provide drains, sumps, casings, well points, and other water control devices as necessary to remove excess water.
- C. Provide continuous operation of water management actions. Maintain standby equipment to provide proper and continuous operation for water management.
- D. Ensure that water drainage does not damage adjacent property. Divert water into the same natural watercourse in which its headwaters are located, or other natural stream or waterway as approved by the Owner. Assume responsibility for the discharge of water from the Site.
- E. Remove the temporary construction and restore the Site in a manner acceptable to the Engineer and to match surrounding material at the conclusion of the Work.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials meeting regulatory requirements.

3.00 EXECUTION

- 3.01 CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY CONTROLS
 - A. Construct temporary controls in accordance with regulatory requirements.
 - B. Maintain controls in accordance with regulatory requirements were applicable, or in accordance with the requirements of the Contract Documents.
 - C. Remove temporary control when no longer required, but before the Project is complete. Correct any damage or pollution that occurs as the result of removing controls before the point where they are no longer required.

END OF SECTION

01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

1.00 GENERAL

1.01 WORK INCLUDED

Comply with requirements of the General Conditions and specified administrative procedures in closing out the Construction Contract.

1.02 SUBMITTALS

Submit affidavits and releases on forms shown in Section 01 31 13.13, FORMS.

1.03 SUBSTANTIAL COMPLETION

- A. Submit written notification that the work or designated portion of the work is substantially complete to the Construction Manager when the work is considered to be substantially complete per the General Conditions. Include a list of the items remaining to be completed or corrected before the project will be considered to be complete.
- B. Construction Manager and Engineer shall visit the project site to observe the work within a reasonable time after notification is received to determine the status of completion.
- C. Engineer shall issue notification to the Contractor that the work is either substantially complete or that additional work must be performed before the project may be considered substantially complete.
 - 1. Engineer shall notify the Contractor in writing of items that must be completed before the project can be considered substantially complete.
 - a. Correct the noted deficiencies in the work.
 - b. Issue a second written notice with a revised list of deficiencies when work has been completed.
 - c. Construction Manager and Engineer shall revisit the site and the procedure shall begin again.
 - 2. Engineer shall issue a tentative Certificate of Substantial Completion to the Owner when the project is considered to be substantially complete. Certificate shall include a tentative list of items to be corrected before final payment.
 - a. Owner will review and revise the list of items and notify the Engineer of any objections or other items that are to be included in the list.
 - b. Engineer shall prepare and send to the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be corrected or completed.
 - c. Review the list and notify the Engineer in writing of any objections within 10 days of receipt of Certificate of Substantial Completion.

1.04 FINAL INSPECTION

- A. Submit written request for final inspection when the project is complete and:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been completed in compliance with the Contract Documents.
 - 3. Equipment and systems have been tested per Contract Documents and are fully operational.
 - 4. Final Operations and Maintenance Manuals have been provided to the Owner and all operators training has been completed.
 - 5. Specified spare parts and special tools have been provided.
 - 6. Work is complete and ready for final inspection.
- B. Construction Manager and Engineer shall make an inspection with the Owner and appropriate regulatory agencies to determine the status of completeness within a reasonable time after the receipt of the Certificate.

- C. Engineer shall issue notice that the project is complete or notify the Contractor that work is not complete or is defective.
 - 1. Submit the request for final payment with Closeout submittals described in Paragraph 1.07 if notified that the project is complete and the work is acceptable.
 - 2. Upon receipt of notification from the Engineer that work is incomplete or defective, take immediate steps to remedy the stated deficiencies. Send a second certification to the Engineer when work has been completed or corrected.
 - 3. Construction Manager and Engineer shall re-visit the site and the procedure will begin again.

1.05 RE-INSPECTION FEES

- A. Pay fees to the Owner to compensate the Construction Manager and Engineer for reinspection of the work required by the failure of the work to comply with the claims of status of completion made by the Contractor.
- B. Owner may withhold the amount of these fees from the Contractor's final payment.
- C. Cost for additional inspections will be billed to the Owner by the Construction Manager and Engineer for the actual hours required for the inspection and preparation of related reports in accordance with the rates in the Supplemental Conditions

1.06 CLOSEOUT SUBMITTALS TO THE ENGINEER

- A. Record Drawings per Section 01 31 13, PROJECT COORDINATION.
- B. Keys and keying schedule.
- C. Warranties and bonds.
- D. Evidence of payment or release of liens on the form indicated in Section 01 31 13.13, FORMS and as required by the General Conditions.
- E. Releases from property owners of land outside the easement which were used by the Contractor.
- F. Consent from Surety to Final Payment.
- G. Equipment installation reports on equipment.
- H. Shop drawings, record data, Operations and Maintenance Manuals, and other submittals as required by the Contract Documents.
- I. Specified spare parts and special tools.
- J. Certificates of Occupancy, operating certificates, or other similar releases required to allow the Owner unrestricted use of the work and access to services and utilities.
- K. Evidence of final, continuing insurance, and bond coverage as required by the Contract Documents.
- L. Compile Equipment List on compact disc in Microsoft Excel format using Equipment List Form provided in Section 01 78 23.

1.07 FINAL PAYMENT REQUEST

- A. Submit a preliminary final payment request. This request is to include adjustments to the Contract Amount for:
 - 1. Approved Change Orders
 - 2. Allowances not previously adjusted by Change Order
 - 3. Unit prices
 - 4. Deductions for defective work that has been accepted by the Owner

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- 5. Penalties and bonuses
- 6. Deductions for liquidated damages
- 7. Deductions for re-inspection payments per Paragraph 1.05
- 8. Other adjustments
- B. Engineer shall prepare a final Change Order, reflecting the approved adjustments to the contract amount which have not been covered by previously approved Change Orders.
- C. Submit the final Application for Payment per the General Conditions, including the final Change Order.

1.08 TRANSFER OF UTILITIES

- A. Transfer utilities to the Owner when the Substantial Completion has been issued, final cleaning has been completed and the work has been accepted by the Owner.
- B. Submit final meter readings for utilities and similar data as of the date the Owner occupied the work.

1.09 WARRANTIES, BONDS, AND SERVICES AGREEMENTS

- A. Provide warranties, bonds, and service agreements required by Section 01 33 00, SUBMITTALS or by the individual sections of the specifications.
- B. The date for the start of warranties, bonds, and service agreements is established per the General Conditions.
- C. Compile warranties, bonds, and service agreements and review these documents for compliance with the Contract Documents.
 - 1. Each document is to be signed by the respective manufacturer, supplier, and subcontractor.
 - 2. Each document is to include:
 - a. The product or work item description
 - b. The firm, with the name of the principal, address, and telephone number
 - c. Scope of warranty, bond or services agreement
 - d. Date, duration, and expiration date for each warranty bond and service agreement
 - e. Procedures to be followed in the event of a failure
 - f. Specific instances that might invalidate the warranty or bond
- D. Submit two copies of each document to the Engineer for review and transmittal to the Owner.
 - 1. Submit duplicate sets.
 - 2. Documents are to be submitted on 8-1/2" x 11" paper, punched for a standard three-ring binder.
 - 3. Submit each set in a commercial quality three-ring binder with a durable and cleanable plastic cover. The title "Warranties, Bonds, and Services Agreements", the project name and the name of the Contractor are to be typed and affixed to the cover.
- E. Submit warranties, bonds and services agreements:
 - 1. At the time of final completion and before final payment.
 - 2. Within 10 days after inspection and acceptance for equipment or components placed in service during the progress of construction.

1.10 CLAIMS AND DISPUTES

Claims and disputes must be resolved prior to recommendations of final payment. Acceptance and final payment by the Contractor will indicate that any outstanding claims or disputed issues have been resolved to the full satisfaction of the Contractor.

END OF SECTION

Execution and Closeout Requirements NTMWD #490 – Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements May 2020

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SECTION 01 74 23 FINAL CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Requirements for maintaining the buildings and site in a standard of cleanliness throughout the construction period.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 REFERENCES

- A. Definitions
 - 1. "Clean", for the purpose of this Section, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

1.3 QUALITY ASSURANCE

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Description
 - 1. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.
 - 2. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Progress Cleaning
 - 1. General
 - a. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
 - b. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - c. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

- d. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
- 2. Site
 - a. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
 - b. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1.A.1 above.
 - c. Maintain the site in a neat and orderly condition at all times.
- 3. Structures
 - a. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
 - b. Weekly, and more often if necessary, sweep interior spaces clean.
 - 1) "Clean", for this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
 - c. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
 - d. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
 - 1) "Clean", for this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Engineer, may be injurious to the finish floor material.
- B. Final Cleaning
 - 1. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described above.
 - 2. Site
 - a. Unless otherwise specifically directed by the Construction Manager, broom clean paved areas on the site and public paved areas adjacent to the site.
 - b. Completely remove resultant debris.
 - 3. Structures
 - a. Exterior
 - 1) Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and the foreign matter.
 - 2) Remove all traces of splashed materials from adjacent surfaces.
 - 3) If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
 - 4) In the event of stubborn stains not removable with water, the Construction Manager may require light sandblasting or other cleaning at no additional cost to the Owner.
 - b. Interior
 - 1) Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - 2) Remove all traces of splashed material from adjacent surfaces.
 - 3) Remove paint droppings, spots, stains, and dirt from finished surfaces.
 - c. Glass
 - 1) Clean inside and outside

- d. Polished Surfaces
 - 1) To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.
- 4. Schedule final cleaning as approved by the Construction Manager to enable the Owner to accept a completely clean Work.

3.2 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Engineer in accordance with the General Conditions of the Contract.

END OF SECTION

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01 75 00 STARTING AND ADJUSTING

1.00 GENERAL

1.01 WORK INCLUDED

- A. Provide step-by-step procedures for starting provided systems, including equipment, pumps and processes.
- B. Provide pre-start up inspections by equipment manufacturers.
- C. Provide instruction and demonstration of operation, adjustment, and maintenance of each system and the component parts.
- D. Place each system in service and operate the system to prove performance and to provide for initial correction of defects in workmanship, calibration, and operation.
- E. Provide for initial maintenance and operation.

1.02 SUBMITTALS

- A. Provide Submittals in accordance with Section 01 33 00, SUBMITTALS:
 - 1. Provide a Plan of Action for testing, checking, and starting major equipment and process piping systems. Submit reports as required by this specification.
 - 2. Provide Equipment Installation Reports on form shown in SECTION 01 31 13.13, FORMS per Section 01 33 00, SUBMITTALS.
 - 3. Provide Operation and Maintenance Manuals per Section 01 78 23, OPERATION AND MAINTENANCE DATA.

1.03 STANDARDS

A. Comply with any standards associated with the testing or start-up of equipment, as listed in the various sections of the specifications.

1.04 SPECIAL JOB CONDITIONS

- A. Do not start or test any apparatus until the complete unit has been installed and thoroughly checked.
- B. Furnish the services of a representative of the Supplier to witness tests and start-up procedures as required by these specifications.

2.00 PRODUCTS

2.05 TESTING INSTRUMENTATION

A. Furnish any instrumentation or other testing devices needed to conduct tests.

3.00 EXECUTION

- 3.01 SERVICES OF SUPPLIER'S REPRESENTATIVES
 - A. Provide the services of a Supplier's representative for inspection, supervision of installation, and training. Supervisor's representative must be an experienced and competent technical (not sales) representative of the Supplier.
 - B. Perform installation, adjustment, and testing of the equipment under the direct supervision of the Supplier's representative where specified.
 - C. Provide the services of the Supplier's representative to instruct the Owner or his authorized personnel on operational procedures and maintenance requirements.

D. Include the cost of the services of the Supplier's representative in the equipment price which is included in the Contract Price.

3.02 INSPECTION AND START-UP

- A. Inspect equipment prior to placing any equipment or system into operation. Make adjustments as necessary for proper operation.
 - 1. Check for adequate and proper lubrication.
 - 2. Determine that parts or components are free from undue stress from structural members, piping or anchorage.
 - 3. Adjust equipment for proper balance and operations.
 - 4. Determine that vibrations are within acceptable limits.
 - 5. Determine that equipment operates properly under full load conditions.
 - 6. Determine that the equipment is in true alignment.
- B. Have the Supplier's representative present when the equipment is placed in operation.
 - 1. The Supplier is to be on Site as often as necessary for proper and trouble free operation.
 - 2. Ensure that the proper procedure is employed in start up of systems.
- C. Provide Equipment Installation Reports for Equipment on the form indicated in Section 01 31 13.13, FORMS.
 - 1. Certify that the equipment and related appurtenances have been thoroughly examined and approved for start-up and operation.
 - 2. Include the date when Owner's personnel were instructed in the proper operation and maintenance of the equipment in the report.

3.03 STARTING REQUIREMENTS

A. Refer to the individual sections of the specifications for specific start up procedures.

3.04 INITIAL OPERATION

- A. Start, test, and place equipment and systems into operation for 30 days to allow the Owner and Engineer to observe the operation and overall performance of the equipment and to determine that controls function as intended.
- B. Equipment which operates on a limited or part-time basis shall be operated in the presence of the Engineer to demonstrate that controls function as specified.
- C. Perform acceptance test as specified in individual specification sections. Demonstrate that equipment and systems meet the specified performance criteria.
- D. Unless specifically stated otherwise in the individual equipment specifications, equipment and systems are not Substantially Complete until the end of this initial operation period. If an exception to this requirement is specifically noted in an individual equipment specification, the exception shall only apply to that particular piece of equipment and not to the remaining components provided under the project.

3.05 OPERATOR TRAINING

- A. Provide instruction and demonstration of the care and operation of the equipment to the Owner's personnel. Instruction is to include classroom and hands-on training.
- B. Provide training in adequate detail to ensure that the trainees who complete the program will be qualified and capable of operating and maintaining the equipment, products, and systems provided.
- C. Operations training is to include but not be limited to:
 - 1. Orientation to provide an overview of system/subsystem configuration and operation

- 2. Terminology, nomenclature, and display symbols.
- 3. Operations theory.
- 4. Equipment appearance, functions, concepts, and operation.
- 5. Operating modes, practices and procedures under normal, diminished, and emergency conditions.
- 6. Start-up and shutdown procedures.
- 7. Safety precautions.
- 8. On-the-job operating experience for monitoring functions, supervisory, or command activities. Include functions and activities associated with diminished operating modes, failure recognition, and responses to system/subsystem and recovery procedures.
- 9. Content and use of Operation and Maintenance manuals and related reference materials.
- D. Provide training for performing on-site routine, preventive, and remedial maintenance of the equipment, product, or system. Maintenance training is to include but not be limited to:
 - 1. Orientation to provide an overview of system/subsystem concept, configuration, and operation.
 - 2. Operations theory and interfaces.
 - 3. Instructions necessary to ensure a basic theoretical and practical understanding of equipment appearance, layout and functions.
 - 4. Safety precautions.
 - 5. Use of standard and special tools and test equipment.
 - 6. Adjustment, calibration, and use of related test equipment.
 - 7. Detailed preventive maintenance activities.
 - 8. Troubleshooting, diagnostics, and testing.
 - 9. Equipment assembly and disassembly.
 - 10. Repair and parts replacement.
 - 11. Parts ordering practices and storage.
 - 12. Failure and recovery procedures.
 - 13. Cabling and/or interface connectors.
 - 14. Content and use of operation and maintenance manuals and related reference materials.
 - 15. Procedures for warranty repairs.
 - 16. Lubrication.
 - 17. Procedures, practices, documentation, and materials required to commence system maintenance.
- E. Provide a training plan that indicates the schedule and sequence of the training programs. The training plan is to include for each course:
 - 1. Number of hours for the course.
 - 2. Agenda and narrative description, including the defined objectives for each lesson.
 - 3. Draft copy of training handbooks.
 - 4. A descriptive listing of suggested reference publications.
 - 5. Audio-visual equipment required for training.
 - 6. Type and number of tools or test equipment required for each training session.
- F. Provide and use training aids to complement the instruction and enhance learning.
 - 1. Provide training handbooks for use in both the classroom and the hands-on phases of training for each course.
 - 2. Provide instructional materials which include references to the Operation and Maintenance Manuals and identify and explain the use of the manual.
 - 3. Provide a copy of all audio/visual training materials used in the presentations.
- G. Provide qualified instructors to conduct the training.
 - 1. Provide instructors with knowledge of the theory of operation and practical experience with the equipment, product, or system.
 - 2. Provide instructors that have successfully conducted similar training courses.

- H. Training may be recorded by the Owner or its consultants for use in future training. Provide legal releases or pay additional fees required to allow training by the Supplier to be recorded.
- I. Schedule for training is to be approved by Owner.
 - 1. Schedule training and start-up operations for no more than one piece of equipment or system at a time.
 - 2. Owner may require re-scheduling of training if operations personnel are not available for training on a scheduled date.
 - 3. Provide a minimum of two weeks' notice if training must be rescheduled.
 - 4. Training is to be limited to 8 hours per week.
 - 5. Time required for training is to be considered in the development of the project schedule.
- J. Schedule and coordinate training for equipment, products, or systems which depend upon other equipment or systems for proper operation so that trainees can be made familiar with the operation and maintenance of the entire operating system.
- K. Conduct a training course for the equipment products and systems listed below. Training is to be adequate to meet the training objectives described above and is to be for at least the minimum time indicated.

| Specification Section | Equipment/System Description | Minimum Hours |
|-----------------------|------------------------------|---------------|
| 33 04 11 | Remote Monitoring Unit | 4 hours |

3.06 INITIAL MAINTENANCE

- A. Maintain equipment until the project is accepted by the Owner.
 - 1. Insure that mechanical equipment is properly greased, oiled, or otherwise cared for as recommended by the Supplier.
 - 2. Operate air handling equipment only when filters are in place and are clean. Change filters weekly during construction.
- B. Service equipment per the Supplier's instructions immediately before releasing the equipment to the Owner.
 - 1. Replace replaceable filters and clean permanent filters associated with air handling units or other packaged equipment.
 - 2. Remove and clean screens at strainers in piping systems.
 - 3. Clean insects from intake louver screens.

END OF SECTION

01 78 23 OPERATION AND MAINTENANCE DATA

1.00 GENERAL

1.01 WORK INCLUDED

- A. Prepare a complete and detailed Operation and Maintenance Manual for each type and model of equipment or product furnished and installed under this contract.
- B. Prepare the manuals in the form of an instruction manual for the Owner. The manual is to be suitable for use in providing operation and maintenance instruction as required by Section 01 75 00, STARTING AND ADJUSTING.
- C. Provide complete and detailed information specifically for the products or systems provided for this project. Include the information required to operate and maintain the product or system. Provide Maintenance Summary Form to include information on any routine operations required to ensure satisfactory performance and longevity of equipment.
- D. Manuals are to be in addition to any information packed with or attached to the product when delivered. This information is to be taken from the product and provided as an attachment to the manual.

1.02 SUBMITTALS

- A. Submit manuals in accordance with Section 01 33 00, SUBMITTALS. Attach to each manual a copy of the Operation and Maintenance Manual Review Form as shown in Section 01 31 13.13 FORMS with pertinent information completed.
- B. Preliminary Manuals: Submit prior to shipment date for equipment, system, subsystem, or component. Include copy of warranties, bonds, and services agreements if specified.

1.03 GUARANTEES

A. Provide copies of the Manufacturer's warranties, guarantees, or service agreements in accordance with Section 01 70 00, EXECUTION AND CLOSEOUT REQUIREMENTS.

2.00 PRODUCTS

- 2.01 MATERIALS
 - A. Provide indexed manuals in electronic (PDF) format as well as three hard copies of the final O&M submittal. Upload manuals to Projectmates website.
 - B. Provide an Equipment List using Equipment List Form at the end of this Section.

3.00 EXECUTION

3.01 MANUAL ORGANIZATION AND CONTENTS

- A. Provide a Table of Contents listing each section of the manual for each product or system.
 - 1. Identify each product or system using the nomenclature shown in the Contract Documents.
 - 2. Assign a number and letter to each section in the manual.
 - a. Assign a number to each product or system. The number is to correspond to the Owner's equipment numbering system or other system designated by the Engineer.
 - b. A cross reference is to be provided for the Owner's numbering system and designations for equipment indicated in the Contract Documents.
 - c. The letter assigned will represent the part of the manual, consistent with the manual contents as required by Paragraphs 3.02, 3.03, and 3.04.
 - 3. Provide index tabs for each section in the manual.

- 4. The designation on each index tab is to correspond to the number and letter assigned in the Table of Contents.
- B. Include only the information that pertains to the product described. Annotate each sheet to:
 - 1. Clearly identify the specific product or component installed.
 - 2. Clearly identify the data applicable to the installation.
 - 3. Delete reference to inapplicable information.
- C. Supplement manual information with drawings as necessary to clearly illustrate relations of component parts of equipment and systems, and control and flow diagrams.

3.02 EQUIPMENT AND SYSTEMS MANUAL CONTENT

A. Manual shall provide the following information:

- 1. A description of the unit and component parts.
- 2. Schedule of routine maintenance requirement on the Maintenance Summary form
- 3. Operating instructions for startup, normal operations, regulation, control, shutdown, emergency conditions, and limiting operating conditions.
- 4. Maintenance instructions including assembly, installation, alignment, adjustment, and checking instructions.
- 5. Lubrication schedule and lubrication procedures. Include a cross reference for recommended lubrication products.
- 6. Troubleshooting guide.
- 7. Description of sequence of operation by the Control Manufacturer.
- 8. Warnings for detrimental maintenance practices.
- 9. Parts lists including:
 - a. Outline, cross section and assembly drawings, engineering data, test data, and performance curves.
 - b. Control schematics and point to point wiring diagrams prepared for field installation, including circuit directories of panel boards and terminal strips.
 - c. Other information as may be required by the individual sections of the specifications.

3.03 EQUIPMENT LIST

A. Provide Equipment List Form on compact disc in Microsoft Excel format.

3.04 LIST OF SERVICE ORGANIZATIONS

A. Provide a directory of authorized service organizations with company name, address, telephone number, and the contact person for warranty repair.

3.05 SUPPLEMENTS

- A. The supplements listed below, following "End of Section", are part of this specification.
 - 1. Maintenance Summary Form
 - 2. Equipment List Form

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT NUMBER& NAME:

- 1. EQUIPMENT ITEM ______
- 2. MANUFACTURER______
- 3. EQUIPMENT LOCATION _____
- 3. EQUIPMENT/TAG NUMBER(S)_____

4. RECOMENDED MAINTENANCE REQUIREMENTS

| Maintenance Operation Comments | Frequency | Materials Required |
|---|--|---|
| List briefly each maintenance operation require and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable) | List require frequency of each maintenance operation (weekly, monthly, quarterly, annually, etc) | Lubricant, chemicals, paint, air filters, etc with specific size, recommended model name, type, etc. |
| Example: Replace Air Filter on air vent | Every 90 days | 20" X 30" air filter |
| | | |
| | | |
| | | |

5. LUBRICANT LIST

| Reference Symbol | Lubricant 1 | Lubricant 2 | Lubricant 3 | Lubricant 4 |
|-----------------------------------|-----------------------------------|---------------------|----------------------|----------------|
| List symbols used in (4) above | List lubricants as o intended. | distributed by each | manufacturer for the | e specific use |
| | | | | |
| | | | | |
| | | | | |

6. RECOMENDED SPARE PARTS FOR OWNER'S INVENTORY

| Part No | Description | Unit | Quantity | Unit Cost | |
|--------------------|---|------|----------|-----------|--|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Note: Identify Par | Note: Identify Parts provided by this contract with two asterisks | | | | |

EQUIPMENT LIST

| FACILITY | <i>ı</i> . | | PRIME CONTRACTOR: | | | | NTM | IWD PROJECT # | · 101-0490-18 | | |
|------------|---|---|------------------------|---|---------|-----------------|-----------------|---------------|-----------------|-------------------------------|----------------|
| | | | | | | | | | | | |
| | To Be Completed by Engineer I ag # Location D | | | To Be Completed by Contractor cation Detail Serial # Warranty NTMWD Opera | | | | | | NTMWD Operation | |
| Asset Type | (alpha-numeric) | Description | (Building, Room, Etc.) | Manufacturer | Model # | (alpha-numeric) | Acceptance Date | List Price | Expiration Date | Warranty Coverage Information | Staff Sign Off |
| | TWVL49996 | 8" Combination Air Release/Vacuum Valve | Sta. 2+00 | | | | | | | | |
| | TWMH49996 | Manhole | Sta. 2+00 | | | | | | | | |
| | TWVL49944 | 12" Blow Off Valve | Sta. 24+25 | | | | | | | | |
| | TWMH49944 | Manhole | Sta. 24+25 | | | | | | | | |
| | TWVL49923 | 8" Combination Air Release/Vacuum Valve | Sta. 44+90 | | | | | | | | |
| | TWMH49923 | Manhole | Sta. 44+90 | | | | | | | | |
| | TWMH49921 | 36" Manway and Vault | Sta. 47+29 | | | | | | | | |
| | TWVL49900 | 12" Blow Off Valve | Sta. 65+78 | | | | | | | | |
| | TWVL49899 | 48" Butterfly Valve | Sta. 65+93 | | | | | | | | |
| | TWMH49899 | Manhole | Sta. 65+93 | | | | | | | | |
| | TWVL49898 | 8" Combination Air Release/Vacuum Valve | Sta. 66+08 | | | | | | | | |
| | TWMH49898 | Manhole | Sta. 66+08 | | | | | | | | |
| | TWVL49878 | 12" Blow Off Valve | Sta. 85+70 | | | | | | | | |
| | TWMG49878 | Manhole | Sta. 85+70 | | | | | | | | |
| | TWVL49875 | 12" Blow Off Valve | Sta. 87+12 | | | | | | | | |
| | TWMH49875 | Manhole | Sta. 87+12 | | | | | | | | |
| | TWMH49830 | 36" Manway and Vault | Sta. 131+85 | | | | | | | | |
| | TWMH49825 | 36" Manway and Vault | Sta. 135+10 | | | | | | | | |
| | TWVL49802 | 8" Combination Air Release/Vacuum Valve | Sta. 157+90 | | | | | | | | |
| | TWMH49802 | Manhole | Sta. 157+90 | | | | | | | | |
| | TSVL49801 | 48" Butterfly Valve | Sta. 158+00 | | | | | | | | |
| | TWMH49801 | Manhole | Sta. 158+00 | | | | | | | | |
| | TWVL49800 | 8" Combination Air Release/Vacuum Valve | Sta. 158+10 | | | | | | | | |
| | TWMH49800 | Manhole | Sta. 158+10 | | | | | | | | |
| | TWMH49783 | 36" Manway and Vault | Sta. 172+92 | | | | | | | | |
| | TWVL49780 | 12" Blow Off Valve | Sta. 173+77 | | | | | | | | |
| | TWVL49759 | 42" Butterfly Valve | Sta. 195+57.76 | | | | | | | | |
| | TWMH49759 | Manhole | Sta. 195+57.76 | | | | | | 1 | | 1 |
| | TWVL49753 | 8" Combination Air Release/Vacuum Valve | Sta. 201+03 | | | | T | | 1 1 | | 1 |
| | TWMH49753 | Manhole | Sta. 201+03 | | | | T | | 1 1 | | |
| | TWVL49752 | 48" Butterfly Valve | Sta. 201+13 | | | | | | 1 | | 1 |
| | TWMH49752 | Manhole | Sta. 201+13 | | | 1 | | | | | |

01 79 00 CONTRACTOR SAFETY PLAN

1.0 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall provide the management, labor, material, equipment and related items to development, implement, enforce, manage, and report on a Site Specific Environmental Health and Safety Plan (EH&S) for this project.
 - 1. The Contractor is responsible for addressing the safety concerns associated with construction activities, including potential hazards. Primary and ultimate responsibility for construction job site and activity safety shall remain with the Contractor in spite of documentation of this plan. Maintain a Site Specific EH&S Plan during the duration of construction including all staff, equipment, and materials needed.
- B. Provide the Site Specific EH&S plan to North Texas Municipal Water District (NTWMD) at the Preconstruction Meeting and be prepared to discuss major points of the submitted plan. (See 1.04-Submittals below)
- C. Host safety training for staff and subcontract staff on site as conditions require.
- D. Designate a safety officer to provide guidance and strategies on for safety site to NTMWD and contractors employees.
- E. Inspect equipment as needed to ensure safe operation
- F. Provide necessary training to employees as required by equipment, materials, or working conditions prior to risk related field activities

1.02 QUALITY ASSURANCE

A. Plan and conduct all construction activities to minimize risk and ensure safety to staff, surroundings, and subcontractors.

1.03 STANDARDS

- A. The Contractor shall provide a Site Specific EH&S Plan that complies with and addresses compliance with:
 - 1. Applicable Local, State, and Federal Requirements for all project specific hazards.
 - 2. All requirements of OSHA Title 29 CFR Part 1910 and OSHA Title 29 CFR PART 1910
 - 3. NTMWD Lock Out Program Control #382-018

1.04 SUBMITTALS

A. Contractor shall submit one Site Specific EH&S Safety plan in accordance with Section 01 33 00, SUBMITTALS at the Preconstruction meeting and maintain one copy on the project site at all times. The document shall be updated in the Construction Management Software on a regular basis.

2.00 PRODUCTS

2.01 MATERIALS

- A. Print plan on heavy, first quality paper
 - 1. Paper shall be 8-1/2 X 11 paper.
 - a. Reduce drawings and diagrams to 8-1/2 X 11 paper size
 - b. When reduction is not practical, fold drawings and place each separately in a clear, super heavy weight, top loading polypropylene sheet protector design for ring binder use. Provide a type identification label on each sheet protector.
 - 2. Punch Paper for standard three-ring binders
- B. Place manuals in three ring binder
 - 1. Binders are to have clear front, back, and spine covers
 - 2. Sheet lifters are to be provided

- 3. Minimum size is 2-inch capacity
- C. Provide tab indexes for each section of the manual
- D. Major Updates to the plan shall be provided to NTWMD on a regular basis via a PDF file.

3.00 EXECUTION

- 3.01 SITE SPECIFIC EH&S CONTENTS
 - A. The Site Specific EH&S Plan shall include at the minimum the following information:
 - a. Background information including but not limited to
 - i. Contractor Name
 - ii. Project Number
 - iii. Project Name
 - iv. Project Location(s)/Site(s)
 - v. Project Description
 - vi. List of conditions of site/location that may or shall pose a hazard to contractor, owner or citizens.
 - b. Objective of the Site Specific EH&S Plan
 - c. Administration and Enforcement of the Plan
 - i. Assignment of Safety Officer(s)
 - ii. Injury reporting approach
 - d. Emergency Notification procedures based on hazard type
 - i. Who to notify in which situations
 - e. Site Access Control Requirements
 - i. Contractor shall prohibit unauthorized persons from entering the project area during the performance of this Contract. Contractor shall be responsible for ensuring that applicable OSHA requirements and standards are met before any person is allowed to enter the project area.
 - f. Contractor Safety Guidelines may include the following based on the project specific issues. but not limited to
 - i. Fire Prevention and Protection
 - ii. Means of Egress
 - iii. Hazardous Materials
 - iv. Hazardous waste operations
 - v. Bloodborne Pathogen Exposure
 - vi. Solid wastes
 - vii. Health Hazards
 - viii. Confined Space plan
 - ix. Electrical safety
 - x. Excavations
 - xi. Fall Protection Plan
 - xii. Equipment safety (scaffolding, vehicles, etc.)
 - xiii. Site safety housekeeping
 - xiv. Flammable/Combustable Liquids
 - xv. Hot work activities (welding)
 - xvi. Hazard communication
 - xvii. Trench safety requirements
 - 1. Reference trench safety plan
 - xviii. Ladders and Stairways
 - xix. Machine and equipment guarding
 - xx. Personal protective equipment
 - g. Contractor's training program
 - h. Job Hazard analysis
 - i. Job site safety inspections and audit schedule/plan
 - ii. Job safety checklist specific to the project (and phase)
 - i. Contractor and subcontractor acknowledgement of the safety plan

- j. Appendix
 - i. Accident Reporting documentation
 - ii. Safety equipment checklists
 - iii. Equipment Checklists
 - iv. Safety Meeting sign in
 - v. List of Trained Individuals

3.02 SITE SPECIFIC EH&S PLAN ORGANIZATION

- A. Provide a Table of Contents listing each section of the manual for each product or system.
- B. Assign a number and letter to each section in the manual.
- C. Provide Index tabs for each section of the manual
- D. The designation on each index tab is to correspond to the number and letter assigned in the Table of Contents

END OF SECTION

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03 00 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish labor, materials, equipment, and incidentals necessary to place, transport, consolidate, finish, cure, and mix concrete, consisting of Portland cement, fine aggregate, admixtures, and water in the proper portions as specified.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM)

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Trial mix design
- B. Show Drawings
 - 1. Submit a schedule to the Owner's representative which shows the sequence of
- C. Test and Evaluation Reports
 - 1. Compressive test results
 - 2. Portland Cement certificate of compliance
 - 3. Aggregate certificate of compliance

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications

- 1. A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.
- 2. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- C. Testing
 - 1. Factory Testing
 - a. Trial Mix
 - The Contractor shall be responsible for the design of the concrete. A trial mix shall be designed by an independent testing laboratory, retained by the Contractor and approved by the Owner. The testing laboratory shall submit verification that the materials and proportions of the trial mix design meet the requirements of the specifications.
 - 2) In lieu of a trial mix design, Contractor may submit a mix design used successfully in previous similar work, for similar materials for approval.
 - 3) The Contractor shall not make changes in materials, gradation, source, brand, or proportions after having the design approved.
 - 4) Testing shall be done using the same cement, water, aggregates, and fly ash that will be used for the project.
 - b. Portland Cement
 - 1) Secure from the cement manufacturer Certificates of Compliance delivered directly to the concrete producer for further delivery directly to the testing laboratory.
 - 2) Require the Certificates of Compliance to positively identify the cement as to production lot, bin or silo number, dating and routing of shipment, and compliance with the specified standards.
 - 3) If so required by the Owner, promptly provide such other specific physical and chemical data as required.
 - c. Aggregate
 - 1) Provide one test unless character of material changes, material is substituted, or additional test is requested by the Engineer.
 - 2) Sample from conveyor belts or batching gates at the ready-mix plant:
 - a) Sieve analysis to determine compliance with specified standards and grading;
 - b) Specific gravity test for compliance with specified standards.
 - 2. Owner Testing
 - a. It is the responsibility of the Contractor to achieve and maintain the quality of concrete required. However, the Owner may, at his option, perform laboratory testing to verify the quality of the concrete. The Owner shall have the right to require additional testing of concrete which has failed to the minimum requirements of this section. Any additional tests will be at the cost of the Contractor.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

1.10 STANDARDS

- A. Mixing, sampling, placing, curing and testing of concrete, and the materials used shall be in compliance with the latest revisions of the following standards, unless otherwise noted in the Contract Documents. The Contractor shall maintain one copy of each of the applicable standards at the construction field office.
 - 1. American Society for Testing and Materials (ASTM) Standards
 - 2. American Concrete Institute (ACI) Standards

1.11 FIELD CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 CONCRETE

- A. Performance / Design Criteria
 - 1. Concrete shall be proportioned to give the necessary workability and strength and shall conform to the following requirements:

| Class | Min. 28 Day | Min. Cement | Max Size | Max | Slump | Use |
|-------|-------------|-------------|-----------|-------|--------|---|
| | Compressive | Bags Per | of Coarse | W/C | Inches | |
| | Strength | Cu.Yd. | Aggregate | Ratio | | |
| В | 2,000 | 4.0 | 1 1⁄2" | 0.71 | 4-6 | MH Base |
| А | 3,000 | 5.0 | 1 1⁄2" | 0.60 | 4-6 | Pads, Bases, Sidewalk, Footings, Piers |
| С | 3,600 | 5.0 | 1 1⁄2" | 0.45 | 5-7 | Pavement |
| S | 4,000 | 6.0 | 1 1⁄2" | 0.45 | 5-7 | Structures, Curbs |

2. In no case shall the amount of coarse material be such as to produce harshness in placing and honeycombing in the structure when forms are removed.

B. Materials

- 1. Cement
 - a. Portland Cement conforming to the specifications and test results for Type I Portland Cement as designated in ASTM C 150.
 - 1) A maximum of 20% of the cementitious materials used in mix designs may be replaced with Class C or F fly ash.
 - a) Fly ash shall not be used with Type IV cement.
 - b) Carbon content in fly ash shall not exceed 3% by volume
- 2. Fine Aggregate
 - a. Fine aggregates consisting of natural, washed and screened sand having clean, hard, strong, durable, uncoated grains complying with the requirements of ASTM C 33.
 - b. The sand shall generally be of such size that all will pass a 3/8" sieve, at least 95% passing a 1/4" screen and at least 80% passing a No. 8 sieve.
 - Aggregate shall not contain strong alkali, or organic material which gives a color darker than the standard color when tested in accordance with ASTM C 40.
- 3. Coarse Aggregate
 - a. Evenly graded and consisting of sound, washed and screened gravel, free of clay balls, injurious amounts of soft, friable, thin, elongated, or laminated pieces, alkali, organic, or other deleterious materials.
 - b. Coarse aggregates shall comply with ASTM C 33, size 57.
- 4. Reinforcing Steel
 - a. New billet steel, deformed bars, conforming to ASTM A 615 Grade 60.
- 5. Admixtures
 - a. Concrete of 3,000 psi or stronger shall contain air-entraining admixtures, except for drilled shafts, and when conditions require, water reducing and set controlling admixtures may be used. Only admixtures specified may be used:

- 1) Air Entraining Admixture
 - a) Comply with ASTM C 260. The total average air content shall be in accordance with recommendations ACI 211.1: 4.5% + 1.0% for 1-1/2" maximum size aggregate.
- 2) Water Reducing Admixture
 - a) Comply with ASTM C 494, Types A and D only. Accurately measure and add to the mix in accordance with the Manufacturer's recommendations.
- 3) Set Retarding Admixture
 - a) Retarding agents may be used if approved by the Engineer. Comply with ASTM C 494, Types B and D only. Accurately measure and add to the mix in accordance with the Manufacturer's recommendations.
- 6. Water
 - a. Water for concrete shall be clean and free from oil, acid, alkali, organic matter or other harmful impurities.
 - b. Water which is suitable for drinking or for ordinary household use will be acceptable for concrete.
 - c. Where available, water shall be obtained from mains of a waterworks system.
- 7. Expansion Joints
 - a. Bituminous type performed expansion joint filler complying with ASTM D 994, in thickness specified.
 - Expansion joint sealant shall be a two component non-sag polysulfide base elastometric sealing compound conforming to Fed. Spec. TT-S-00227E, Type II, Class B.
- 8. Concrete shall be capable of developing two-thirds of the required 28-day compressive strength in 7 days.
- C. Mixes
 - In the determination of the amount of water required for mix, consideration shall be given to the moisture content of the aggregate. The net amount of water in the mix will be the amount added at the mixer, plus the free water in the aggregate; and minus the absorption of the aggregate, based on a 30 minute absorption period. No water allowance shall be made for evaporation after batching.
 - 2. The methods of measurement of materials shall be such that the proportions of water to cement can be closely controlled during the progress of the work and easily checked at any time by the Owner. Contractor shall obtain aggregate from a source which will insure a uniform quality and grading during any single day. Sources of supply shall be approved by the Owner.
 - 3. All materials shall be separately and accurately measured. Measurement may be made by weight or by volume. All equipment for measurement of materials shall be subject to approval by Owner.
 - 4. Proportions of the mix shall be such that the concrete can be installed into the corners and angles of forms and around reinforcing without excessive spading or vibrating.
- D. Required Average Compressive Strength:
 - 1. All concrete is required to have an average compressive strength greater than the specified strength. The required average compressive strength shall be established according to the requirements of ACI 301, 4.2.3.3.

- 2. Standard Deviation: If the production facility has records of field tests performed within the past 12 months and spanning a period of not less than 60 calendar days for a class of concrete within 1000 psi of that specified for the work, calculate a standard deviation and establish the required average strength fcr' in accordance with ACI 301, 4.2.3.2 and 4.2.3.3.a. If field test records are not available, select the required average strength from ACI 301, Table 4.2.3.3.b.
- E. Documentation of Required Average Compressive Strength:
 - 1. Documentation indicating the proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength, shall consist of field strength records or trial mixture.
 - 2. Field Strength Records: Document field strength records according to ACI 301, 4.2.3.4.a and including the following:
 - a. Field test data shall not be older than 1 year.
 - b. If field test data are available and represent a single group of at least 30 consecutive strength tests for one mixture, using the same materials, under the same conditions, and encompassing a period of not less than 60 days, verify that the average of the field test results equals or exceeds fcr'. Submit for acceptance the mixture proportions along with the field test data.
 - c. If the field test data represent two groups of compressive strength tests for two mixtures, plot the average strength of each group versus the watercementitious materials ratio of the corresponding mixture proportions and interpolate between them to establish the required mixture proportions for fcr'.
 - 3. Trial Mixtures:
 - a. Establish trial mixture proportions according to ACI 301, 4.2.3.4.b and including the following.
 - Make at least three trial mixtures complying with performance and design requirements. Each trial mixture shall have a different cementitious material content. Select water-cementitious materials ratios that will produce a range of compressive strengths encompassing the required average compressive strength fcr'.
 - 2). Submit a plot of a curve showing the relationship between water-cementitious materials ratio and compressive strength.
 - 3). Establish mixture proportions so that the maximum water-cementitious materials ratio is not exceeded when the slump is at the maximum specified.
 - b. Laboratory samples shall be taken in accordance with the trial mix designs for laboratory testing purposes.
 - c. The fresh concrete shall be tested for Slump (ASTM C143) and Air Content (ASTM C173 and ASTM C231). Strength test specimens shall be made, cured and tested for 7-day and 28-day strength in accordance with ASTM C192, ASTM C39, and ASTM C293.
 - d. Suitable facilities shall be provided for readily obtaining representative samples of aggregate from each of the weigh batchers for test purposes and for obtaining representative samples of concrete for uniformity tests. The necessary platforms, tools, and equipment for obtaining samples shall be furnished. Aggregates shall be tested in accordance with ASTM C289.
 - e. The cement contents specified are minimum values. If additional quantities are required to obtain the specified strengths, supply the cement at no additional cost to the Owner.
 - f. A trial mix shall be designed by an independent testing laboratory, retained and paid by the Contractor and approved by the Owner. The testing laboratory shall submit verification that the materials and proportions of the trial concrete mix design meet the specifications.

- g. From these trial mix tests, the ratios between 7-day and 28-day strengths shall be established. The 7-day strength which corresponds to the required 28-day strength shall be determined.
- h. The final results of the trial mix design shall be submitted to the Engineer at least 10 days prior to the scheduled beginning of concrete placement and shall be approved by the Engineer prior to the placement of any concrete.
- 4. Revisions to Concrete Mixtures
 - a. When less than 15 compressive strength tests results for a given class of concrete are available from the current project:
 - 1). If any of the following criteria are met, take immediate steps to increase average compressive strength of the concrete.
 - a). A 7-day compressive strength test result multiplied by 1.5 falls below the required 28-day compressive strength.
 - b). A 28-day compressive strength tests result is deemed not satisfactory
 - b. When at least 15 compressive strength test results for a given class of concrete become available from the current project:
 - 1). Calculate the actual average compressive strength, standard deviation and required average compressive strength using the previous 15 consecutive strength tests. Submit results in graphical form with each 28-day test result for that class of concrete.
 - 2). If any of the following criteria are met, take immediate steps to increase average compressive strength of the concrete

a). A 7-day compressive strength test result multiplied by the average job-to-date ratio of 7-day to 28-day compressive strength falls below the required 28-day compressive strength.

b). A 28-day compressive strength tests result is deemed not satisfactory.

c) The average compressive strength falls below the required average compressive strength.

d) When revisions to the mix design are required, notify the Engineer in writing of the corrective actions taken.

2.2 CONCRETE MIXING

- A. Mixers may be stationary, truck, or paving mixers of approved design. They shall be capable of combining the materials into a uniform mixture and of discharging without mixture segregation. Stationary and paving mixers shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixers or mixing plant shall include a device for automatically counting the total number of batches of concrete mixed. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer on the name plate.
- B. The mixing time for stationary mixers shall be based upon the mixer's ability to produce uniform concrete throughout the batch and from batch to batch. For guidance purposes, the manufacturer's recommendations, or 1 minute for 1 cubic yard plus 1/4 minute for each additional cubic yard may be used. Final mixing time shall be based on mixer performance. Mixers shall not be charged in excess of the capacity specified by the manufacturer.
- C. When a stationary mixer is used for partial mixing of the concrete (shrink mixed), the stationary mixing time may be reduced to the minimum necessary to intermingle the ingredients (about 30 seconds).

- D. When a truck mixer is used, either for complete mixing (transit-mixed) or to finish the partial mixing in a stationary mixer and in the absence of uniformity test data, each batch of concrete shall be mixed not less than 70 nor more than 100 revolutions of the drum, at the rate of rotation designated by the manufacturer of the equipment as mixing speed. If the batch is at least 1/2 cubic yard less than the rated capacity, in the absence of uniformity test data, the number of revolutions at mixing speed may be reduced to no less than 50. Additional mixing shall be performed at the speed designated by the manufacturer of the equipment as agitating speed. When necessary for proper control of the concrete, mixing of transit-mixed concrete shall not be permitted until the truck mixer is at the site of the concrete placement. Truck mixers shall be equipped with accurate revolution counters.
- E. Paving mixers may be either single compartment drum or multiple compartment drum type. A sled or box of suitable size shall be attached to the mixer under the bucket to catch any concrete spillage that may occur when the mixer is discharging concrete into the bucket. Multiple compartment drum paving mixers shall be properly synchronized. The mixing time shall be determined by time required to transfer the concrete between compartments of the drum.
- F. Vehicles used in transporting materials from the batching plant to the paving mixers shall have bodies or compartments of adequate capacity to carry the materials and to deliver each batch, separated and intact, to the mixer. Cement shall be transported from the batching plant to the mixers in separate compartments which are equipped with windproof and rain proof covers.

2.3 FORM TIES

- A. Form Ties
 - 1. Metal form ties shall be used to hold forms in place and to provide easy metal removal. The use of wire for ties shall not be permitted.
 - 2. No metal or other material shall be left within 1 1/2" of the surface, when removing form tie assemblies which are inside the forms. The assembly shall provide cone-shaped depressions in the concrete surface at least 1" in diameter and 1 1/2" deep to allow filling and patching. Such devices when removed shall leave a smooth depression in the concrete surface without injury to the surface.
 - 3. Burning off rods, bolts, or ties shall not be permitted.
 - 4. Metal ties shall be held in place by devices attached to wales. Each device shall be capable of developing the strength of the tie.
 - 5. Metal and wooden spreaders which are separated from the forms shall be wired to the top of the form and shall be entirely removed as the concrete is placed.

2.4 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes. Unless indicated otherwise, provide the following configurations.
 - 1. Construction Joints:
 - a. Profile: Ribbed without center bulb.
 - b. Width: 6 inches.
 - c. Minimum thickness: 3/8 inch.
 - 2. Expansion Joint:
 - a. Profile: Ribbed with center bulb.
 - b. Width: 9 inches.
 - c. Minimum thickness: 3/8 inch.
 - 3. Manufacturers:

- a. Greenstreak.
- b. Meadows: W. R. Meadows, Inc.
- c. Murphy: Paul Murphy Plastics Co.
- d. Progress Unlimited Inc.
- e. Sternson Group.
- f. Tamms Industries Co.; Div. of LaPorte Construction Chemicals North America, Inc.
- g. Vinylex Corporation.
- h. Westec Barrier Technologies; Div. of Western Textile Products, Inc.
- B. Self-Expanding Strip Waterstops (Hydrophilic): Self-expanding strip waterstops shall be used only where specifically indicated. Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophilic material for adhesive bonding to concrete.
 - 1. Products: Adeka Ultra Seal: Mitsubishi International Corporations

2.5 CURING MATERIALS

- A. Sheet Curing Material: Conforming to ASTM C171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. White burlap -polyethylene film.
- B. Membrane Curing Compounds: Membrane curing compound conforming to ASTM C309; having a color to indicate coverage when applied; non-staining; applied according to the manufacturer's recommendations. No curing compound shall be used on walls which are to receive a plaster mix finish. When tested according to ASTM C156, the curing compound shall provide a film which has retained, within the specimen, the following percentages of moisture present when the curing compound was applied:
 - 1. At least 97 percent at the end of 24 hours.
 - 2. At least 95 percent at the end of 3 days.
 - 3. At least 91 percent at the end of 7 days.
- C. Concrete Curing and Sealing Compound:
 - 1. Where a sealer is necessary, use a concrete curing and sealing compound. Application of this product shall be in accordance with the manufacturer's recommendations.
 - 2. Interior concrete surfaces: Sonneborn Kure-N-Seal W, by BASF The Chemical Company.
 - 3. Exterior concrete surfaces: Sonneborn Kure 1315, by BASF The Chemical Company.
- D. Finishing Aid: Spraying material designed to form a monomolecular film on fresh concrete that reduces the rate of evaporation of surface moisture prior to finishing; conforming to Confilm, as manufactured by Master Builders, Inc. This material is not a curing compound. Concrete must be cured as specified.

2.6 RELATED MATERIALS

- A. Joint Materials for Water-Retaining Structures:
 - 1. Pre-molded, resilient, non-bituminous expansion joint filler conforming to ASTM D1752, Type "II", in the thickness specified.
 - 2. Joint sealer conforming to ASTM D6690.

- 3. Expansion joint sealant for non-potable water shall be a two-component, non-sag, polysulfide-base, elastomeric sealing compound. The material shall conform to Federal Specification TT S 00227E, Type "II", Class B; installed according to the manufacturer's recommendations. Backing material for sealant shall be a rod of a diameter and composition recommended by the sealant manufacturer.
- 4. Expansion joint sealant for potable water shall be a two-component, non-sag, polysulfide sealant containing no lead or mercury; conforming to Fed. Spec. TT S 00227E, Type "II", Class A; applied according to the manufacturer's specifications. Backing material for sealant shall be a rod of a diameter and composition recommended by the sealant manufacturer.
- 5. Where surface is to receive a swept in grout topping, a 3-inch wide, 1-mil polyethylene strip shall be placed above the joint sealant and held in place with 1-inch wide polyethylene tape spaced at 12-inch centers (maximum).
- B. Joint Materials for Non-Water Retaining Structures: Bituminous-type, preformed, expansion joint filler, conforming to ASTM D994.
- C. Bonding Agents: Install according to the manufacturer's recommendations and written instructions.
 - 1. Bonding agent shall be Sika Armatec 110 EpoCem by Sika Corporation.
- D. Non-Shrink Grout:
 - 1. General: Non-shrink grout for grouting of pump, motor, and equipment baseplates or bedplates, column baseplates, other miscellaneous baseplates, piping block outs and other uses of grout. Grout shall meet the following requirements, as verified by independent laboratory tests:
 - a. No shrinkage from the time of placement, or expansion after set, under ASTM C827 and CRD C621 83 (Corps of Engineers). When non shrink grouts are tested under CRD C621 83, the grout shall be tested in a fluid state. A fluid state shall be defined as flowing through a flow cone at a rate of 20 seconds, plus or minus 5 seconds.
 - b. An initial set time of not less than 45 minutes under ASTM C191.
 - 2. Non-Shrink Non Metallic Grout: Pre mixed, non-staining, non-shrink grout; minimum 28day compressive strength of 5000 psi.
 - a. Do not use for vibrating equipment.
 - b. Products:
 - 1). Masterflow 713 Plus by BASF The Chemical Company.
 - 2). Five Star Grout by Five Star Products, Inc.
 - 3). SikaGrout 212 by Sika Corporation.
 - 3. Non-Shrink Epoxy Structural Grouts: Furnished in two components from the factory and mixed on the job site; conforming to ASTM C579, ASTM C580, and ASTM C827; chemical resistant, water resistant and a minimum 7-day compressive strength of 12,000 psi.
 - a. Use for vibrating equipment.
 - b. Products:
 - 1). Sikadur 42, Grout-Pak by Sika Corporation.
 - 2). Five Star HP Epoxy Grout by Five Star Products, Inc.
 - 3). Masterflow 648 CP by BASF The Chemical Company.
- E. Normal Shrinkage Grout: 1 part Portland cement, Type I, to 3 parts of clean, first quality sand; proportioning on a volumetric basis; used for non-structural applications for grouting areas as shown on the plans which do not require non-shrink grout.
- F. Foundation Waterproofing: Waterproofing shall be in accordance with Section 07 11 13 BITUMINOUS DAMPPROOFING

G. Zinc Rich Primer: Aluminum surfaces which contact or are embedded in concrete shall be coated with zinc rich primer. Primer shall be Tneme-Zinc.

2.7 REPAIR MATERIALS

A. Concrete shall be repaired with hand-applied repair mortar in accordance with Section 03 01 40

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify the Owner's representative upon completion of various portions of the work required for placing concrete, so that inspection may be made as early as possible. Keep the Owner's representative informed of the anticipated concrete placing schedules.
- B. All items, including lines and grades, forms, waterstops, reinforcing, inserts, piping, electrical, plumbing and the Contractor's concreting materials and equipment shall be in compliance with the plans and specifications before proceeding.
- C. Do not place any concrete until formwork and the placing reinforcement in that unit is complete. Place no concrete before the completion of all adjacent operations which might prove detrimental to the concrete.
- D. Brilliantly light the work site so that all operations are plainly visible when concrete mixing, placing, and finishing, continues after daylight. Whenever possible, concrete finishing shall be completed in daylight hours.
- E. When placing concrete, the forms shall be clean and entirely free from all chips, dirt, sawdust and other extraneous matter. Forms for slab, beam and girder construction shall not have tie wire cuttings, nails, or any other matter which would mar the appearance of the finished construction. Clean forms and keep them free of any foreign matter during concrete placing.
- F. The concrete shall be mixed in quantities required for immediate use. Any concrete which is not in place within the time limits specified shall not be used. Concrete shall not be re-tempered.
- G. Concrete shall not be placed if impending weather conditions would impair the quality of the finished work.
- H. Unless otherwise provided, the following requirements shall govern the time sequence on which construction operations shall be carried.
 - 1. Forms for walls or columns shall not be erected on concrete footings until the concrete in the footing has cured for at least 2 curing days. Concrete may be placed in a wall or column as soon as the forms and reinforcing steel placements are approved.
 - 2. Steel beams or forms and falsework for superstructures shall not be erected on concrete substructures until the substructure concrete has cured for at least 4 curing days. Falsework required for superstructures shall not be erected until the substructure has cured for 4 curing days, and shall not be removed until the superstructure has cured.
- I. Aluminum and Steel Items

- 1. Where aluminum anchors, aluminum shapes, or aluminum electrical conduits are embedded in concrete, contact surfaces shall be painted with zinc chromate primer. The paint shall be allowed to thoroughly dry before the aluminum is placed in contact with the concrete.
- 2. Aluminum surfaces to be placed in contact with concrete, wood, or masonry construction, except where the aluminum is to be embedded in concrete, shall be given a heavy coat of an alkali-resistant paint before installation. The paint shall be applied as it is received from the manufacturer without the addition of any thinner.
- 3. Steel or other ferrous metal to be mounted on or placed in contact with dry/cured concrete such as piping, access manholes, electrical switchgear, etc. shall have contact surfaces coated with bituminous paint in accordance with previous paragraph.

3.2 JOINTS

- A. Expansion Joints and Devices:
 - 1. Workmanship: Exercise careful workmanship in joint construction to separate the concrete sections by an open joint or by the joint materials, and make the joints true to the outline indicated.
 - 2. Expansion Joints: Construct expansion joints and devices to provide expansion and contraction. Construct joints which are to be left open or filled with poured joint material with forms which are adaptable for loosening or early removal. In order to avoid jamming by the expansion action of the concrete and the consequent likelihood of injuring adjacent concrete, remove or loosen these forms as soon as possible after the concrete has initially set. Make provisions for loosening the forms to permit free concrete expansion without requiring full removal.
- B. Construction Joints:
 - 1. Construction joints are formed by placing plastic concrete in direct contact with concrete which has attained its initial set. When concrete is specified as monolithic, the term shall be interpreted as the manner and sequence of concrete placement so that construction joints do not occur.
 - a. Unless noted otherwise, the maximum horizontal spacing of construction joints shall be 40 feet.
 - b. For slabs on grade, the maximum spacing between two construction joints or between a construction joint and a control joint shall be 15 feet, unless noted otherwise.
 - c. Unless noted otherwise or approved by the Engineer, the maximum vertical spacing of construction joints shall be 15 feet. If not detailed on the drawings, construction joint details and locations shall be submitted to the Engineer for approval.
 - 2. Additional horizontal and vertical construction joints, when submitted and approved by the Engineer, may have an impact on reinforcing details. Revise reinforcing details to reflect additional joints.
 - 3. Unless otherwise provided, construction joints shall be square and normal to the forms. Provide bulkheads in the forms for all joints except horizontal joints.
 - 4. At the proper time, clean horizontal construction joints for receiving the succeeding lift using air water cutting. The surface shall be exposed sound, clean aggregate. The air pressure supply to the jet shall be approximately 100 lb. per square inch, and the water pressure sufficient to bring the water into effective influence of the air pressure. After cutting, wash the surface until there is no trace of cloudiness in the wash water.

- 5. In areas where air water cutting cannot be satisfactorily accomplished, or in areas where it is undesirable to disturb the surface of the concrete before it has hardened, prepare the surface for receiving the next lift by wet sand blasting to immediately remove all laitance and unsound concrete prior to placing of the next lift. Thoroughly wash the surface of the concrete after sand blasting to remove all loose material.
- 6. Provide construction joints with concrete keyways, reinforcing steel dowels, and waterstops. The method of forming keys in keyed joints shall permit the easy removal of forms without chipping, breaking, or damaging the concrete.
- C. Existing hardened concrete: where new concrete or grout is to be placed in contact with existing hardened concrete, texture the existing surface by chipping or other means so that an irregular surface having a height variance of not less than 1/4 inch is created. The existing concrete shall then be coated with a bonding agent and new concrete or grout placed.

3.3 WATERSTOPS

- A. PVC Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work.
 - 1. At formed surfaces, a split form shall be used. The split form shall have a tight fit which prevents misalignment and concrete leakage.
 - 2. The embedded flange of the waterstop must be secured prior to concrete placement. The flange shall be secured at 12 inches on-center by factory installed hog rings or grommets at the outermost rib. Never place nails or screws through the body of the waterstop.
 - 3. All fittings and changes in direction shall be factory fabricated. Only straight butt splices shall be made in the field. Field splices shall be according to the manufacturer's written instructions and as follows:
 - a. Cut adjoining ends square to form matching edges.
 - b. Uniformly melt the ends at 380 F using a thermostatically controlled, Teflon coated splicing iron.
 - c. When a 1/8-inch diameter melt bead develops on each waterstop end, remove the splicing iron and firmly press the two ends together in proper alignment. Hold until the material has fused and cooled. Allow the splice to cool naturally; do not quench.
- B. Self-Expanding Strip Waterstops:
 - 1. Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place.
 - a. Waterstop shall be bonded to the substrate using a continuous bead of ADEKA Ultra Seal P-201
 - 2. Install in longest lengths practicable.

3.4 CONCRETE PLACEMENT

- A. Cold Weather:
 - 1. If air temperature is at or below 40 F, cold weather concreting shall be performed in accordance with ACI 306R
 - 2. No concrete shall be mixed or placed when the atmospheric temperature is at or below 35 F. The temperature shall be taken in the shade away from artificial heat.

- 3. In cases where the temperature drops below 40 F after the concreting operations have been started, sufficient canvas and framework or other type of housing shall be furnished to enclose and protect the structure, in accordance with the requirements of ACI 306R. Sufficient heating apparatus such as stoves, salamanders, or steam equipment and fuel to provide heat shall be supplied. The concrete shall be protected when placed under all weather conditions. Should concrete placed under such conditions prove unsatisfactory, remove and replace the concrete at no cost to the Owner.
- 4. When mixing with the air temperature below 40 F, water used for mixing shall be heated to raise the concrete temperature to 70 F. The temperature of the mixing water shall not exceed 165 F when entering the mixer.
- 5. If heating the mixing water only does not raise the placing temperature of the concrete to 70 F, the aggregate must also be heated, either by steam or dry heat, to raise the placing temperature of the concrete to the required temperature. In no case shall the aggregate temperature exceed 150 F as it enters the mixer. The heating apparatus shall heat the mass of the aggregate uniformly and preclude the occurrence of hot spots which burn the material.
- 6. Salts, chemicals, or other foreign materials shall not be mixed with the concrete to preventing freezing. Calcium chloride is not permitted.
- B. Hot Weather
 - Hot weather is defined as any combination of high air temperature, low relative humidity and wind velocity that impairs the quality of the concrete. Hot weather concreting shall be in accordance with ACI 305R. Concrete shall be placed in the forms without the addition of any more water than that required by the design (slump). No excess water shall be added on the concrete surface for finishing. Control of initial set of the concrete and extending the time for finishing operations may be accomplished with the use of approved water reducing and set retarding admixture, as specified.
 - Maximum time intervals between the addition of mixing water and/or cement to the batch, and the placing of concrete in the forms shall not exceed the following (excluding HRWR admixture use):

| Concrete Temperature | Maximum Time From Water Batch to Placement | | |
|-----------------------|---|--|--|
| Non-Agitated Concrete | | | |
| Up to 80 F | 30 Minutes | | |
| Over 80 F | 15 Minutes | | |
| Agitated Concrete | | | |
| Up to 75 F | 90 Minutes | | |
| 75 F to 89 F | 60 Minutes | | |

- a. The use of an approved set-retarding admixture will permit the extension of the above time maximums by 30 minutes, for agitated concrete only.
- b. The use of an approved high range water reducing (HRWR) admixture will allow placement time extensions as determined by the manufacturer.
- 3. The maximum temperature of concrete shall not exceed 90 F at the time the concrete is placed. The temperatures of the mixing water shall be reduced by the use of chilled water or ice.
- 4. The maximum temperature of concrete with high range water reducing admixture shall not exceed 100 F at the time concrete is placed.

- 5. Under extreme heat, wind, or humidity conditions, concreting operations may be suspended if the quality of the concrete being placed is not acceptable.
- C. Handling and Transportation
 - 1. Delivery tickets shall be required for each batch and shall be in accordance with ASTM C94, Section 16. Each delivery ticket must show plainly the amount of water, in gallons that can be added to the mixer truck at the site without exceeding the maximum water cement ratio approved for that mix design. Amount of water added must be in proportion to contents of truck.
 - 2. Arrange and use chutes, troughs, or pipes as aids in placing concrete so that the ingredients of the concrete are not segregated. They shall be steel or steel lined. When steep slopes are necessary, equip the chutes with baffles or make in short lengths that reverse the direction of movement. Extend open troughs and chutes, if necessary, inside the forms or through holes left in the forms. Terminate the ends of these chutes in vertical downspouts.
 - 3. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete by thoroughly flushing with water before and after placement. Discharge water used for flushing away from the concrete in place.
 - 4. Concrete pumping is permitted and shall comply with ACI 304.2R.
 - 5. Carting or wheeling concrete batches on completed concrete floor slab shall not be permitted until the slab has aged at least 4 curing days. Unless pneumatic tired carts are used, wheel the carts on timber planking so that the loads and impact are distributed over the slab. Curing operations shall not be interrupted for the purpose of wheeling concrete over finished slabs.
- D. Depositing:
 - 1. The method and manner of placing shall prevent segregation or separation of the aggregate or the displacement of the reinforcement. Use drop chutes of rubber or metal when necessary. Prevent the spattering of forms or reinforcement bars if the spattered concrete dries or hardens before it is incorporated into the mass.
 - 2. Fill each part of the forms by directly depositing concrete as near its final position as possible. Work the coarse aggregate back from the face and force the concrete under and around the reinforcement bars without displacing them. Depositing large quantities at one point in the forms, then running or working it along the forms shall not be permitted.
 - 3. After the concrete has taken initial set, the forms shall not be jarred. No force or load shall be placed upon projecting reinforcement.
 - 4. Deposit the concrete through vertical drop chutes of rubber or metal of satisfactory size when operations involve placing concrete from above, such as directly into an excavated area, or through the completed forms, particularly in walls, piers, columns, and similar structures. Drop chutes shall be made in sections or provided in several lengths so that the outlet may be adjusted to proper heights during placing.
 - 5. Except for drilled shafts, concrete shall not be dropped free more than 10 feet when HRWR admixture is used or 5 feet without HRWR. Place in continuous horizontal layers with a depth of from 1 to 3 feet, depending upon the wall thickness. Each layer shall be soft when a new layer is placed upon it. No more than 1 hour shall elapse between the placing of successive concrete layers in any portion of the structures included in continuous placement.
 - 6. Place required sections in one continuous operation to avoid additional construction joints.

- 7. If excessive bleeding causes water to form on the surface of the concrete in tall forms, make the mix dryer to reduce the bleeding. In tall walls, place the concrete to a point about 1 foot below the top of the wall and allow to settle for 1 to 2 hours. Resume and complete concreting before set occurs.
- 8. For slopes greater than two percent, start concrete placement at low end and proceed upslope.
- E. Consolidating
 - Compact each layer of concrete and flush the mortar to the surface of the forms by continuous-working mechanical vibrators. Vibrators which operate by attachment to forms shall not be used. Apply the vibrator to the concrete immediately after deposit. Move vibrator throughout the layer of the newly placed concrete, several inches into the plastic layer below. Thoroughly work the concrete around the reinforcement, embedded fixtures and into the corners and angles of the forms until it is well-compacted.
 - 2. Mechanical vibrators shall not be operated so that they penetrate or disturb previously placed layers which are partially set or hardened. They shall not be used to aid the flow of concrete laterally. The vibration shall be of sufficient duration to completely compact and embed reinforcement and fixtures, but not to an extent causing segregation.
 - 3. Keep vibrators constantly moving in the concrete and apply vertically at points uniformly spaced, not farther apart than the radius over which the vibrator is visibly effective. The vibrator shall not be held in one location longer than required to produce a liquified appearance on the surface.
 - 4. When submerged in concrete, internal vibrators shall maintain a frequency of not less than 6,000 impulses per minute for spuds with diameters greater than 5 inches and 10,000 impulses for smaller spuds. The vibration intensity (amplitude) shall be sufficient to produce satisfactory consolidation.
 - 5. Provide one vibrator (powered pneumatically or electrically) for each 10 cubic yards of concrete per hour being placed. Provide at least one vibrator, which may be of the gasoline powered type, as a standby for each two vibrators in service. To produce satisfactory consolidation, and based upon the observed performance, the Owner's representative may require the use of a larger sized and powered vibrator.
 - 6. Check vibrators intended for regular service or standby service before beginning concreting operations.
- F. Placement in Water:
 - 1. Deposit concrete in water only when dry conditions cannot be obtained. The forms, cofferdams, or caissons shall be sufficiently tight to prevent any water flowing through the space where concrete is to be deposited. Pumping of water shall not be permitted while the concrete is being placed, nor until it has set for at least 36 hours.
 - Carefully place the concrete compact mass using a tremie, closed bottom dumping bucket, or another approved method which does not permit the concrete to fall through the water without protection. The concrete shall not be disturbed after being deposited. Regulate depositing to maintain horizontal surfaces.
 - 3. When a tremie is used, it shall consist of a tube constructed in sections having watertight connections. The means of supporting the tremie shall permit the movement of the discharge end over the entire top surface of the work, and shall allow the tremie to be rapidly lowered to retard the flow. The number of times it is necessary to shift the location of the tremie shall be held to a minimum for any continuous placement of concrete. During the placing of concrete, keep the tremie tube full to the bottom of the hopper. When a batch is dumped into the hopper,

slightly raise the tremie, but not out of the concrete at the bottom, until the batch discharges to the level of the bottom of the hopper. Stop the flow by lowering the tremie. Continue placing operations until the work is completed.

- 4. When concrete is placed by means of the bottom dump bucket, the bucket shall have a capacity of not less than 1/2 cubic yard. Lower the bucket gradually and carefully until it rests upon the concrete already placed. Raise it very slowly during the discharge travel to maintain still water at the point of discharge and to avoid agitating the mixture.
- 5. Use a sump or other approved method to channel displaced fluid and concrete away from the shaft excavation. Recover slurry and dispose of it as approved. Do not discharge displaced fluids into or in close proximity to streams or other bodies of water.
- G. Placement in Slabs:
 - 1. Allow concrete in columns, walls and deep beams or girders to stand for at least 1 hour to permit full settlement from consolidation, before concrete is placed for slabs they are to support. Haunches are considered as part of the slab and shall be placed integrally with them.
 - 2. When monolithic slabs are placed in strips, the widths of the strips, unless otherwise specified or indicated, shall insure that concrete in any one strip is not allowed to lie in place for more than 1 hour before the adjacent strips are placed.
 - 3. Immediately before placing concrete, thoroughly dampen the earthen cushion to receive concrete to prevent moisture absorption from the concrete.
 - 4. As soon as concrete placing is complete for a slab section of sufficient width to permit finishing operations, level the concrete, strike off, tamp and screed. The screed shall be of a design adaptable to the use intended, shall have provision for vertical adjustment and shall be sufficiently rigid to hold true to shape during use.
 - 5. The initial strike off shall leave the concrete surface at an elevation slightly above grade so that, when consolidation and finishing operations are completed, the surface of the slab is at grade elevation.
 - Continue tamping and screeding operations until the concrete is properly consolidated and free of surface voids. Bring the surface to a smooth, true alignment using longitudinal screeding, floating, belting, and/or other methods.
 - 7. When used, templates shall be of a design which permits early removal so satisfactory finishing at and adjacent to the template is achieved.
 - 8. While the concrete is still plastic, straightedge the surface using a standard 10-foot metal straightedge. Lap each straightedge pass one-half of the preceding pass. Remove high spots and fill depressions with fresh concrete and re-float. Continue to check with a straightedge during the final finishing operation, until the surface is true to grade and free of depressions, high spots, voids, or rough spots.
 - 9. Check the final surface with a straightedge. Ordinates measured from the face of the straightedge to the surface of the slab shall not exceed 1/16 inch per foot from the nearest point of contact. The maximum ordinate shall be 1/8 inch per 10 feet.
 - 10. Unless noted otherwise, where floor drains are shown in slabs and sloping the slab is not indicated, slope slab to drain on a grade of 1/16 inch per foot with a maximum total slope of 1-1/4 inches. The thickness of slab at floor drain shall be the thickness of slab, as indicated on the plans.
- H. Placement in Foundations: Place concrete in deep foundations so that segregation of the aggregates or displacement of the reinforcement is avoided. Provide suitable chutes or vertical pipes. When footings can be placed in dry foundation pits without the use of cofferdams or caissons, forms may be omitted and the entire excavation filled with concrete to the elevation of the top of footing. The placing of concrete bases above

seal courses is permitted after the forms are free from water and the seal course cleaned. Execute necessary pumping or bailing during concreting from a suitable sump located outside the forms.

3.5 FINISHED FORMED SURFACES

- A. Air voids, for all types of finishes, are defects and shall be removed by rubbing or patching.
- B. Type of Finish
 - 1. No Finish: Surfaces which are not visible from the inside or outside of the completed structure or more than 12 inches below finish grade
 - 2. Smooth Finish: Surfaces exposed to view and areas below to a point 12 inches below grade
- C. No Finish: After forms are removed, repair or patch tie holes and defects. Otherwise, no additional finish is required.
- D. Smooth Finish: Unless otherwise shown on the schedule above, provide smooth form finish for concrete surfaces to be exposed to view. Surfaces to receive a rubbed finish shall have a smooth form finish. The form facing material shall produce a smooth, hard, uniform texture on the concrete. The arrangement of the facing material shall be orderly and symmetrical with a minimum number of seams. Patch tie holes and defects and remove fins flush with the adjacent surface.

3.6 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Finish slabs, platforms and steps monolithically and apply as indicated on the drawings and the following schedule of finishes:
 - 1. Trowel Finish: slab surfaces exposed to view or to be covered with paint, or another thin film-finish coating system
 - 2. Broom Finish: exterior concrete platforms, steps, and ramps
- C. Trowel Finish:
 - 1. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/8 inch.
- D. Broom Finish: Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- E. Give sidewalks a brush finish, unless noted otherwise. Score sidewalks at a spacing equal to the width of the walk and edge on each side using a tool with a radius of approximately 1/4 inch.
- F. Finishing in Hot, Dry Weather: During periods of high temperature and/or low humidity, take extreme care in finishing the slabs to eliminate initial shrinkage cracks. Following the initial set of concrete, but while the concrete is still "green" continue to finish as required to remove shrinkage cracks which may occur. In hot, dry weather, keep a cement finisher on the job following normal finishing operations for a sufficient length of time to insure the removal of initial shrinkage cracks.

3.7 MISCELLANEOUS CONCRETE ITEMS

- A. Normal Shrinkage Grouting:
 - 1. Prior to grout application, thoroughly clean the surface of all foreign matter and wet down. Thoroughly clean the foundation and the forms set in place and securely anchor, with holes or cracks in forms caulked with rags, cotton waste or dry sand mixture to prevent the loss of grout. The necessary materials and tools shall be on hand before starting grouting operations. Concrete shall be damp when the grout is poured, but shall not have excess water to dilute the grout.
 - 2. After wetting and just prior to grouting, sprinkle the surface lightly with cement to improve the bond between the grout and the surface.
 - 3. After mixing, quickly and continuously place the grout to avoid overworking, segregation and breaking down of the initial set. Mix and place the grout according to the manufacturer's recommendations. Cure grout using wet curing method for concrete. Grout shall receive a steel trowel finish.
- B. Non-Shrink Grout:
 - 1. Obtain field technical assistance from the Grout manufacturer, as required, to insure that grout mixing and installation comply with the manufacturer's recommendations and procedures.
 - 2. Saturate the foundation for non-shrink grouts 24 hours before installation and clear of excess water. Free baseplates or bedplates of oil, grease, laitance and other foreign substances.
 - 3. Place grout according to the manufacturer's directions so that spaces and cavities below the top of the baseplates and bedplates are completely filled. Provide forms where structural components of the baseplates or bedplates do not confine the grout. Where necessary and acceptable under the manufacturer's procedures, a round head pencil vibrator, 3/4-inch maximum diameter may be used to consolidate the grout.
 - 4. Steel trowel finish the non-shrink grout where the edge of the grout is exposed to view and after the grout has reached its initial set. Cut off the exposed edges of the grout at a 45 degree angle to the baseplate, bedplate, member, or piece of equipment.
 - 5. Wet curing should occur for at least 3 days, unless specified by manufacturer, with wet rags, wet burlap or polyethylene sheets. Keep cloths constantly wet for the curing cycle.
 - 6. Clean and dry the foundation, baseplate or other surface of epoxy grouts prior to installation. Dry curing is acceptable for epoxy grouts.
 - 7. Use epoxy non-shrink grout under all machinery, pumps, equipment, and where chemicals are present that would abate cementitious non-shrink grouts.
 - 8. Mix, install, cure, and finish epoxy grouts according to the manufacturer's recommendations. Install grout in recommended lifts to prevent excess heat.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Give careful attention to proper concrete curing. The curing methods shall be wet curing, sheet materials conforming to ASTM C171, or membrane curing compound conforming to ASTM C309. Membrane curing is not permitted on surfaces to be rubbed or on surfaces to which additional concrete, plaster mix mortar or terrazzo is to be applied. Unless the curing method is specified otherwise, select the appropriate curing method.
- B. Length of Curing Period:

- 1. A "curing day" shall be any day on which the atmospheric temperature taken in the shade, or the air temperature adjacent to the concrete, remains above 50 F for at least 18 hours.
- Cure concrete for a period of 7 consecutive days. In cold weather, when curing may be retarded, extend this period to 7 "curing days", up to a limit of 14 consecutive days.
- C. Wet Curing:
 - Immediately following the finishing operations, cover concrete slabs, including roof slabs, with wet cotton mats or with a temporary covering of canvas or burlap. Keep thoroughly wet for a period of 4 curing days after the concrete is placed. The covering shall be held in direct contact with the concrete. A temporary covering shall be required when the size of slab, size of mats, or other factors dictate that the mats cannot be placed immediately after the finishing operations without marring the finishing of the slab.
 - 2. Water used for curing shall be free from injurious amounts of oil, acid, alkali, salt, or other deleterious substances.
 - 3. Canvas or burlap covering material shall weigh not less than 12 ounces per square yard. Place the sections with a lap at the edges of at least 8 inches. Saturate cover material with water previous to placing. Keep saturated as long as it remains in place. Use care in the placing of the cover material to prevent marring the concrete surface.
 - 4. When temporary coverings are used, keep them in place only until the slab has sufficiently hardened so that a cotton mat covering can be substituted without marring or disturbing the slab finish. Thoroughly saturate cotton mats before placing and keep the mats on the slab in a saturated condition for a period of at least 4 curing days.
- D. Sheet Curing: Sheet materials shall conform to ASTM C171. They shall be in contact with the entire concrete surface and applied according to the manufacturer's recommendations. Patch all holes. Where pedestrian traffic is unavoidable, provide suitable walkways to protect the sheet material.

3.9 CONCRETE SURFACE REPAIRS

- A. After the tie rods are broken back or removed, thoroughly clean the holes to remove grease and loose particles. Patch holes with structural concrete repair material. After the holes are completely filled, strike off flush excess mortar and finish the surface to render the filled hole inconspicuous.
- B. If the surface of the concrete is bulged, uneven, or shows honeycombing or form marks, which in the Engineer's opinion cannot be repaired satisfactorily, remove and replace the entire section.
- C. Patch honeycomb and minor defects in all concrete surfaces with structural concrete repair material in accordance with Section 03 01 40.

3.10 FIELD QUALITY CONTROL

- A. Testing:
 - 1. General:
 - a. Tests shall be required throughout the work to monitor the quality of concrete. Samples shall be taken in accordance with ASTM C172
 - b. The Engineer may waive these requirements on concrete placements of ten cubic yards or less. However, evidence shall be furnished showing a design mix which meets the specifications.

- c. Unless noted otherwise, testing of the materials, ready mix, transit mix or central plant concrete will be by an independent testing agency. The Contractor will select and pay for this service. A summary of all tests performed will be available. No concrete shall be placed without a representative present at either the plant or at the project site.
- 2. Slump Test: Slump tests, in accordance with ASTM C143, shall be used to indicate the workability and consistency of the concrete mix from batch to batch. Generally, a slump test shall be made at the start of operations each day, at regular intervals throughout a working day, and at any time when the appearance of the concrete suggests a change in uniformity.
- 3. Air Content Test: Tests for the concrete's air content shall be made in accordance with ASTM C231 or ASTM C173, at the point of delivery of concrete, prior to placing in forms. The test shall be made frequently to monitor a proper air content uniform from batch to batch.
- 4. Temperature Test: The temperature of the concrete to be placed shall be taken with a thermometer immediately before placement, with the point of measurement being in the chute or bucket. Temperature test shall be performed for each truck. Record temperatures on batch ticket.
- 5. Compression Test:
 - a. Compression test specimens shall be 6-by-12-inch concrete cylinders made and cured in accordance with ASTM C31. If the maximum aggregate size is no longer than 1 inch, 4-by-8-inch concrete cylinders are acceptable. No fewer than four 6-by12-inch specimens shall be made for each test sample. Samples shall be taken at a minimum of every 50 cubic yards of concrete for each class placed. At least one set of test specimens per day shall be made for each class of concrete used that day. Specimens shall be cured under laboratory conditions specified in ASTM C31. Additional concrete cylinders may be required for curing on the job under actual job curing conditions. These samples could be required when:
 - 1) There is a possibility of the air temperature surrounding the concrete falling below 40 F, or rising above 90 F.
 - 2) The curing procedure may need to be improved and/or lengthened.
 - 3) It is necessary to determine when the structure may be put into service.
 - b. Test one (1) cylinder at seven (7) days, two (2) at twenty-eight (28) days, and one (1) when so directed.
 - c. The value of each test result shall be the average compressive strength of all of the cylinders in the test sample. All cylinders within a test sample shall be taken at the same time from the same batch of concrete. For the 28-day cylinders, the strength level shall be satisfactory if the averages of all sets of three consecutive strength test results exceed the required design compressive strength, and no individual strength test result falls below the required compressive strength by more than 500 psi.
 - d. Report the mix, slump, location of concrete in the structure, and test results prior to the addition of any plasticizers.
- 6. Core Test
 - a. Provide only when specifically so directed by the Engineer because of low cylinder test results.
 - b. Cut from locations directed by the Engineer or Owner, secured in accordance with ASTM C42, and prepared and tested in accordance with ASTM C39.
- 7. Placement Inspections
 - a. On concrete over 2,000 psi, provide continuous or other inspection as required by governmental agencies having jurisdiction.

- b. Throughout progress of concrete placement, take slump tests to verify conformance with specified slump.
- c. Using all required personnel and equipment, throughout progress of concrete placement verify that finished concrete surfaces will have the level or slope that is required by the Contract Documents.
- 8. Failure to Meet Requirements:
 - a. Should the 7-day strengths shown by the test specimens fall below the required values, additional curing shall be performed on those portions of the structures represented by the test specimens at the Contractor's expense. Test cores shall be obtained and tested in accordance with ASTM Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, Designation C 42. If additional curing does not give the strength required, the Owner reserves the right to require strengthening, replacement of those substandard portions of the structure, or additional testing, at the Contractor's expense.
 - b. Upon receipt of the Contractor's written request, substandard concrete work may be reexamined in place by nondestructive testing methods or core samples, in accordance with ACI 301. The services of an independent testing laboratory shall be retained and all expenses paid without compensation from the Owner. Laboratory results shall be evaluated by the Engineer, who shall make the final decision on acceptability of the concrete in question. Core sample holes shall be repaired.
- B. The Owner may withhold payment for any section of concrete which does not meet the requirements of these specifications. Withheld payment shall be based upon the unit prices established for concrete and reinforcing steel. Payment shall be withheld until the unacceptable concrete has been refinished, removed and replaced or otherwise brought into conformance with the specifications.
- C. PVC Waterstops: Waterstops shall be observed by the Owner's representative prior to concrete placement. Unacceptable splicing defects include:
 - 1. Misalignment of center bulb, ribs and end bulbs greater than 1/16 inch.
 - 2. Bond failure at joint deeper than 1/16 inch.
 - 3. Misalignment which reduces waterstop cross-section more than 15 percent.
 - 4. Bubble or visible porosity in the weld.
 - 5. Visible signs of splice separation when a cooled splice is bent by hand at a sharp angle.
 - 6. Charred or burnt material.

END OF SECTION

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03 34 13 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Controlled low strength material (CLSM) for use in the following: a. Flowable backfill.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM):
 - a. C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C 33 Standard Specification for Concrete Aggregates.
 - c. C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C 143 Standard Test Method for Slump of Hydraulic Cement Concrete.
 - e. C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - f. C 260 Standard Specification for Air-Entraining Admixtures for Concrete.
 - g. C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - h. D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3).

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Submit data completely describing products.
- B. Shop Drawings
 - 1. Submit full mix details, including mix design calculations for mix proposed for use.
- C. Test and Evaluation Reports
 - 1. Sieve Analysis
 - a. Submit sieve analyses of fine and coarse aggregates being used. Resubmit at any time there is a significant change in grading of materials.
 - 2. Trial Batch Test Data

- a. Submit data for each test cylinder.
- b. Submit data that identifies mix and slump for each test cylinder.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Preconstruction Testing
 - 1. Compression Testing
 - a. Test 8 cylinders, four at three days and four at 28 days.
 - 2. Slump Test
- B. Field Samples
 - 1. Not less than three (3) cylinder specimens will be tested for each 150 cubic yards of controlled low strength material and not less than three (3) specimens for each half day's placement

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Performance / Design Criteria
 - 1. Total calculated air content
 - a. Not less than 8.0 percent or greater than 12.0 percent.
 - 2. Minimum unconfined compressive strength
 - a. Not less than 50 pounds per square inch measured at 28 days.
 - 3. Maximum unconfined compressive strength
 - a. Not greater than 150 pounds per square inch measured at 28 days.
 - b. The long-term strength (90 days) shall be limited to 200 psi such that material could be re-excavated with conventional excavation equipment in the future if necessary.
 - 4. Wet density
 - a. No greater than 132 pounds per cubic foot.
 - 5. Color
 - a. No coloration required unless noted.
 - b. Submit dye or other coloration means for approval.
- B. Materials
 - 1. Portland cement
 - a. Type II low alkali portland cement as specified in the plans.
 - 2. Fly ash
 - a. Class F fly ash in accordance with ASTM C 618.
 - 3. Admixture
 - a. Air entraining admixture in accordance with ASTM C 260.
 - 4. Fine aggregate
 - a. Concrete sand (does not need to be in accordance with ASTM C 33).

- b. No more than 12 percent of fine aggregate shall pass a No. 200 sieve
- c. No plastic fines shall be present.
- 5. Coarse aggregate
 - a. Pea gravel no larger than 3/8 inch.
- C. Mixes
 - 1. Suggested design mix

| Material | Weight | Specific Gravity | Absolute Volume Cubic Foot |
|------------------|--------------|------------------|-------------------------------|
| Cement | 30 pounds | 3.15 | 0.15 |
| Fly Ash | 300 pounds | 2.30 | 2.09 |
| Water | 280 pounds | 1.00 | 4.54 |
| Coarse Aggregate | 1,465 pounds | 2.68 | 8.76 |
| Fine Aggregate | 1,465 pounds | 2.68 | 8.76 |
| Admixture | 4-6 ounces | - | 2.70 |
| TOTAL | 3,543 pounds | - | 27.00 |

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION TESTING

- A. Preparing Trial Batch
 - 1. After mix design has been accepted by Engineer, have trial batch of the accepted mix design prepared by testing laboratory acceptable to Construction Manager.
 - 2. Prepare trial batches using specified cementitious materials and aggregates proposed to be used for the Work.
 - 3. Prepare trial batch with sufficient quantity to determine slump, workability, consistency, and to provide sufficient test cylinders.
- B. Trial Batch Test Cylinders
 - 1. Prepare test cylinders in accordance with ASTM C 31 with the following exceptions:
 - a. Fill the concrete test cylinders to overflowing and tap sides lightly to settle the mix.
 - b. Do not rod the concrete mix.
 - c. Strike off the excess material.
 - 2. Place test cylinders in a moist curing room. Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.
 - 3. Do not remove the test cylinder from mold until the cylinder is to be capped and tested.
 - 4. The test cylinders may be capped with standard sulfur compound or neoprene pads:
 - a. Perform the capping carefully to prevent premature fractures.
 - b. Use neoprene pads a minimum of 1/2 inch thick, and 1/2 inch larger in diameter than the test cylinders.
 - c. Do not perform initial compression test until the cylinders reach a minimum age of 3 days.

- C. Compression Testing
 - 1. Test 4 test cylinders at 3 days and 4 at 28 days in accordance with ASTM C 39 except as modified herein:
 - a. The compression strength of the 4 test cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength.
 - b. If the trial batch tests do not meet the Specifications for strength or density, revise and resubmit the mix design, and prepare additional trial batch and tests. Repeat until an acceptable trial batch is produced that meets the Specifications.
 - c. All the trial batches and acceptability of materials shall be paid by the Contractor.
 - d. After acceptance, do not change the mix design without submitting a new mix design, trial batches, and test information.
- D. Slump Testing
 - 1. Determine slump in accordance with ASTM C 143 with the following exceptions:
 - a. Do not rod the concrete material.
 - b. Place material in slump cone in one semi-continuous filling operation, slightly overfill, tap lightly, strike off, and then measure and record slump.

3.2 INSTALLATION

- A. Prior to placement, soils located below controlled low strength material placement shall be scarified to a depth of 8 inches, uniform moisture conditioned to or above the optimum moisture content, and compacted to a minimum of 95 percent relative compaction in accordance with ASTM D 1557 at the direction of the Engineer.
- B. Place controlled low strength material by any method which preserves the quality of the material in terms of compressive strength and density:
 - Limit lift heights of CLSM placed against structures and other facilities that could be damaged due to the pressure from the CLSM, to the lesser of four (4) feet or the lift height indicated on the Drawings. Do not place another lift of CLSM until the last lift of CLSM has set and gained sufficient strength to prevent lateral load due to the weight of the next lift of CLSM.
 - 2. The basic requirement for placement equipment and placement methods is the maintenance of its fluid properties.
 - 3. Transport and place material so that it flows easily around, beneath, or through walls, pipes, conduits, or other structures.
 - 4. Use a slump of the placed material greater than nine (9) inches, and sufficient to allow the material to flow freely during placement:
 - a. After trial batch testing and acceptance, maintain slump developed during testing during construction at all times within plus or minus one (1) inch.
 - 5. Use a slump, consistency, workability, flow characteristics, and pumpability (where required) such that when placed, the material is self-compacting, self densifying, and has sufficient plasticity that compaction or mechanical vibration is not required.
 - 6. When using as embedment for pipe take appropriate measures to ensure line and grade of pipe.

3.3 FIELD QUALITY CONTROL

- A. General
 - 1. Make provisions for and furnish all material for the test specimens, and provide manual assistance to assist the Engineer in preparing said specimens.
 - 2. Be responsible for the care of and providing curing condition for the test specimens.

- B. Tests
 - 1. During the progress of construction, the Owner will have tests made to determine whether the controlled low strength material, as being produced, complies with the requirements specified hereinbefore. Testing shall be in accordance with Section 01 40 00 QUALITY REQUIREMENTS.
 - 2. Test cylinders
 - a. Prepare test cylinders in accordance with ASTM C 31 with the following exceptions:
 - 1) Fill the concrete test cylinders to overflowing and tap sides lightly to settle the mix.
 - 2) Do not rod the concrete mix.
 - 3) Strike off the excess material.
 - 3. Place the cylinders in a safe location away from the construction activities. Keep the cylinders moist by covering with wet burlap, or equivalent. Do not sprinkle water directly on the cylinders.
 - a. Do not perform initial compression test until the cylinders reach a minimum age of 3 days.
 - 4. Not less than 3 cylinder specimens will be tested for each 150 cubic yards of controlled low strength material and not less than 3 specimens for each half day's placement:
 - a. Test 1 cylinder at 3 days and 2 at 28 days in accordance with ASTM C 39 except as modified herein.
 - b. The compression strength of the cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength.

END OF SECTION

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SECTION 03 42 00 PRECAST CONCRETE PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish labor, materials, equipment, and incidentals necessary to install precast concrete products.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM):
 - a. ASTM A 48 Gray Iron Castings
 - b. ASTM C 443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
 - c. ASTM C 478 Precast Reinforced Concrete Manhole Sections
 - d. ASTM C 88-86 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - e. ASTM C 330 Specification for Lightweight Aggregates for Structural Concrete
 - f. ASTM A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - g. ASTM A 706 Specifications for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
 - h. ASTM C 877 Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
 - i. ASTM C 923 Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes
 - 3. American Association of State Highway Officials (AASHTO)
 - a. Standard Specifications for Highway Bridges

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Manhole Rings
 - 2. Precast Concrete Manholes

- 3. Joint Wraps
- B. Shop Drawings
 - 1. For precast concrete vaults, manufacturer shall provide a signed and sealed certification by a Professional Engineer licensed in the State of Texas stating design conditions and that the product fully conforms to the specifications.
 - 2. Concrete mix design for precast vaults and manholes
 - 3. Manhole fabrication drawings showing project specific manhole layout for each specific manhole location. At a minimum, drawings shall include penetration angles, manhole height, and riser sections.
- C. Test and Evaluation Reports
 - 1. Submit concrete compression test results for precast manholes and vaults

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE [NOT USED]

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements
 - 1. Ship precast concrete products to the site, unload and handle in a manner to prevent damage.
 - 2. Promptly remove any unit which is damaged from the construction site and replace with an undamaged unit.

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE MANHOLES

- A. Manufacturers
 - 1. Precast concrete manholes meeting the requirements of the specifications as manufactured by the following companies:
 - a. Forterra
 - b. Oldcastle Precast
 - c. The Turner Company
 - 2. Manhole cover shall be as shown on the drawings.
- B. Performance / Design Criteria
 - 1. Design
 - a. Concrete for precast manholes shall be the manufacturer's standard mix design for obtaining a minimum 28 day compressive strength of 4,000 psi.
 - b. Concrete shall be air entrained.
 - c. Live loads shall be designed for H-20 and/or H-20-44 with wheel loads as specified in the latest version of the AASHTO Standard Specifications for Highway Bridges.
 - 2. Riser Sections
 - a. Riser sections shall conform to current specifications for Precast Reinforced Manhole Sections, ASTM Designation C478, with the following additions:

- Riser shall be machine made by a process which will provide for uniform placement of zero slump concrete in the form and compaction by mechanical devices which will assure a dense concrete in the finished product.
- 2) Aggregates for the concrete shall consist of limestone aggregates in the proportion of at least 75% by weight of the total aggregate.
- Minimum wall thickness for the manhole risers shall be as listed under Wall "B" in the "Class Tables" of ASTM C 76 for Class III pipe.
- 4) Reinforced concrete pipe conforming to ASTM C76, Class III, Wall "B" may be used in lieu of C478 type pipe, at the Contractor's option.
- 5) All penetrations shall be made in the factory unless otherwise specified in the plans.
- 3. Joints
 - a. Joints shall conform to the joint specifications in ASTM C478, C76, and C443.
 - b. All manhole sections, including the bottom section, shall be furnished with "Oring" type rubber gasket joints per ASTM C443.
 - c. The joints shall be furnished and installed with the bell down to resist groundwater infiltration.
 - d. When manhole is located within the floodplain, joints shall be wrapped with butyl adhesive tape per ASTM C877 (Type III)
- 4. Lift Holes
 - a. Manhole cones may have two lift holes, 180 degrees apart, 2 to 3 inches in diameter.
 - b. Holes shall be cast or drilled in the wall of each section for handling and installing.
 - c. Holes shall be patched full depth with high strength non-shrink grout after the manhole has been installed.

C. Materials

- 1. Cement
 - a. Portland Cement conforming to Type I or III ASTM C 150.
- 2. Reinforcing Steel
 - a. New billet steel conforming to ASTM A 615 Grade 60.
- 3. Aggregate
 - a. Aggregate free of deleterious substances conforming to ASTM C 33 or ASTM C 330 for light weight aggregate.
- 4. Cast Iron Castings
 - a. Castings shall be gray cast iron conforming to ASTM A 48, Class 30 for cast iron.
- 5. Manhole Steps
 - a. Unless specified otherwise, manhole steps shall not be provided.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The Contractor shall prepare and be responsible for any excavation in accordance with those shown on manufacturer's specification drawings.
- B. Prior to placing the precast substructure into the excavation, the Contractor shall provide manhole base at the bottom of the excavation.

- 1. Concrete manhole base, 12-inches minimum, shall be provided unless shown otherwise in plans. Base shall be provided with #4 bars at 12" on center, each way, top and bottom.
- 2. The concrete base material shall be set at the proper elevation in conjunction with the conduit and the conduit entrance of vaults/manholes as designated on the plans.

3.2 ERECTION / INSTALLATION / APPLICATION

- A. Precast Concrete Manholes
 - 1. The manhole riser shall be set in a vertical, plumb position.
 - 2. All joints shall be sealed with mortar or an approved non-shrink grout on the inside and the outside of the manhole.
 - 3. Grade rings shall be mortared to each other on the inside and outside to provide a waterproof seal.

END OF SECTION

SECTION 03 60 00 CONTACT GROUTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. This Section includes requirements for contact grouting of all voids, created due to overexcavation or encountered outside the jacking pipe, after hand tunneling, around shafts as necessary to prevent surface settlements, and for abandonment grouting of boreholes for subsurface monitoring points after completion of hand tunneling.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 33 05 23 Hand Tunneling
 - 4. Section 33 05 25 Settlement Monitoring

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials:
 - a. ASTM C 31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. ASTM C 39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - c. ASTM C 109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-inch or 50-mm cube specimens).
 - d. ASTM C 150, Standard Specification for Portland Cement.
 - e. ASTM C 937, Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings
 - 1. Grout mix details including:
 - a. Proportions
 - b. Admixtures including:
 - 1) Manufacturer's literature
 - 2) Laboratory test data verifying the strength of the proposed grout mix
 - 3) Proposed grout densities

- 4) Viscosity
- 5) Initial set time of grout
 - a) Data for these requirements shall be derived from trial batches from an approved testing laboratory.
- 2. Submit a minimum of 3 other similar projects where the proposed grout mix design was used.
- 3. Contact Grouting Work Plan and Methods including:
 - a. Grouting methods
 - b. Details of equipment
 - c. Grouting procedures and sequences including:
 - 1) Injection methods
 - 2) Injection pressures
 - 3) Monitoring and recording equipment
 - 4) Pressure gauge calibration data
 - 5) Materials
 - 6) Method of transporting grouting equipment and materials within the pipe
 - 7) Provisions to protect interior of pipe and shaft supports
 - d. Grout mix in accordance with Paragraph 2.1.
 - e. Submit anticipated volumes of grout to be pumped for each application and reach grouted.
- B. Test and Evaluation Reports
 - Maintain and submit daily logs of grouting operations, including grouting locations, pressures, volumes, grout mix, and time of pumping. Note any problems or unusual observations on logs.
 - a. Daily logs shall be submitted within one work day.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Preconstruction Testing
 - 1. Grout Strength Tests
 - a. Prepare samples for 24-hour and 28-day compressive strength tests according to ASTM C 31 for cylinders or ASTM C 109 for cubes.
 - b. Cylinder molds shall be at least two inches in diameter and four inches long.
 - c. Grout cubes shall be either two inches or 50 millimeters square.
 - d. Test samples according to ASTM C 39 or C 109 as applicable.
 - e. Grout for the cylinders or cubes shall be taken from the nozzle of the grout injection line.
 - f. Provide at least one set of four (4) samples for each 250 cubic feet of grout injected but not less than one set for each grouting shift, unless directed otherwise by the Engineer.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 GROUT

- A. Description
 - 1. Contact grout shall be used to fill any voids caused by overexcavation or encountered outside the jacking pipe, to fill any voids caused or encountered outside of shafts, and for abandonment or subsurface monitoring point boreholes.
- B. Performance / Design Criteria
 - 1. Grout Mixes
 - a. Develop one or more grout mixes designed to completely fill voids outside the pipe and to provide acceptable strength. All grout mix proportions shall be subject to review and acceptance by the Engineer.
 - 2. Grout Composition
 - a. Comprised of 1 cubic foot of cement and 3.5 cubic feet of clean fine sand with sufficient water added to provide a free flowing slurry. If desired to maintain solids in the mixture in suspension, one cubic foot of commercial grade bentonite may be added to each 12-15 cubic feet of slurry.
 - 3. Compressive Strength
 - a. The grout shall reach a minimum strength of 10 psi in 24 hours, 50 psi in 28 days. The maximum strength of grout injected at shaft entry and exit locations for pipejacking or microtunneling machines shall be compatible with excavation capabilities of the pipejacking or microtunneling machines.
- C. Materials
 - 1. Cement
 - a. Cement shall be Type II or Type V Portland cement conforming to ASTM C 150.
 - 1) Type II cement shall meet Table 4 false set requirements of ASTM C 150.
 - b. Fly ash will not be allowed as a cement substitute.
 - 2. Sand
 - a. Natural, washed and screened sand having clean, hard, strong, durable, uncoated grains complying with the requirements of ASTM C 33.
 - b. The sand shall generally be of such size that all will pass a 3/8" sieve, at least 95% passing a 1/4" screen and at least 80% passing a No. 8 sieve.
 - Aggregate shall not contain strong alkali, or organic material which gives a color darker than the standard color when tested in accordance with ASTM C 40.
 - 3. Bentonite
 - a. Bentonite shall be a commercially processed powdered bentonite, Wyoming type, such as Baroid, Imacco-gel, Black Hills, or equal.
 - 4. Admixtures
 - a. Other admixtures may be used subject to the written approval of the Engineer to improve the pumpability, to control set time, to hold sand in suspension, and to prevent segregation and bleeding.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall use contact grouting to fill any voids caused by overexcavation or encountered during the tunneling work.

- 1. Modify equipment and procedures as required to avoid recurrence of excessive settlements or damage.
- B. The Contractor shall use contact grouting to fill any voids caused or encountered during shaft construction that could lead to shaft movements during tunneling, or that could lead to settlement and damage of installed pipe, surface features, or subsurface utilities.
- C. The Contractor shall use contact grouting to fill and abandon boreholes for subsurface monitoring points.
- D. All grouting operations are to be performed in the presence of the Engineer. Notify the Engineer at least 24 hours in advance of starting contact grouting operations.
- E. The Contractor shall take care to prevent the spill or escape of grout to the ground surface, into any water body, or into any sanitary or storm sewer. Any such spill shall be immediately contained and cleaned up by the Contractor at no additional cost to the Owner.
- F. During grouting work, provide for adequate disposal of all waste and wastewater. Remove and properly dispose of all waste grout resulting from grouting operations. The contents of grout lines shall not be discharged into the shafts or pipes.

3.2 EQUIPMENT

- A. Equipment for mixing and injecting grout shall be adequate to satisfactorily mix and agitate the grout and force it into the grout holes, in a continuous flow at the desired pressure.
 - 1. Pumps shall be capable of continuously developing a sustained pressure of 15 pounds per square inch above groundwater pressure at the grout hole connection.
- B. Two pressure gauges shall be provided, one at the grout pump and one at the collar of each hole being grouted. The accuracy of the gauges shall be periodically checked with an accurately calibrated pressure gauge.
 - 1. A minimum of two spare pressure gauges shall be available on site at all times.
- C. The grouting equipment shall be provided with a meter to determine the volume of grout injected. The meter shall be calibrated in cubic feet to the nearest one-tenth of a cubic foot.
- D. The grouting equipment shall be maintained in satisfactory operating conditions throughout the course of the work to ensure continuous and efficient performance during grouting operations.
- E. Suitable stop valves shall be provided at the collar of each pipe grout port or hole for use in maintaining pressure as required until the grout has set.
- F. Grout hoses shall have an inside diameter not less than 1-1/4 inches and capable of withstanding the maximum water and grout pressures to be used.

3.3 MIXING AND INJECTION OF GROUT

- A. All materials shall be free of lumps when put into the mixer and the grout mix shall be constantly agitated. Grout shall flow unimpeded and shall completely fill all voids.
 - 1. Grout not injected after 90 minutes of mixing shall be wasted.
- B. The grouting process shall be operated and controlled so that the grout will be delivered uniformly and steadily.

- C. Recirculate grout mixes when any new mix is batched or after adding water, fluidifier, or sand to mix. Recirculate mix for at least 2 minutes prior to pumping grout into the grout port.
- D. In general, grouting will be considered completed when less than one cubic foot of grout of the accepted mix and consistency can be pumped in 5 minutes under the specified maximum pressure. After the grouting is finished, the valve shall be closed before the grout header is removed and remain closed until grout has set.
- E. The maximum sustained grouting pressure shall be 15 pounds per square inch (psi) or one-half (1/2) psi per foot of earth cover above groundwater pressure, whichever is less, at the grout hole collar connection unless otherwise approved in writing by the Engineer.

3.4 GROUTING OUTSIDE OF MICROTUNNELED, HAND TUNNELED, AND AUGER BORED PIPELINES

- A. If required, commence contact grouting outside of the pipe within 24 hours of the completion of each tunneling drive performed in accordance with Section 33 05 23 HAND TUNNELING.
- B. Inject grout through the pipe grout connections in such a manner as to completely fill all voids outside the pipe resulting from overexcavation, or encountered, during tunneling operations.
 - 1. Grout pressure shall be controlled to avoid damaging the pipe, and to avoid movement of the surrounding ground or improvements.
 - 2. Install pressure grouting through grout fittings for the casing/tunnel liner plate 48inches in diameter or larger.
 - a. Grout fittings shall be fabricated into tunnel liner plate at a maximum spacing of 6 feet.
 - b. Remove and plug grout fittings after pressure grouting.
 - c. Pipe grout fittings shall be sealed with corrosion resistant screw type plugs upon completion of grouting. Dry pack mortar shall be used to fill any recesses, and to provide a smooth surface.
- C. Damaged or collapsed pipe shall be replaced by Contractor if damage to pipe was caused by Contractor's excessive grouting pressures.
 - 1. No additional cost shall be paid to the Contractor by the Owner and no schedule extension shall be granted.
- D. Install pressure grout from the low end for all crossings where grout fittings are not used.
 - 1. Seal the low end and pressure grout until grout is extruded from the opposite end.

END OF SECTION

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SECTION 09 96 00 PIPING AND EQUIPMENT PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish all labor, materials, tools and equipment required for painting of piping, equipment, and structural steel which are to receive finish as indicated in the schedule. This section applies to mechanical piping, valves, fittings, structural steel, and electrical equipment.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. Steel Structures Painting Council (SSPC)
 - 3. National Association of Pipe Fabricators (NAPF)

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. For each paint system used herein, furnish a Paint System Data Sheet (PSDS), Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system, except for products applied by equipment manufacturers. A sample PSDS form is appended at the end of this Section.
 - 2. The Contractor shall also provide copies of the paint system submittals to the coating applicator.
 - 3. Indiscriminate submittal of manufacturer's literature only is not acceptable.
- B. Shop Drawings
 - 1. Submit samples of finish for approval by Engineer.
 - 2. Submit a written plan describing the materials and methods proposed for use in blast cleaning. A separate submittal shall be made for each method proposed.
- C. Certificates

- 1. Where ANSI/NSF Standard 60 and 61 approval is required, submit ANSI/NSF certification letter for each coating in the system indicating product application limits on size of piping, dry film thickness, number of coats, specific product tested, colors certified, and approved additives.
- D. Test and Evaluation Reports
 - 1. Provide TCLP test data for lead and other regulated heavy metals in nonrecyclable, slag type abrasive blast media to be used on the Project. Acceptable abrasive test data shall indicate the abrasive manufacturer, location of manufacture, and media gradation and type. Surface preparation will not be permitted to begin until acceptable test data has been submitted.
- E. Source Quality Control Submittals
 - 1. Applicator's Experience: List of references substantiating the requirements as specified.
 - 2. Factory Applied Coatings: Manufacturer's certification stating factory applied coating systems meets or exceeds requirements specified herein.
 - 3. If the manufacturer of finish coating differs from that of shop primer, provide both manufacturers' written confirmation that materials are compatible.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturers
 - a. The paint manufacturer shall provide a representative to visit the jobsite at intervals during surface preparation and painting as may be required for product application quality assurance, and to determine compliance with manufacturer's instructions and the Contract Documents, and as may be necessary to resolve field problems attributable to, or associated with, the manufacturer's products furnished under this Contract.
 - 2. Applicators
 - a. Minimum of 5 years practical experience in application of specified products. Submit a list of recent projects and names of references for those projects. The Engineer will waive the requirement for 5 years' experience, when at the discretion of the Engineer, the applicators' experience and capabilities meet the intent of the experience requirement.
- B. Inspection
 - 1. Inspect and provide substrate surfaces prepared in accordance with the Contract Documents and the printed directions and recommendations of paint manufacturer whose product is to be applied.
 - 2. Provide Engineer minimum 3 days advance notice prior to start of surface preparation work or coating application work.
 - 3. Inspection by the Engineer, or the waiver of inspection of any particular portion of the Work, shall not be construed to relieve the Contractor of responsibility to perform the Work in accordance with the Contract Documents.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements
 - 1. Deliver paint materials in sealed original labeled containers bearing manufacturers name, type of paint, brand name, color designation and instructions for mixing.

- 2. Provide adequate storage facilities at minimum ambient temperature of minimum 45° F to a maximum of 90° F in well-ventilated area.
- 3. Where precoated items are to be shipped to the jobsite, protect coating from damage. Batten coated items to prevent abrasion.
- 4. Use nonmetallic or padded slings and straps in handling.
- 5. Items will be rejected for excessive damage.
- B. Storage and Handling Requirements
 - 1. Store paints in a suitable protected area that is heated or cooled as required to maintain temperatures within the range recommended by the paint manufacturer.

1.11 FIELD CONDITIONS

- A. Environmental Requirements
 - 1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and systems can be applied.
 - 2. Do not apply finish in areas where dust is being generated.
 - 3. Do not perform abrasive blast cleaning whenever the relative humidity exceeds 85 percent or whenever surface temperature is less than 5 degrees F above the dew point of the ambient air.
 - 4. Surface preparation power tools and blast equipment shall contain dust collection equipment that will prevent discharge of dust particles into the atmosphere when surface preparation work is located within enclosures or confined areas with electrical equipment, motors, instrumentation, or other equipment that may be damaged by airborne dust and particles.

1.12 WARRANTY

- A. Manufacturer Warranty
 - 1. The Contractor and coating manufacturer shall jointly and severally warrant to the Owner and guarantee the Work under this Section against defective workmanship and materials for a period of 2 years commencing on the date of final acceptance of the Work.
 - 2. A warranty inspection shall be conducted 1 month prior to expiration of the warranty period. Any defective Work discovered at this date shall be corrected by the Contractor in accordance with the Contract Documents at no additional cost to the Owner. Other corrective measures may be required during the 2 year warranty period.

PART 2 - PRODUCTS

2.1 COATINGS

- A. Manufacturers
 - 1. Sherwin Williams
 - 2. Tnemec Coatings
 - 3. Carboline Coatings Company
 - 4. No others will be allowed
- B. Description
 - 1. Regulatory Requirements
 - a. Products shall meet federal, state, and local requirements limiting the emission of volatile organic compounds.

b. Coatings shall be free of lead and lead compounds.

C. Materials

- 1. General
 - a. Whenever a material is identified by reference to manufacturer's or vendors' names, trade names, catalog number or the like, it is so identified for the purpose of establishing a standard, and material of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered acceptable provided the material so proposed is substituted under provisions of the General Provisions. It shall not be purchased or installed by the Contractor without the Engineer's written approval.
 - b. Materials Including Primer and Finish Coats shall be produced by same paint manufacturer.
 - c. Thinners, Cleaners, Driers, and Other Additives may be used as recommended by paint manufacturer of the particular coating. Where coatings are required to meet ANSI/NSF Standard 60 and 61, addition of thinners, driers, and other paint additives not approved under the ANSI/NSF certification letter will not be permitted without written approval from the Engineer.
- 2. Products
 - a. See Painting Schedule below.
- 3. Colors
 - a. Provide as selected by the Owner or Engineer. Provide custom color if required to match this color when coatings provided by another manufacturer.
 - b. The Contractor shall submit for approval samples of each color and finish, with the name of the manufacturer made on the same materials on which each is to be used. Approved samples will form a standard for acceptance or rejection of completed work as to color and finish. Most colors will be the inter-mixes and let downs. Mix paints as required to obtain the color scheduled.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspection
 - 1. Thoroughly examine surfaces scheduled to be painted prior to commencement of work.
 - 2. The application of finishes shall be held to denote the acceptance of surfaces and conditions by the painter and he will be responsible for producing results reasonably to be expected under the specifications. Rooms shall be swept out before application of paint, and no sweeping shall be done in or adjacent to places where the paint has not had sufficient time to dry dust-free.
 - 3. Check each coat for the correct millage. Do not make measurement before a minimum of 8 hours after application of the coating.
- B. Inspection Test Equipment
 - 1. Provide a magnetic type or electronic dry film thickness gauge to test coating thickness specified in mils, as manufactured by:
 - a. Nordson Corp., Anaheim, CA, Mikrotest.
 - b. DeFelsko Corp., Anaheim, CA, Positector.
 - c. Or equal

- 2. Provide an electrical holiday detector, low voltage, wet sponge type to test finish coatings less than 20 mils in thickness, except zinc primer, high-build elastomeric coatings, and galvanizing, for holidays and discontinuities as manufactured by:
 - a. Tinker and Rasor, New Braunfels, TX, Model M-1.
 - b. Or equal.

3.2 REGULATORY REQUIREMENTS

- A. Protect workers and comply with applicable federal, state, and local air pollution and environmental regulations for surface preparation, blast cleaning, disposition of spent aggregate and debris, coating application and dust prevention including, but not limited to the following Acts, Regulations, Standards, and Guidelines:
 - 1. Clean Air Act.
 - 2. National Ambient Air Quality Standard.
 - 3. Resource Conservation and Recovery Act (RCRA).
- B. Comply with applicable federal, state, and local regulations for confined space entry.
- C. Provide and operate equipment that meets explosion proof requirements.
- D. Perform painting in accordance with recommendations of the following:
 - 1. Paint manufacturer's instructions.
 - 2. NACE contained in the publication, Manual for Painter Safety.

3.3 DEHUMIDIFICATION

- A. Where weather conditions or Project requirements dictate, Contractor shall provide and operate dehumidification equipment to maintain environmental conditions suitable for abrasive blasting and coating application as specified.
- B. Contractor shall provide dehumidification equipment sized to maintain dew point temperature 5 degrees F or more below surface temperature of metal surfaces to be cleaned and painted.
- C. Cleaned metal surfaces shall be prevented from flash rusting throughout the project duration, condensation or icing shall be prevented throughout surface preparation and coating application.
- D. Equipment size and power requirements shall be designed and operated by personnel trained in the operation and setup of dehumidification equipment based on project requirements and anticipated weather conditions.
- E. If required, dehumidification equipment shall operate 24 hours per day and continuously throughout surface preparation and coating application.
- F. Daily maintenance requirements of the equipment shall be documented in writing and posted near the equipment for review by the Engineer.
- G. Reblasting of flash rusted metal surfaces or removal of damaged coatings, as a result of equipment malfunction, shutdown, or other events that result in the loss of environmental control, will be at the sole expense of the Contractor.

3.4 VENTILATION AND ILLUMINATION

A. Adequate illumination shall be provided while work is in progress. Whenever required by the inspector, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the inspector.

B. Ventilation shall be used to control potential dust and hazardous conditions within confined areas. Ventilation flow rates shall be in accordance with OSHA regulations and as required to reduce air contamination to nonhazardous conditions.

3.5 PREPARATION OF SURFACES

- A. General
 - 1. All metal surfaces to be painted shall be sound, clean and free of mill scale, rust, dust, dirt, oil, grease, moisture or any other foreign matter which might, in any way, lessen the life or usefulness of the coating.
 - 2. All metal surfaces shall be washed with mineral spirits to remove any dirt or grease, before applying materials. Where rust or scale is present, it shall be wire brushed, or sandpapered clean before painting. Shop coats of paint that become marred shall be cleaned and touched up.
 - 3. Metal shall also be smooth and free from blisters, rough corners, pits, dents, or other imperfections before painting. Pits and dents shall be filled and the metal ground smooth where required.
 - 4. When called for in the specifications or recommended by the paint manufacturer, the latest revisions of the following surface preparation specifications of the SSPC shall apply:
 - a. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.
 - b. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wire brushing.
 - c. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or power sanders.
 - d. White Metal Blast Cleaning (SSPC-SP5): Blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.
 - e. Commercial Blast cleaning (SSPC-SP6): Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues from each square inch.
 - f. Brush-Off blast Cleaning (SSPC-SP7): Blast cleaning to remove loose rust, loose mill scale and other detrimental foreign matter to degree specified.
 - g. Near White Blast Cleaning (SSPC-SP10): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues from each square inch.
 - 5. When called for in the specifications or recommended by the paint manufacturer, the latest revisions of the following surface preparation specifications of the NAPF shall apply:
 - a. Solvent Cleaning (NAPF 500-03-01): A method which shall result in the surface being free of all oil, small deposits of asphalt paint, grease, soil, drawing and cutting compounds and other soluble contaminants from iron surfaces.
 - b. Abrasive Blast Cleaning of Ductile Iron Pipe (NAPF 500-03-04): A method of preparing the exterior of ductile iron pipe surfaces which, when viewed without magnification, shall result in the surface being free of all visible dirt, dust, loose annealing oxide, loose rust, loose mold coating and other foreign matter.

- c. Abrasive Blast Cleaning of Cast Ductile Iron Fittings (NAPF 500-03-05): A method of preparing cast ductile iron fitting surfaces which, when viewed without magnification, shall result in the surface being free of all visible dirt, dust, loose annealing oxide, loose rust, loose mold coating and other foreign matter.
- 6. All surface preparation of new equipment and surfaces shall be assumed to be on a SSPC Grade A steel surface condition, unless specifically noted otherwise.
- 7. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
- 8. Hand tool clean areas that cannot be cleaned by power tool cleaning.
- B. Welds and Adjacent Areas
 - 1. Prepared such that there is:
 - a. No undercutting or reverse ridges on the weld bead.
 - b. No weld spatter on or adjacent to the weld or any other area to be painted.
 - c. No sharp peaks or ridges along the weld bead.
 - 2. Grind embedded pieces of electrode or wire flush with the adjacent surface of the weld bead.
- C. Blast Cleaning Requirements
 - 1. Select type and size of abrasive to produce a surface profile that meets the coating manufacturer's recommendations for the particular coating to be applied or not less than 20 percent of the specified coating thickness, whichever is more stringent.
 - 2. Meet applicable federal, state, and local air pollution control regulations for blast cleaning and disposition of spent aggregate and debris.
 - 3. Do not reuse abrasive, unless abrasive is a recyclable abrasive.

3.6 PROTECTION OF SURFACES NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be blast cleaned and/or painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering the motors.

3.7 PAINT MIXING

- A. Multiple-component coatings:
 - 1. Prepare using all of the contents of the container for each component as packaged by the paint manufacturer.
 - 2. No partial batches will be permitted.
 - 3. Do not use multiple-component coatings that have been mixed shall not be used beyond their pot life.
 - 4. Provide small quantity kits for touchup painting and for painting other small areas.
 - 5. Mix only components specified and furnished by the paint manufacturer.
 - 6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.
- B. Keep paint materials sealed when not in use.

- C. Where more than one coat of a material is applied within a given system, alternate color to provide a visual reference that the required number of coats have been applied.
- D. Paints and similar materials shall be mixed in vessels of adequate capacity. All paints shall be thoroughly stirred before being taken from the containers, shall be kept stirred while using, and all ready-mixed paints shall be applied exactly from the manufacturer without addition of any kind of a drier or thinner, except as provided in manufacturer's directions or upon specific authorization.
- E. Mixing, thinning and application of the coating materials shall be in exact accordance with the manufacturer's recommendations.

3.8 APPLICATION

- A. General
 - 1. All work shall be done by skilled mechanics. All materials shall be evenly spread and smoothly flowed on without sags or runs, and all coats shall be thoroughly dry per the manufacturer data sheet before applying succeeding coats.
 - 2. Apply coatings in accordance with the paint manufacturer's recommendations. Finish applied metal shall be sanded between coats with fine sandpaper to produce an even, smooth finish.
 - 3. No exterior painting shall be done in rainy, damp, or frosty weather per the manufacturer data sheet or until the surface is thoroughly dry. No interior painting or finishing shall be permitted until the building has thoroughly dried out by natural or artificial heat.
 - 4. Inspection: Schedule with Engineer in advance for cleaned surfaces and all coats prior to the succeeding coat.
 - 5. Paint units to be bolted together and to structures prior to assembly or installation.
 - 6. Shop Primed or Factory Finished Surfaces
 - a. Inspection: Schedule with Engineer in advance for shop primed or factoryfinished items delivered to the Site for compliance with the Specifications.
 - b. Power sand areas of chipped, peeled, or abraded coating, feathering the edges. Follow with a spot primer using specified primer.
 - c. For two-package or converted coatings, consult the coatings manufacturer for specific procedures as relates to top coating of products.
 - d. Prior to application of finish coats, clean shop primed surfaces of dirt, oil, and grease, and apply a mist coat of specified primer, 1.0 mil dry film thickness.
 - e. After welding, prepare and prime holdback areas as required for the specified paint system. Apply primer in accordance with manufacturer's instructions.
 - 7. Manufacturer Applied Paint Systems
 - a. Repair abraded areas on factory-finished items in accordance with the equipment manufacturer's directions.
 - b. Carefully blend repaired areas into the original finish.
- B. Film Thickness
 - 1. Applied coating system film thickness per coat shall be applied at the specified coating thickness or the manufacturer's recommended minimum thickness, whichever is greater.
 - 2. Maximum film build per coat shall not exceed the coating manufacturer's recommendations.

- 3. Surfaces that are subject to immersion, condensing environments, or where specifically specified shall be stripe coated on all angles, edges, corners, threads, welds, and similar type surfaces. Stripe coat shall be an extra coat of the intermediate or topcoat material. The stripe coat shall be a separate coat of paint from coats specified under the coating system. Stripe coats shall be alternated in color similar to a full coat.
- C. Damaged Coatings, Pinholes, and Holidays
 - 1. Feather edges and repair in accordance with the recommendations of the paint manufacturer.
 - 2. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.
- D. Unsatisfactory Application
 - If the item has an improper finish color, or insufficient film thickness, clean and topcoat surface with specified paint material to obtain the specified color and coverage. Obtain specific surface preparation information from the coating manufacturer. Hand or power sand visible areas of chipped, peeled, or abraded paint and feather the edges. Follow with primer and finish coat in accordance with the Specifications. Depending on the extent of repair and its appearance, a finish sanding and topcoat may be required.
 - 2. Evidence of runs, bridges, shiners, laps, or other imperfections shall be cause for rejection.
 - 3. Repair defects in coating system per written recommendations of coating manufacturer.

3.9 CLEANUP

- 1. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroyed at the end of each day.
- 2. Upon completion of the Work, remove staging, scaffolding, and containers from the Site.
- 3. Completely remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.
- 4. Damages due to over spray on buildings, vehicles, trees, or other surfaces not specified to be painted would be the responsibility of the Contractor.

3.10 PAINTING AND FINISHING SCHEDULE

- A. The number of coats called for in this schedule shall be considered minimum. If more coats are required for complete coverage and uniform appearance, they shall be applied.
- B. Schedule A
 - 1. Application
 - a. All steel surfaces located inside of structures, manholes, or valve vaults.
 - b. All steel surfaces with shop applied fusion bonded epoxy or other two component coating system shall be prepared as specified in Article 3.8.A.6 and top coated with the specified coating material. Final color shall be uniform in appearance.
 - 2. Exposure Condition
 - a. Submerged or Intermittently Submerged
 - 3. Surface Preparation
 - a. SSPC-SP10 Near-White Metal Blast Cleaning. Anchor profile shall be 2.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287.

- 4. Painting System
 - a. 1st Coat Zinc-Rich Urethane Primer
 - 1) Tnemec Series 94-H20 Hydro-Zinc applied at 2.5 to 3.5 dry mils
 - 2) Sherwin Williams Corothane I Galvapac Zinc Primer, B65G11, applied at 3.0 to 5.0 dry mils
 - 3) Carboline Carbozinc 621 applied at 3.0 to 4.0 dry mils
 - b. 2nd Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 891VOC applied at 5.0 to 6.0 dry mils
 - c. 3rd Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 891VOC applied at 5.0 to 6.0 dry mils

C. Schedule B

- 1. Application
 - a. All exposed ductile iron surfaces located inside of structures, manholes or valve vaults.
 - b. All surfaces with shop applied fusion bonded epoxy or other two component coating system shall be prepared as specified in Article 3.8.A.6 and top coated with the specified coating material. Final color shall be uniform in appearance.
- 2. Exposure Condition
 - a. Submerged or Intermittently Submerged
- 3. Surface Preparation
 - a. NAPF 500-03-01 "Solvent Cleaning" to remove all oil, grease, factory-applied tars and/or bitumastic coatings and all other soluble contaminants.
 - b. NAPF 500-03-04 "Abrasive Blast Cleaning of Ductile Iron Pipe" providing a minimum 1.5 mil angular anchor profile
 - c. NAPF 500-03-05 "Abrasive Blast Cleaning of Cast Ductile Iron Fittings"
- 4. Painting System
 - a. 1st Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 891VOC applied at 5.0 to 6.0 dry mils
 - b. 2nd Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 891VOC applied at 5.0 to 6.0 dry mils
 - c. 3rd Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 891VOC applied at 5.0 to 6.0 dry mils
- D. Schedule C
 - 1. Application
 - a. All exposed ductile iron surfaces located above ground.
 - b. All surfaces with shop applied fusion bonded epoxy or other two component coating system shall be prepared as specified in Article 3.8.A.6 and top coated with the specified coating material. Final color shall be uniform in appearance.

- 2. Exposure Condition
 - a. Not Submerged
- 3. Surface Preparation
 - a. NAPF 500-03-01 "Solvent Cleaning" to remove all oil, grease, factory-applied tars and/or bitumastic coatings and all other soluble contaminants.
 - b. NAPF 500-03-04 "Abrasive Blast Cleaning of Ductile Iron Pipe" providing a minimum 1.5 mil angular anchor profile
 - c. NAPF 500-03-05 "Abrasive Blast Cleaning of Cast Ductile Iron Fittings"
- 4. Painting System
 - a. 1st Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 890 applied at 4.0 to 6.0 dry mils
 - b. 2nd Coat Epoxy
 - 1) Tnemec Series N140 Pota-Pox Plus applied at 5.0 to 6.0 dry mils
 - 2) Sherwin Williams Macropoxy 646 PW, B58-X-600 Series, applied at 5.0 to 6.0 dry mils
 - 3) Carboline Carboguard 890 applied at 4.0 to 6.0 dry mils
 - c. 3rd Coat Aliphatic Acrylic Polyurethane
 - 1) Tnemec Series 1074 Endura-Shield II applied at 2.0 to 3.0 dry mils
 - 2) Sherwin Williams Corothane I Aliphatic Finish, B65W15, applied at 3.0 to 5.0 dry mils
 - 3) Carboline Carbothane 8845 or 8812 applied at 3.0 to 5.0 dry mils

END OF SECTION

PAINT SYSTEM DATA SHEET

Attach products' Technical Data Sheet (if applicable) to this sheet for each paint submittal.

| Paint System Number (from spec): | | | | |
|----------------------------------|---------------------|---------------------|--|--|
| Paint System Title (from spec): | | | | |
| Coatings Manufacturer: | | | | |
| Representative: | | | | |
| Surface Preparation: | | | | |
| Paint Material (Generic) | Product Name/Number | Min Coats, Coverage | | |
| | | | | |
| | | | | |
| | | | | |

Additional Information Required (check if applicable):

- ANSI/NSF Certification letter for each paint material listed above requiring ANSI/NSF Standard 60 and 61 approval
- □ Manufacturer's minimum and maximum recommended coating thickness per coat and for total coating system.

SECTION 31 10 00 SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

- 1. Work in this section includes furnishing all labor, materials, equipment, and services required for clearing and grubbing, minor demolition, removal and disposal of items as specified herein and on the plans.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - American Society for Testing and Materials (ASTM)
 a. ASTM D698
- **B.** Definitions
 - 1. Caliper The diameter as measured twelve (12") inches above the ground
 - 2. Diameter at Breast Height (DBH) The diameter as measured 4 feet above the ground.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS [NOT USED]

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Remove any existing uncontrolled fill, vegetation and soft or loose soils in all areas designated for building and pavements and perform required undercutting.
- C. Provide for a geotechnical engineer to be on site providing observation to determine if further remedial work is required. Execute the Engineer's instructions.
 - 1. Geotechnical engineer shall be retained by the Contractor.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials, not specifically described but required for proper completion of the work of this Section, as selected by the Contractor subject to the approval of the Owner.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PROTECTION

- A. Protect existing utilities indicated or made known.
- B. Avoid damage to existing trees that are larger than three inches in diameter at DBH. Protect trees per this section and Drawings. Obtain approval from the Construction Manager and the City before removing or trimming any tree.
 - 1. The Owner will assist the Contractor in identifying trees that are to be saved from clearing. The Contractor will protect such trees from construction damage such as trunk impacts and scrapes, limb breakage, compaction of soil within the drip line, and other injurious construction activities.
 - a. If necessary, the Owner may direct the Contractor, at the Contractor's expense, to erect protective stockades along the drip lines of trees that the Owner considers vulnerable to damage. Such stockades shall be of eight (8') foot long by six (6") inch diameter posts vertically buried three (3') feet deep at six (6') foot intervals along the drip line.
 - 2. Where grading or clearing and grubbing operations are to occur between trees that are to be preserved and protected, the Contractor shall prune the lower branches of these trees as necessary to prevent their breakage and to permit access by construction machinery. Branches will be cut off to the trunk or major limb in a workmanlike manner. The Engineer may direct that the Contractor remove additional branches in such a manner that the tree presents a balanced appearance. Scars will be treated with a heavy coat of an approved tree sealant.
 - 3. Remove and dispose of trees, branches, limbs, and roots leaving the right-of-way in a neat and presentable condition. Perform clearing and grubbing without injury or damage to adjacent property. Maintain the blade of equipment used for clearing and grubbing slightly above the ground surface to protect grass roots.
 - 4. Remove all trees, stumps, slashing, brush or other debris removed from the Site before beginning construction. Select locations for dumping, acquire required permits and properly dispose of excess material. Do not allow burning without written approval of Construction Manager.
- C. Protection of persons and property

- 1. Barricade open depressions and holes occurring as part of this Work and post warning lights on property adjacent to or with public access.
- 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
- 3. Protect structures, utilities, sidewalks, pavements, existing trees, in particular, trees designated as "protected" and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations under this Section.
- D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Maintain access to the site at all times.

3.3 CLEARING AND GRUBBING

- A. Clearing and grubbing shall consist of removing all natural and artificial objectionable materials from the project site or from limited areas of construction specified within the site.
- B. In general, clearing and grubbing shall be performed in advance of grading and earthwork operations and shall be performed over the entire area of earthwork operations.
- C. In cut areas where fill is to be placed, the subgrade moisture content and density shall be verified unless intact undisturbed limestone is present in which case density testing is not required. If the density is less than 95 percent of the maximum dry density as determined by ASTM D 698 (Standard Proctor) or if the moisture content is below optimum, the subgrade shall be scarified to a depth of 6 inches. After scarifying, moisture shall be adjusted as necessary and the soils shall be compacted to a minimum of 95 percent of the maximum of dry density as determined by ASTM D 698 (Standard Proctor) at moisture contents that are at or above the Proctor optimum value.
- D. Unless otherwise specified on the plans, all trees and shrubs of three (3") inches DBH and less and all scrub growth, such as cactus, yucca, vines, and shrub thickets, shall be cleared. All dead trees, logs, stumps, rubbish of any nature, and other surface debris shall also be cleared.
- E. Buried material such as logs, stumps, roots of downed trees that are greater than one (1") inch in diameter, matted roots, rubbish, and foreign debris shall be grubbed and removed to a minimum depth of twenty-four (24") inches below proposed finished grades.
- F. Ground cover of weeds, grass, and other herbaceous vegetation shall be removed prior to stripping and stockpiling topsoil from areas of earthwork operations. Such removal shall be accomplished by "blading" off the uppermost layers of sod or root-matted soil for removal.
- G. Do not allow water to collect in or near foundation areas or floor slab areas during or after construction.

3.4 PAVEMENT REMOVAL

- A. Bituminous and concrete pavements shall be removed to neatly sawed edges. Saw cuts shall be full depth. If a saw cut in concrete pavement falls within three (3') feet of an existing score joint, construction joint, saw joint, cold joint, expansion joint, or edge, the concrete shall be removed to that joint or edge. All saw cuts shall be parallel and/or perpendicular to the line of existing pavement. If an edge of a cut is damaged subsequent to saw cutting, the concrete shall again be sawed to a neat, straight line for the purpose of removing the damaged area. Concrete shall be removed and replaced in full panel sections only.
- B. Concrete curb and gutter shall be removed as specified above. No section to be replaced shall be smaller than thirty (30") inches in length or width.

3.5 UTILITIES

- A. Contact all utility companies and agencies 48 hours prior to beginning any clearing.
- B. Where utility cutting, capping, or plugging is required, perform such work in accordance with requirements of the utility company or governmental agency having jurisdiction.
- C. In general, those utilities on the site that are to be removed or abandoned and that belong to the Owner shall be removed or abandoned by the Contractor. The Owner is responsible for arranging the relocation or removal of other utilities owned by utility companies or other parties.

3.6 MISCELLANEOUS DEMOLITION

A. There may be certain items on the site such as old building foundations, fences and other undetermined structures and improvements that must be removed before construction can commence. Unless otherwise specified, such items become the property of the Contractor for subsequent disposal.

3.7 USE OF EXPLOSIVES

A. The use of explosives will not be permitted in site preparation operations unless specifically permitted by the Owner in writing.

3.8 BACKFILLING

A. All holes, cavities, and depressions in the ground caused by site preparation operations will be backfilled and tamped to normal compaction and will be graded to prevent ponding of water and to promote drainage. In areas that are to be immediately excavated, the Engineer may permit holes, etc., to remain open.

3.9 DISPOSAL OF WASTE MATERIALS

- A. Unless otherwise stated, materials generated by clearing, grubbing, removal, and demolition shall be known as "waste" or "spoils" and shall be removed from the site and disposed of by the Contractor. Similar materials may be unearthed or generated by earthwork operations or by the drilling of piers. Unless otherwise specified, any merchantable items become the property of the Contractor.
- B. Do not store or permit debris to accumulate on the job site. Cleared vegetation shall be removed from the site the same day it is removed.
- C. Burning will not be allowed as a method of disposal.

END OF SECTION

SECTION 31 20 00 EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - The Work includes furnishing all labor, materials, equipment and incidentals necessary to perform earth excavation, backfill, fill and grading as indicated or specified, including but not limited to making excavations to accommodate piping, conduits, foundations and other structures, constructing embankments of compacted materials, grading surfaces to meet finished grades indicated, and removing boulders and tree stumps within the excavation limits.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 32 92 19 Seeding

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Definitions
 - 1. Percentage of Compaction: The ratio of the field dry density, as determined by ASTM D1556, to the maximum dry density, determined by ASTM D698, multiplied by 100.
 - 2. Proof Roll: Compaction with a minimum of four (4) passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller cannot be used.
 - 3. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inches [15 cm] in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.
 - 4. Unacceptable Materials: Materials, which do not comply with the requirements for acceptable material or which, cannot be compacted to the specified or indicated density.
- B. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - a. American Society for Testing and Materials (ASTM)
 - 1) C33: Specification for Concrete Aggregates.
 - 2) C136: Sieve Analysis of Fine and Coarse Aggregates.
 - 3) D421:Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.
 - 4) D422: Test Method for Particle-Size Analysis of Soils.
 - 5) D448: Sizes of Aggregate for Road and Bridge Construction.
 - D1140: Test Method for Amount of Material in Soils Finer than the No. 200 (75 Fm) Sieve.

- 7) D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- D698: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3 (600 kN-m/m3)).
- 9) D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- 10) D2922: Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).
- 11) D3017: Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- 12) D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- 13) D4718: Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.
- 14) D4944: Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Pressure Tester Method.
- 15) D4959: Test Method for Field Determination of Water (Moisture) Content of Soil by Direct Heating Method.
- 16) D5080: Test Method for Rapid Determination of Percent Compaction.
- b. Occupational Safety and Health Administration (OSHA)
 - 1) Title 29: Subpart P Excavations, Trenching and Shoring.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Immediately notify the Engineer if suspected hazardous materials are encountered and cease operations in that part of work.

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. The following material submittals shall be submitted to the Engineer prior to backfilling and filling for only those materials specified on the plans:
 - a. Screened Gravel
 - b. Gravel and Crushed Gravel
 - c. Select Borrow/Select Fill
 - d. Fine and Coarse Aggregates
 - e. Crushed Stone
 - f. Rip-rap: As specified in Section 2.1B1 of this specification.
 - g. Stone Fill Pad: 467 Stone as specified in ASTM D448
 - h. Geotextile Fabric: As specified in Section 2.1B2 of this specification.
 - i. Other Acceptable Materials: Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.
- B. Shop Drawings
 - Submit an excavation, backfilling, and filling plan at least two (2) weeks prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:
 - a. Detailed sequence of work.

- b. General description of construction methods.
- c. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.
- d. Details of dust control measures.
- e. Proposed locations of stockpiled excavation and/or backfill materials.
- f. Proposed surplus excavated material off-site disposal areas and required permits.
- C. Test and Evaluation Reports
 - 1. Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.9B of this specification, four (4) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.
 - 2. During construction, submit written confirmation of fill lift thickness, in-place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. General Construction
 - 1. Excavations shall be performed in the dry, and kept free from water, snow and ice during construction with the exception of the water that is applied for dust control and to aid in the compaction efforts. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material.
 - The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflicts between OSHA and State regulations exist, the more stringent requirements shall apply.
 - 3. The Contractor shall not excavate, construct embankments, or fill until the Engineer has reviewed all the required submittals.
 - 4. The Contractor shall prepare excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.
 - 5. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.
 - 6. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed.
 - 7. Dig test pits are considered as incidental to the normal excavation as indicated and specified in this Section, at no additional compensation.
 - 8. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbings, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun.

- 9. When pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced, the following applies:
 - a. Whenever certain existing structures are encountered, and the Construction Manager so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.
 - b. In removing existing pipes or other structures, include for payment only those new materials that are necessary to replace those unavoidably damaged as determined by the Construction Manager.
- 10. Restore existing property or structures as promptly as practicable.
- 11. If material that is unacceptable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, remove such material to the required width and depth as directed by the Engineer and replace it with screened gravel, select borrow, or concrete.
- 12. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Construction Manager.
- 13. Haul away and stockpile surplus excavated materials to the site designated in the plans at NO additional cost to the Owner. Any required permits or other disposal requirements are the responsibility of the Contractor.
- 14. During progress of work, conduct earth-moving operations and maintain work site so as to minimize the creation and dispersion of dust.
 - a. Apply water, or other materials that are acceptable to the Construction Manager, to aid in dust control.
 - 1) Water or other material shall be clean, free from industrial waste and other objectionable matter.
 - b. Furnish and spread calcium chloride if the Engineer or Construction Manager decides that it is necessary for more effective dust control.
 - c. The Contractor shall furnish and operate a sprinkler equipped with positive and rapidly working cutoff valves and approved spray bars, which shall insure the distribution of material in a uniform and controllable rate of application.
- 15. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

B. Testing

- 1. Qualifications
 - a. The Contractor shall employ an independent testing laboratory to perform particle size and gradation analyses in accordance with ASTM D422, and to determine compactibility in accordance with ASTM D698 for all the proposed backfill and fill materials, and monitoring field compaction operations. The independent testing laboratory shall have the following qualifications:
 - 1) Approved in Section 01 40 00, QUALITY REQUIREMENTS.
 - 2) Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.
 - 3) Have three (3) years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations.
 - 4) Able to provide three (3) references from previous work.
- 2. Methods

- a. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922.
- b. In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959.
- 3. Field Samples
 - a. Performed by the Contractor's independent testing laboratory, acceptable to the Owner, (at Contractor's expense) as specified above.
 - b. Location of tests mutually acceptable to testing laboratory and the Engineer, the Owner's Representative or as directed by the Engineer.
 - c. In the event compacted material does not meet specified in-place cost, recompact material and retest this area until specified results are obtained at no additional cost to the Owner.
 - d. Testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.
- 4. Frequency
 - a. The following testing frequencies are the minimum required for all structural and non-structural fill, grading and embankment. At a minimum, two tests should be performed at each of the respective frequencies, per lift.
 - 1) Field In-Place Density and Moisture Content
 - a) Screened gravel and crushed stone shall be compacted as specified and indicated.
 - b) Trenches under structures foundation preparation or roadways subbase
 - (1) Every 150 linear feet per lift
 - c) Trench embedment
 - (1) Every 100 linear feet
 - d) Trenches in areas without structures or roadways
 - (1) Every 100 linear feet per lift.
 - e) Paved roadways
 - (1) Every 200 linear feet per lift.
 - f) Paved areas
 - (1) Every 2,000 square feet per lift.
 - g) Under structures
 - (1) Every 100 square feet per lift.
 - h) Around structures
 - (1) Every 500 square feet per lift.
 - i) Embankment fills
 - (1) Every 10,000 square feet per lift.
 - j) Non-structural fill
 - (1) Every 5,000 square feet per lift
 - b. Moisture Density
 - 1) One per source, except for screened gravel and crushed stone.
 - 2) Repeat the moisture density test for every 200 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Construction Manager.
 - c. Gradation Analysis
 - 1) A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.
 - d. Liquid Limit, Plastic Limit and Plasticity Index
 - 1) Minimum of one test per 200 cubic yard of soil for use as fill material and whenever classification of material is in doubt as determined by the Construction Manager.
- C. Construction Tolerances
 - 1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.
 - 2. Grade cut and fill areas to plus or minus 0.20 foot of the grades indicated.

- 3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.
- 4. Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of service, other construction, and for inspection.
- 5. The Contractor shall provide the Engineer with adequate survey information to verify compliance with above tolerances.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS

- A. Subsurface Conditions
 - 1. Refer to Appendices for geotechnical report, if provided.
 - 2. Contractor may make additional test borings and other exploratory operations at no cost to Owner, provided he obtains the Owner's permission prior to performing these operations.
 - 3. Any data, which has or may be provided on subsurface conditions, is not intended as a representation or warranty of accuracy or continuity between soil strata. It is expressly understood that neither the Owner nor the Engineer will be responsible for interpretations or conclusions drawn therefrom by Contractor. Data is made available for convenience of Contractor.
- B. Contractor is to verify existing site grading within 30 days of contract date. Discrepancies are to be brought to the Engineer's attention in writing during that period.
 - 1. Any and all site grading discrepancies found after that date will be the total responsibility of the Contractor.
- C. Existing Utilities
 - 1. Contractor shall locate all existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Description
 - 1. Regulatory Requirements
 - a. Use only acceptable materials from excavations or borrows.
 - b. Provide screened gravel, fine aggregate, select borrow, and crushed stone as specified in the Drawings.
 - c. Provide Fine Aggregate conforming to ASTM C33.
- B. Performance / Design Criteria
 - 1. Rip-rap material shall meet the following gradation:

| Sieve Designation | % by Weight Passing Square Mesh Sieves |
|-------------------|---|
| 6 inch | 100 |
| 2 inch | 20-65 |
| No. 4 | 10-35 |

| No. 200 | 0-5 |
|---------|-----|
| | |

- 2. Geotextile fabric shall meet the following requirements:
 - a. The Geotextile material shall be a non-woven fabric consisting of filaments or yarns of polyester or polypropylene.
 - b. The Geotextile shall be provided in rolls with protective covering to protect the fabric from mud, dirt, dust, and debris. The fabric shall be free of defects or flaws which significantly affect its physical properties. Each roll of fabric in the shipment shall have a number or symbol identifying that production run.
 - c. A competent laboratory shall be maintained by the producer of the fabric at the point of manufacture to provide quality control in accordance with ASTM testing procedures. The laboratory shall maintain records of its quality control results and provide a manufacturer's certificate to the owner prior to shipment. The certificate shall include the following:
 - 1) Name of manufacturer
 - 2) Chemical composition
 - 3) Product description
 - 4) Statement of compliance to specification requirements
 - d. The geotextile shall be placed with overlaps of a minimum of 36 inches. The backfill shall be back dumped on the fabric and spread in a uniform lift maintaining the design aggregate thickness at all times. Construction vehicles will not be allowed to traffic directly on the fabric.
 - e. The fabric shall conform to the following average roll minimum values (lot mean-2 standard deviations), as determined by Federal Highway Administration Task Force 25 guidelines cited below, measured in the weakest direction:

| Designation | Торіс | Drain | age * | Eros | ion * | | Stabili | ization | |
|----------------|----------------------------|-------|-------|------|-------|---------|---------|---------|-----|
| | | PR | UPR | PR | UPR | LOADING | | | |
| | | | | | | Low | Med. | Hi | VHI |
| ASTM D 4632 | Grab Strength (lbs.) | 80 | 180 | 90 | 200 | 90 | 130 | 180 | 27 |
| ASTM D 4632 | Grab Elongation | NA | NA | 15% | 15% | NA | NA | NA | NA |
| ASTM D 4533 | Trapezoidal Tear (lbs.) | 25 | 50 | 30 | 50 | 30 | 40 | 50 | 75 |
| ASTM D 751 | Burst (psi) | 130 | 290 | 140 | 320 | 145 | 210 | 290 | 430 |
| ASTM D 751 | Puncture (psi) | 25 | 80 | 40 | 80 | 30 | 40 | 75 | 110 |
| ASTM D 4355 | UV Resistance (500 hr) | NA | NA | 70% | 70% | NA | NA | NA | NA |

| ASTM D | Equivalent Opening Size (EOS) (mm) - soil retention. | | |
|--|--|--------------------------|--|
| 4751 | | | |
| For Soils in Which: | | EOS: | |
| 50% or less passes a #200 mesh sieve | | Greater than a #30 sieve | |
| More than 50% passes a #200 mesh sieve | | Greater than a #50 sieve | |

| ASTM D 4491 | Permeability (k): | |
|----------------------|-------------------|-------------------------|
| Type of Application | | Required Permeability: |
| Critical/Severe: | | k (fabric) > 10k (soil) |
| Normal Applications: | | k (fabric) > k (soil) |

- * PR: Protected Application (used in conjunction with a buffer)
- UPR: Unprotected Application (used with no protective buffer)

2.2 EQUIPMENT

A. The compaction equipment shall be selected by the Contractor, and shall be capable of consistently achieving the specified compaction requirements.

PART 3 - EXECUTION

3.1 SITE MAINTANENCE

- A. Site Leveling
 - 1. Site as to maintain them in a level, unrutted condition and to eliminate ponding of surface and subsurface water.

3.2 EXCAVATION

- A. Execution of any earth excavation shall not commence until all the submittals are reviewed by the Engineer and all Engineer's comments satisfactorily addressed.
- B. Carry out program of excavation and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- C. Excavate to widths that give suitable room for building structures or laying and jointing piping.
- D. Do not plow, scrape or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.
- E. Excavate to lines and grades indicated in an orderly and continuous program.
- F. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.
- G. Excavate to elevations indicated, or deeper, as directed by the Engineer, to remove unacceptable bottom material.
- H. Place excavated material at the approved stockpile locations and in no case closer than three (3) feet from edge of excavations to discourage a cave-in or bank slides.
- I. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
- J. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- K. Regard small, less than 0.5 cubic yards, boulders, rock fragments, and concrete encountered during excavation as a normal part of in-place soils and not included for payment as rock.
- L. Unsuitable excavation and suitable excavation in excess of that needed for construction shall be known as "waste" and shall become the property of the Contractor to be disposed of by him outside the limits of the project, associated rights-of-way, etc.
- M. Payment will not be allowed for excavation of any material which is used for purposes other than those designated, except as provided in the specifications.

- N. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- O. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.
- P. Provide minimum of 48-hour notice to Construction Manager, and receive written notice to proceed before interrupting any utility.
- Q. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.
- R. The use of explosives is not permitted.
- S. Apply final seeding to all disturbed areas, as specified in the SECTION 32 92 19, SEEDING.

3.3 STRUCTURAL EXCAVATION

- A. Excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Structural excavation shall include the furnishing of all materials and equipment; the construction or installation of all facilities which may be necessary to perform the excavations and place and compact the backfill; and the subsequent removal of such facilities, except where they are required or permitted by the plans or specifications to remain in place.
- C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific approval or direction of the Engineer. Unauthorized excavation, as well as remedial work resulting from the unauthorized excavation, shall be at Contractor's expense.
 - 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
 - a. Soil bearing shall be verified by a registered geotechnical engineer retained by the Contractor.
 - 2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by the Construction Manager.
- D. Additional Excavation
 - 1. When excavation has reached required subgrade elevations, notify the Construction Manager so that he may observe the conditions.
 - 2. When unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Construction Manager.
 - 3. When footing concrete or masonry is to rest upon rock, the rock shall be removed to a depth sufficient to expose sound rock. The rock shall be roughly leveled off or cut to approximate horizontal and vertical steps, and shall be roughened. Seams in the rock shall be grouted under pressure or treated as the Engineer may direct and the cost thereof will be included for payment in the quantities for the unit of the structure for which the excavation is made.

- 4. When footing concrete or masonry is to rest on an excavated surface other than rock, care shall be taken not to disturb the bottom of the excavation and final removal of the foundation material to grade shall not be made until just before the concrete or masonry is placed.
- 5. Except when over-excavation is directed by the Construction Manager, excavation below grade shall be replaced at the Contractor's expense with the same class of concrete specified for the structure and at the time the concrete for the structure is being placed.
- 6. For all single and multiple box culverts, pipe culverts, and pipe arch culverts, where the soil encountered at established footing grade is a quick sand, muck, or similar unstable material, the following procedure shall be used unless other methods are called for on the plans:
 - a. All unstable soil shall be removed to a depth of two (2) feet below bottom of culvert for culverts two (2) feet to four (4) feet in height, and to a depth equal to the height of culvert for culverts less than two (2) feet in height. Such excavation shall be carried at least one (1) foot beyond the horizontal limits of the structure on all sides. The Engineer will determine the necessary over excavation for culverts larger than four (4) feet in height.
 - All unstable soil so removed shall be replaced with suitable stable material, placed in uniform layers of suitable depth for compaction as directed by the Construction Manager, and each layer shall be wetted if necessary, and compacted by rolling or tamping as required to provide a stable foundation for the structure.
 - Soil that is considered to be of sufficient stability to sustain properly the adjacent sections of the roadway embankment will be considered a suitable foundation material for the culvert.
 - b. When the material encountered at footing grade of a culvert is found to be partially rock, or incompressible material, and partially a soil or material that is compressible, but otherwise satisfactory for the foundation, the incompressible material shall be removed for a depth of six (6) inches below the footing Grade and backfilled with a material similar to the compressible foundation used for the rest of the structure.
 - c. When the material encountered at footing grade of a bridge bent or pier is found to be partially of rock or incompressible material, and partially of a compressible material, the foundation shall not be placed until the Engineer has authorized such changes as are found necessary.
 - d. Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

3.4 UNCLASSIFIED CHANNEL EXCAVATION

- A. Contractor is responsible for securing all required regulatory permits should construction occur near or in existing drainage ways.
- B. All excavation of channels shall be performed in accordance with the lines, grades, and sections indicated on the plans or as approved by the Construction Manager.
- C. Where excavation to grades established in the field would terminate in unstable soil, the Construction Manager may require the Contractor to remove the unstable soil and backfill to the required grade with suitable material compacted in an approved manner to the required density.
- D. All acceptable materials removed from the excavation shall be used, insofar as practicable for fill material or, in the formation of "Embankments", or shall be otherwise utilized or satisfactorily disposed of as indicated on the plans, or as directed, at no expense to the Owner.

- E. During construction, the channel shall be kept drained, insofar as practicable, and the work shall be prosecuted in a neat workmanlike manner.
- F. Prior to final grading, at minimum, the upper six (6) inches of the exposed soil should be scarified; moisture conditioned at optimum to five (5) percentage points above optimum moisture content, and compacted to at least 95% of the maximum dry density (per ASTM D698).

3.5 UNCLASSIFIED STREET EXCAVATION

- A. All excavation shall be in accordance with the lines, grades, and typical sections as shown on the plans or as established by the Construction Manager. Unless otherwise shown on the plans or established by the Construction Manager, the street excavation will be made to the subgrade of the street or paving project and the finished grade of parkways.
 - 1. Where excavation to grades established in the field would terminate in unstable soil, the Construction Manager may require the Contractor to remove the unstable soil and backfill to the required grade with suitable material compacted in an approved manner to the required density.
 - 2. Where excavation to grade established in the field terminates in loose or solid rock, the Contractor may be required to extend the depth of excavation six (6) inches and backfill with select material compacted in an approved manner to the required density. Subject to the approval of the Engineer, the select material may be obtained from any point within the project limits where suitable backfill material is available.
 - 3. The Contractor shall conduct his operation in such a manner that adequate measurements may be taken before any backfill, as required above, is placed.
- B. Provisions for Drainage
 - If it is necessary in the prosecution of the work to interrupt the natural drainage of the surface, or the flow of artificial drains, the Contractor shall provide temporary drainage facilities that will prevent damage to public or private interests, and shall restore the original drains as soon as the work will permit. The Contractor shall be held liable for all damages which may result from neglect to provide for either natural or artificial drainage which his work may have interrupted.
- C. Excess Excavation
 - Unsuitable street excavation and suitable street excavation in excess of that needed for construction shall be disposed of at the Contractor's expense as directed by the Construction Manager. In general, suitable excess excavation from paving projects will be used in the construction of parkways, widening of embankments, flattening of slopes, etc., but if necessary to waste any material, it shall be disposed of, at the Contractor's expense, in such a manner as to present a neat appearance and to not obstruct proper drainage or cause injury to any street improvements or abutting property.

3.6 BORROW EXCAVATION

- A. Construction Methods
 - 1. All suitable materials removed from the excavation shall be used, insofar as practicable, in the formation of "Embankments", or shall otherwise be utilized as indicated on the plans or as directed, and the completed work shall conform to the established alignment, grades, and cross-section. During construction, the borrow sources shall be kept drained, insofar as practicable, and the work shall be prosecuted in a neat and workmanlike manner.

- 2. Payment will not be allowed for excavation for any material which is used for purposes other than those designated, except as provided in the governing specifications.
- 3. The site of the borrow operations shall be left in a suitable and sightly condition, such as to provide proper drainage. Where indicated on the plans, the sides and/or ends of borrow pits shall be sloped to the dimensions indicated on the plans.
- B. Selection of Materials
 - 1. Where shown on the plans, selected materials will be utilized in the formation of backfill, embankment or to improve the paving sub-grades, in which case the work shall be performed in such manner and sequence that suitable material may be selected, removed separately, and deposited within the limits and at the elevations required. Acceptable borrow material when tested by standard laboratory methods shall meet the requirements indicated on the plans.

3.7 SEPARATION OF EXCAVATED MATERIALS FOR REUSE

- A. Remove only the existing pavement that is necessary for prosecution of work.
- B. Carefully remove loam and topsoil from excavated areas. Store separately for further use or furnish equivalent loam and topsoil as directed.
- C. Carefully remove acceptable material from excavated areas and store separately for further use as backfill material.

3.8 EXCAVATION NEAR EXISTING STRUCTURES

- A. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.
- B. Excavate test pits when determination of exact location of pipe or other underground structure is necessary for doing work properly.

3.9 REMOVAL OF SUBSURFACE OBSTRUCTIONS

- A. Remove indicated subsurface structures and related obstructions to extent shown.
- B. Promptly notify the Engineer when any unexpected subsurface facilities are encountered during excavation such as utility lines and appurtenances, walls and foundations.

3.10 REUSE AND DISPOSAL OF SURPLUS EXCAVATED MATERIALS

A. Reuse surplus acceptable excavated materials for backfill; deposit neatly and grade so as to make or widen fills, flatten side slopes, or fill depressions; or legally dispose offsite; all as directed or permitted and without additional compensation.

3.11 SUBGRADE PREPARATION AND PROTECTION

- A. Remove loam and topsoil, loose vegetable matter, stumps and large roots from areas upon which embankments will be built or material will be placed for grading. Shape subgrade as indicated on drawings, and prepare by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.
- B. As directed by the Engineer, overexcavate unacceptable materials below the foundation subgrade. Backfill the overexcavation as directed in the plans.
- C. Proof roll the foundation subgrade prior to backfilling and filling operation, or placing foundation concrete.

3.12 PROTECTION AND CARE OF PROPERTY

- A. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.
- B. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.
- C. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.
- D. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.
- E. Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

3.13 BACKFILLING, PLACEMENT, AND COMPACTION

- A. Shall meet the requirements set forth in the geotechnical report, if provided, and Section 31 23 33.
- B. Do not place frozen materials in backfill or place backfill upon frozen material. Remove previously frozen material or treat before new backfill is placed.
- C. Do not place, spread, roll or compact fill material during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.
- D. Do not use puddling, ponding or flooding as a means of compaction.

3.14 MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS

A. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

3.15 NON-STRUCTURAL BACKFILL AROUND STRUCTURES

- A. Use acceptable materials for non-structural backfill around structures and compacted as specified and indicated.
- B. Conduct hydraulic testing as soon as practicable after structures are constructed and other necessary work has been done.
- C. Deposit material evenly around structure to avoid unequal soil pressure.
- D. Do not place backfill against or on structures until they have attained minimum compressive strength at 28 days.

3.16 EMBANKMENT/BERM SITE PREPARATION

- A. The on-site soils are suitable for use in site berm construction. Imported materials used for embankment fill should have minimum Liquid Limit of 35, a maximum Liquid Limit of 50, and a Plasticity Index of 15 or higher. At least 20 percent of the imported soil should consist of a clay fraction and no rock fragments should be greater than 4 inches in any given dimension. Any rock fragments larger than 4 inches in any dimension and primarily granular soils should be eliminated.
- B. All areas to receive earthen fill should be cleared, grubbed, and stripped prior to subgrade preparation. Clearing and grubbing should consist of removing all trees, large vegetation, structures, and debris including all roots with a diameter of one-half inch or larger to a minimum depth of 12 inches. Stripping should consist of the removal of all top soil, roots, vegetation, and rubbish not removed by the clearing and grubbing operation. Any unsatisfactory material should be removed from the subgrade area of any future compacted lifts or embankments.
- C. It should be anticipated that construction difficulties will be encountered during periods when the soils are saturated. Proper moisture control below working grade should be accomplished in all areas during excavation and construction.
- D. The subgrade should be firm and capable of supporting construction equipment without displacement. Soft or yielding subgrade soils should be corrected and made stable before construction proceeds. The subgrade should be proofrolled to detect soft spots, which if exists, should be reworked. Proofrolling should be performed using a heavy pneumatic tire roller, loaded dump truck, or similar equipment weighing approximately 25 tons. Any depressions or holes should be filled with the same type of material which is to be placed immediately above the foundation soil.
- E. Prior to placement of compacted fill in any section of the embankment, the subgrade should be compacted to the same density and moisture requirements as the planned embankment.

3.17 PLACING AND COMPACTING EMBANKMENT/BERM MATERIAL

- A. Embankment materials should be placed on a properly prepared subgrade as recommended above. The combined excavation, placing, and spreading operation should be done in such a manner to obtain blending of material, and to provide that the materials, when compacted in the embankment, will have the most practicable degree of compaction and stability. Materials excavated from cut sections and hauled to construct fills must be mixed and not segregated.
- B. If the surface of the embankment is too smooth and hard to bond properly with a succeeding layer, the surface should be roughened and loosened by discing before the succeeding layer is placed.
- C. Where fill is to be placed next to existing fill, that fill should be removed to dense material. Each layer should be benched and disced as adjoining lifts are placed. Material hauling equipment should be so routed over the embankment surface to distribute the added compaction afforded by the rolling equipment, and to prevent the formation of ruts on the embankment surface.
- D. The surface of the fill should be graded to drain freely and maintained throughout construction. During the dumping and spreading process, all roots greater than one-half inch, debris, and all rocks greater than 4 inches in maximum dimension should be removed from the embankment materials. No rocks should be allowed within the final 8 inches of subgrade.

- E. Following the spreading and mixing of the soil on the embankment, it should be processed by discing or pulverizing throughout its thickness to break up and reduce clod size, and provide additional blending of materials. Processing should consist of at least three passes of a fully penetrating disc plow. Additional passes of the processing equipment should be performed as necessary to accomplish breaking up, reduction of clod size, and blending the fill. Each successive pass of the processing equipment should be in a direction perpendicular to the previous pass, where working space permits. The recommended loose lift thickness prior to compaction is 8 inches. The moisture content of the soil should be adjusted, if necessary, by either aeration or the addition of water to bring the moisture content within the recommended range. Water required for sprinkling to bring the fill material to the proper moisture content should be applied evenly through each layer.
- F. Any layers which become damaged by weather conditions should be reprocessed to meet recommended requirements. The compacted surface of a layer of fill should be lightly loosened by discing before the succeeding layer is placed.
- G. When the moisture content and the condition of the fill layer are satisfactory, compaction should be performed with a heavy tamping foot roller with fully penetrating feet (feet long enough to penetrate into the previous lift) either towed by a crawler-type tractor or the self-propelled type. The tamping foot roller should weigh no less than 2,000 pounds per linear foot of drum width. Vibratory tamping rollers are recommended for compacting sandier fill materials.
- H. The in-place density of the fill should be no less than 95 percent of the maximum dry density as determined by ASTM D 698, Standard Proctor, at a moisture content between -2 to +2 percentage points of optimum moisture content for all earth fill zones. The moisture content and density of all fill material should be maintained at the specified range of moisture and density. These moisture ranges represent the maximum recommended limits. It is possible under some circumstances or with some soils, that a more narrow range, within the recommended limits, will be necessary to consistently achieve the recommended density. In order to help provide a homogeneous earth fill mass, a minimum of four passes of the tamping foot roller should be provided, even if the recommended density is achieved with fewer passes.
- I. Field density tests should be taken as each lift of fill material is placed. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of 2 tests per lift should be required. The earthwork operations should be observed and tested on a continuing basis by an experienced geotechnician working in conjunction with the project geotechnical engineer.
- J. Each lift should be compacted, tested, and approved before another lift is added. The purpose of the field density tests is to provide some indication that uniform and adequate compaction is being obtained. The actual quality of the fill, as compacted, should be the responsibility of the contractor and satisfactory results from the tests should not be considered as a guarantee of the quality of the contractor's filling operations.

3.18 ALLOWANCE FOR SHRINKAGE:

A. Build embankments or backfill to a height above finished grade that will, in the opinion of the Engineer, allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

B. Supply specified materials and build up low places as directed, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

END OF SECTION

SECTION 31 23 33 TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. The Work includes furnishing all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, bedding, filling, backfilling, disposal of surplus material, and restoration of trench surfaces and easements.
 - 2. Required work associated with Pipe Laying Prove Out demonstration.
 - 3. Furnishing and placing all sheeting, bracing and supports and remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry, and in all respects acceptable. If conditions warrant, the Contractor may be ordered to deposit gravel for pipe bedding, or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever.
 - a. The length of open trench shall be related closely to the rate of pipe laying.
 - b. All excavation shall be made in open trenches.
 - c. Excavation shall be extended to the width and depth shown on the Drawings or as specified and shall provide suitable room for installing pipe, structures and appurtenances.
- B. Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 31 25 00 Erosion and Sedimentation Controls
 - 4. Section 31 41 33 Trench Safety Requirements
 - 5. Section 32 92 19 Seeding

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - a. Occupational Safety and Health Administration (OSHA)
 - All excavation, trenching, and related sheeting, bracing, etc., shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P), and H.B. 1569 of the 71st Regular Legislative Session.
 - b. American Society for Testing and Materials (ASTM)
 - 1) Wherever soil compaction requirements are referred to herein, it shall refer to Standard Proctor Density as determined by ASTM D 698.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings
 - 1. Prior to the start of work, the Contractor is required to submit his/her proposed method of backfilling and compaction to the Engineer for review.
 - 2. If soil boring logs indicate the presence of groundwater within the proposed trench area, a Groundwater Dewatering Plan shall be submitted outlining how groundwater will be removed.
 - a. Groundwater Dewatering Plan shall be performed by and sealed by a licensed engineer in the State of Texas.
 - b. Contractor shall assume all responsibility for the adequacy of the methods, materials, and equipment employed.
 - 3. Embedment Compaction Plan
- B. Certifications
 - 1. Embedment Compaction Certification
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

- 1.9 QUALITY ASSURANCE [NOT USED]
- 1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]
- 1.11 FIELD [SITE] CONDITIONS [NOT USED]
- 1.12 WARRANTY [NOT USED]
- PART 2 PRODUCTS [NOT USED]

PART 3 - EXECUTION

3.1 TRENCH EXCAVATION

- A. Trench excavation shall include material of every description and of whatever substances encountered, regardless of the methods or equipment required to remove the material. Pavement shall be cut with a saw, wheel or pneumatic chisel along straight lines before excavating.
- B. The Contractor shall strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.
- C. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the Agreement.
- D. Trenches shall be excavated to the depth indicated on the Drawings and in widths sufficient for laying the pipe, bracing and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer.
 - 1. Station 1+00 to 66+00, 148+00 to 167+00, and 187+00 to end
 - a. Trench width shall be practical minimum, but not less than 12-inches nor more than indicated on the Drawings.
 - 2. Station 66+00 to 148+00, and 167+00 to 187+00

- a. Trench width shall be 96".
- E. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below, the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by gravel fill as required by the Engineer at the Contractor's expense.
 - 1. Throughout construction the Contractor shall retain the services of an on-site Geotechnical Engineer, responsible for confirming suitable trench bottom material.
 - 2. If the on-site Geotechnical Engineer deems the in-situ trench bottom material to be unacceptable, the Contractor shall under-cut to a suitable bearing subgrade as defined by the on-site Geotechnical Engineer and replace with structural compacted fill. The over-excavation should extend laterally a distance of at least 1 foot beyond the edges of the pipe, and then at least 1 foot laterally for every 1.5 feet of fill required beneath the pipe. The over-excavation backfill should be completely surrounded with a geotextile consisting of Mirafi 140N or equivalent. The backfill should consist of a free draining aggregate (i.e., sands, gravels, crushed limestone, or crushed concrete) approved by the on-site Geotechnical Engineer. The backfill should be placed in maximum 9-inch loose lifts and uniformly compacted to a minimum relative density of 65 percent as determined by test methods ASTM D 4253 and D4254.
- F. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use smooth-edge bucket to excavate the last one (1) foot of depth.
- G. Where pipe is to be laid in gravel bedding, the trench may be excavated by machinery to the normal depth of the trench provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- H. Within wetlands, the top 6 to 12 inches of native top soil shall be excavated and stored separately onsite. Following pipe installation, final 6 to 12 inches of backfill shall be native topsoil.

3.2 SHEETING AND BRACING

- A. Furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements and as specified in Section 31 41 33, TRENCH SAFETY REQUIREMENTS, to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
- B. Where sheeting and bracing is required to support the sides of trenches, the Contractor shall engage a Professional Engineer, licensed in the State of Texas, to design the sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design and certification provided by the Professional Engineer.
- C. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill.

- 1. When installing rigid pipe (R.C., D.I., V.C., etc), any portion of the box extending below mid diameter shall be raised above this point prior to moving the box ahead to install the next pipe. This is to prevent the separation of installed pipe joints due to movement of the box.
- 2. When installing flexible pipe (Steel, PVC, etc.) trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, backfill shall be placed to fill any voids created and the backfill shall be recompacted to provide uniform side support for the pipe.
- D. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting shall be included in the bid items for trench safety and shall include full compensation for driving, bracing and later removal of sheeting.
- E. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with backfill by ramming with tools especially adapted to that purpose, or otherwise as directed.

3.3 TEST PITS

- A. The Contractor may be required to excavate test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.
- B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.4 DRAINAGE AND DEWATERING

- A. The Contractor shall furnish all materials and equipment and perform all incidental work required to install and maintain the drainage system he proposes for handling groundwater or surface water encountered.
- B. The Contractor shall provide pumping equipment and devices to properly remove and dispose of all water entering trenches and excavations.
 - 1. The subgrade shall be maintained acceptably dry, to a level of five (5) feet below the bottom of the trench, until the facilities to be built therein are completed.
 - 2. Piezometers shall be provided at appropriate locations for verification of dewatering depth.
 - 3. All drainage related work shall be performed without damage to the trench, pavement, pipes, electrical conduits, or other utilities and without damage to public or private property.
- C. The pipe or concrete shall not be laid in water or submerged within 24 hours after being placed. Water shall not flow over new concrete within four (4) days after placement, or as designated on the plans.
- D. In no event shall water rise to cause unbalanced pressure on facilities until the concrete or mortar has set at least 24 hours. The Contractor shall prevent flotation of the pipe by promptly placing backfill.

3.5 EXCAVATION BELOW GRADE AND REFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

- B. If the Contractor excavates below grade through error or for his own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the following paragraph, in which case the work of excavating below grade and furnishing and placing the refill shall be performed at his own expense.
- C. Trench Geotextile Fabric may be installed in specified locations.
 - 1. Soils other than ML or OH in accordance with ASTM D2487
 - a. Needle punch, nonwoven geotextile composed of polypropylene fibers
 - b. Fibers shall retain their relative position
 - c. Inert to biological degradation
 - d. Resist naturally occurring chemicals
 - e. UV Resistant
 - f. Mirafi 140N by Tencate, or approved equal
 - 2. Soils Classified as ML or OH in accordance with ASTM D2487
 - a. High-tenacity monofilament polypropylene woven yarn
 - b. Percent open area of 8 percent to10 percent
 - c. Fibers shall retain their relative position
 - d. Inert to biological degradation
 - e. Resist naturally occurring chemicals
 - f. UV Resistant
 - g. Mirafi FW402 by Tencate, or approved equal

3.6 EMBEDMENT

- A. Embedment for water lines shall be in accordance with AASHTO and as shown on the Drawings:
- B. The initial layer of embedment placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings, and the pipe shall be placed thereon and brought to grade by tamping, or by removal of the slight excess amount of embedment under the pipe. Adjustments to grade shall be made by scraping away or filling with embedment material.
- C. Wedging or blocking up of pipe will not be permitted.
- D. Each pipe section shall have a uniform bearing on the embedment for the full length of the pipe, except immediately at the joint.
- E. All embedment shall extend the full width of the trench bottom.
- F. Embedment shall remain dewatered, in accordance with Paragraph 3.5, until all backfilling is complete.
- G. After the pipe has been laid, jointed and inspected, embedment material shall be brought up in mechanically tamped layers not exceeding eight (8) inches in thickness of loose fill, approximately equal on each side of the pipe, to twelve (12) inches above the top of pipe.
- H. Embedment shall be compacted to minimum 70% relative density in accordance with ASTM D4253 and D5254.
 - Contractor shall submit an Embedment Compaction Plan to the Engineer for approval prior to pipe laying activities. Contractor shall retain an independent geotechnical engineer to help prepare the compaction plan. Plan shall be signed and sealed by a Licensed Engineer in the State of Texas. Plan shall detail the method by which the embedment will be compacted including but not limited to the following:
 - a. Equipment Used

- b. Compaction Process and Anticipated Passes
- c. Lift Heights
- d. Testing Procedure/Firm
- 2. Contractor shall be required to retain an independent geotechnical engineering firm to visually inspect the pipe embedment compaction during construction and provide a certification that the embedment meets the compaction specifications stated above.
 - a. Geotechnical firm shall be subject to approval by the Owner.
 - 1) Contractor shall retain the same firm to help prepare the compaction plan and to visually inspect compaction during construction.
 - A qualified representative shall be on-site once for each 100 linear feet of pipe laid. Representative shall be on-site for a long enough duration each day to observe and certify the embedment placing process.
 - 1) Qualified representative is not required to be a licensed engineer.
 - c. At a minimum, qualified representative shall:
 - 1) Confirm lift thickness
 - 2) Count number of passes
 - 3) Confirm proper equipment is being used
 - 4) Confirm aggregate weight

3.7 PIPE LAYING PROVE OUT

- A. Contractor shall perform prove out prior to any open cut installation beginning. Contractor shall be required to provide out prove as described below for the 48-inch water line. Contractor shall schedule demonstrations at least 14 days in advance with the Owner.
- B. Trench Test Section for Verification of Compaction
 - 1. Acceptable Embedment Compaction Plan shall be based upon a test section performed by the Contractor at the beginning of pipe installation operations. The test section is necessary to verify that the Contractor's method of placement and compaction of the embedment material will produce the minimum specified relative density and placement consistency throughout the embedment zone. The test section shall consist of at least one section of pipe. The pipe shall be installed on the prepared bedding and the lifting straps shall be left in place. The Contractor shall use his proposed method of placing and compacting the embedment as specified in the submitted Embedment Compaction Plan to bring the embedment material up to the spring line of the pipe. A visual inspection will then be performed on the embedment material near the spring line of the pipe by the independent geotechnical testing firm retained by the Contractor. One length of pipe shall then be carefully removed by the Contractor to allow the integrity of the embedment along the haunches and below the pipe to be evaluated visually to verify that the Contractor's method will achieve the specified relative density and uniformity of the embedment.
 - 2. Failure of the compacted embedment to pass visual inspection will be a failure of the pipe embedment demonstration. In the event of a failure, the Contractor shall clean the trench to subgrade, adjust his methods and retest, all as needed, to demonstrate acceptable results.
 - a. A revised Embedment Compaction Plan shall be submitted if methods are required to be adjusted during the Prove Out.
 - 3. Additional test sections shall be performed for all different embedment materials, or if the Contractor proposes to change methods of placement and compaction. The means, methods, and techniques of placement and compaction shall be the sole responsibility of the Contractor, and the test section will be considered only as a means to verify that the Contractor's methods are capable of achieving the

specified density throughout the embedment zone. The actual quality of the embedment and backfill, as compacted, shall be the responsibility of the Contractor and satisfactory results from the test section(s) and field visual inspections shall not be considered as a guarantee of the quality of the Contractor's embedment and backfill operations.

- C. Inspection and Test Pits
 - 1. Excavate test pits after the embedment has been placed and compacted in the pipe zone for the purpose of visually inspecting the haunch areas under the pipe for voids. Provide a safety trench shield to protect the inspector while in the pit.
 - 2. After inspection, backfill and compact the test pit area in accordance with the applicable specification herein.
 - 3. Dig one (1) test pit for inspection of each day's work if deemed necessary or may be required more or less frequently as determined by the Owner's representative. Repair and replace areas which are found not to be in compliance with the specification requirements, until satisfactory results are consistently and uniformly attained.
- D. Provide special attention to assure that the material flows under the pipe haunches. This may require the removal of pipe joints to observe the results. Pipe laying shall not begin until satisfactory results are achieved by the Contractor's proposed method

3.8 BACKFILLING

- A. As soon as practicable after the initial embedment has been placed and the pipe has been laid and jointed, backfilling shall begin and thereafter be prosecuted expeditiously. Embedment, as specified for the type of pipe installed, shall be placed as shown on the Drawings and as specified in Paragraph 3.6 above.
- B. The remainder of the trench shall be filled per Embedment Details in the Drawings. Layers shall not exceed 8-inches in loose measure compacted to 95 percent of maximum density in accordance with ASTM D698. For trench backfill in excess of 15 feet deep, any backfill placed below 15-foot depths should be compacted at a minimum of 98 percent of the Standard Proctor density in accordance with ASTM D698. The backfill shall be mounded twelve (12) inches above the existing grade, or as directed.
- C. Where a grass, loam or gravel surface exists prior to excavation, it shall be removed, conserved and replaced to the full original depth as part of the work under the pipe items. In some areas it may be necessary to remove excess material during the clean-up process, so that the ground may be restored to its original level and condition.
- D. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until the bedding material has been placed and compacted to a level six (6) inches over the pipe.
- E. Backfill shall be brought up evenly on both sides of the pipe. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping.
 - 1. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to fill throughout the full width of the trench.
- F. Compaction shall be by use of hand or pneumatic tamping with tools weighing at least 20 pounds. The material being spread and compacted shall be placed in layers not over 8-inches (loose) thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

- G. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 4-inches may be used in trench backfill providing that the quantity, in the opinion of the Engineer, is not excessive.
 - 1. Rock fragments shall not be placed until the pipe has at least 2-feet of cover.
 - 2. Small stones and rocks shall be placed in thin layers alternating with earth to ensure that all voids are completely filled.
 - 3. Fill shall not be dropped into the trench in a manner to endanger the pipe.
 - 4. If rock fragments are placed in the backfill material, it will be the Contractor's responsibility to prove to the Engineer that the specified compaction is occurring.
 - 5. If the Engineer's opinion is that the compaction is not achieved, then the Contractor shall remove material that contains rock fragments and replace it with suitable material.
- H. Bituminous paving shall not be placed in backfill unless specifically permitted, in which case it shall be broken up as directed. Frozen material shall not be used under any circumstances.
- I. Water jetting will not be accepted as a means of consolidating/compacting backfill.
- J. Dewatering, per Section 3.4, shall be maintained until backfill is complete.

3.9 RESTORING TRENCH SURFACE

- A. Where the trench occurs adjacent to paved areas, road shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he shall immediately deposit additional backfill to restore the level of the ground.
- B. In paved areas, the edge of the existing pavement to be removed shall be cut along straight lines, and the pavement replaced as indicated on the Drawings.
- C. The surface of any driveway, or any other area, which is disturbed by the trench excavation and which is not a part of the paved road shall be restored by the Contractor to a condition at least equal to that existing before work began.
- D. In sections where the pipeline passes through grassed areas, the Contractor shall, at his own expense, remove and replace the sod, or shall loam and reseed the surface to the satisfaction of the Engineer and in accordance with Section 32 92 19, SEEDING.
- E. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

END OF SECTION

SECTION 31 25 00 EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - This Work includes furnishing all labor, materials, equipment and incidentals necessary to perform all installation, maintenance, removal and area cleanup related to sedimentation control work as shown on the Drawings and as specified herein. The work shall include, but not necessarily be limited to; installation of temporary access ways and staging areas, silt fences, sediment protection at storm drain inlets, sediment removal and disposal, device maintenance, removal or temporary devices, temporary mulching, erosion control blankets and final cleanup.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 32 92 19 Seeding

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES [NOT USED]

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTALS.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.
- 1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS [NOT USED]
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. The Contractor shall be responsible for the timely installation of all sedimentation control devices necessary to prevent the movement of sediment from the construction site to off-site areas or into the stream system via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off-site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stabilized Construction Entrance
 - 1. Crushed stone shall be 3" x 5" hard stone.
- B. Silt Fence
 - 1. Posts shall be painted or galvanized steel Tee posts.
 - a. Minimum of three (3) feet in length
 - b. Minimum weight of 1.3 pounds per foot
 - c. Shall have self-fastening tabs and a 5" x 4" (nominal) steel anchor plate at bottom.
 - d. Posts and anchor plates shall conform to ASTM A702.
 - 2. Welded wire fabric shall be 4x4 W1.4xW1.4.
 - 3. Fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc., Charlotte, NC, or approved equal.
 - 4. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or 1/32-inch diameter soft aluminum wire.
 - 5. Pre-fabricated commercial silt fence may be substituted for built-in-field fence.
 - a. Pre-fabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc., Charlotte, NC, or approved equal.
 - 6. Erosion Control Blanket
 - a. Shall be AMXCO Curlex Blanket as manufactured by American Excelsior Company, Arlington, TX or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Silt Fence
 - 1. Silt fences shall be positioned as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
 - 2. Dig trench approximately 6" x 6" along proposed fence lines.
 - 3. Drive metal-stakes, six (6) feet on center (maximum) at back edge of trenches. Stakes shall be driven one (1) foot (minimum) into ground.
 - 4. Hang woven wire mesh on posts, setting bottom of wire in bottom of trench. Secure wire to posts with self-fastening tabs.
 - 5. Hang filter fabric on wire carrying to bottom of trench with about 12-inches of fabric laid across bottom of trench. Stretch fabric fairly taut along fence length and secure with tie wires 12-inch O.C. both ways. The silt fence shall be a minimum of 24 inches high.
 - 6. Backfill trench with excavated material and tamp.
 - 7. Install pre-fabricated silt fence according to manufacturer's instructions.
- B. Erosion Control Blanket
 - 1. Erosion control blankets shall be installed in any areas exceeding 5:1 slope and in areas as required for seeding.
 - 2. The area to be covered shall be properly prepared, fertilized and seeded before the blanket is applied.

- 3. When the blanket is unrolled, the netting shall be on top of the fibers in contact with the soil over the entire area. The blankets shall be applied in the direction of water flow and stapled.
 - a. The staples shall be made of wire, 0.091-inch in diameter or greater, "U" shaped with legs 10-inches in length and 12-inch crown.
 - b. The staples shall be driven vertically into the ground, spaced approximately two
 (2) linear feet apart on each side with one row in the center alternately spaced between each side row.
- 4. Adjoining blankets shall be overlapped and shall utilize a common row of staples to attach.
 - a. Side overlaps shall be 4-inch minimum.

3.2 MAINTENANCE AND INSPECTIONS

- A. Inspections
 - 1. Contractor shall make a visual inspection of all sedimentation control devices in accordance with the local municipalities regulations.
 - a. In instances in which no regulation exists, Contractor shall make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas, Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.
- B. Device Maintenance
 - 1. Silt Fences
 - a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
 - b. Replace damaged fabric, or patch with a 2-foot minimum overlap.
 - c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.

3.3 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner.
- B. Re-grade all areas disturbed during this process and stabilize against erosion with surfacing materials as specified and as shown on the Drawings.

END OF SECTION

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SECTION 31 41 33 TRENCH SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish all labor, materials, and equipment and perform all operations to plan, design, construct, install, maintain, monitor, modify as necessary, and remove upon completion, a Trench Safety System as specified herein.
 - 2. The requirements of this Section apply to all trenches which equal or exceed a depth of five (5) feet, measured from the ground surface at the highest side of the trench to the trench bottom.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 31 23 33 Trenching, Backfilling and Compaction

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - Texas Statute
 a. HB 1569, 71st Regular Legislative Session.
 - 3. Occupational Safety and Health Administration (OSHA)
 - a. 29 CFR 1926, Subpart P Excavations, latest revision at time of construction Agreement execution.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATION SUBMITTALS

- A. Shop Drawings
 - The Contractor shall be responsible for providing to the Owner an acceptable Trench Safety System Plan signed and sealed by a Professional Engineer qualified to do such work and registered in Texas

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. The Contractor shall be responsible for complying with state laws and federal regulations relating to trench safety, including those which may be enacted during the performance under this contract.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and products incorporated into the Trench Safety System shall be suitable for their intended uses; shall meet all design criteria and parameters used by the Trench Safety System designer; and shall meet all applicable requirements of OSHA Standards.

PART 3 - EXECUTION

3.1 PROCEDURES

- A. At least ten (10) Calendar Days prior to execution or any excavation operations, and not more than thirty (30) Calendar Days following the execution date of the Construction Agreement, Contractor shall submit a site-specific Trench Safety System Conformance Affidavit stating that operations will be conducted in full conformance with the OSHA Standards.
 - 1. The Conformance Letter shall also describe the Trench Safety System techniques proposed to be used on the project.
 - 2. Specific references to the applicable OSHA Standards sections shall be included for each technique to be used.
- B. The Trench Safety System Plan shall be in writing, site specific and sufficiently detailed and clear to be understandable and usable by all personnel who will be executing, supervising and witnessing the trenching operations. A copy of the Trench Safety System Plan shall be available at the site of trenching operations at all times. A second copy shall be provided to the Owner for the Owner's records.
- C. If borings and/or detailed geotechnical analyses are required to develop the Trench Safety System Plan, they shall be executed by the Contractor at his cost.
- D. For trenches having depths greater than the various limits given in the OSHA Standards (8, 12 or 20 feet, depending on the techniques used), a site specific protective system shall be designed by a Licensed Professional Engineer experienced in soil mechanics and structural design. The design shall be signed, sealed and dated by the Professional Engineer, and it shall identify those specific locations where the design is applicable.

3.2 METHODS OF PROVIDING TRENCH SAFETY

- A. Protective systems referenced in this Section shall be as defined and described in 29 CFR 1962.652, "Requirements for Protective Systems."
- B. It is the duty, responsibility and prerogative of the Contractor to determine the specific applicability of a proposed Trench Safety System for each field condition encountered on the project. Contractor specifically holds the Owner, Engineer, and any of their designated representatives harmless in any actions resulting from the failure or inadequacy of the Trench Safety System used to complete the project.
- C. Unless otherwise noted on the drawings or excluded below, Sloping/Benching, Trench Shielding with trench boxes, and/or Sheeting/Shoring/Bracing protective systems may be used on this project.

- D. Restrictions on the use of the various protective systems for this project are as follows:
 - 1. Sloping or Benching
 - 2. Trench Shields/Boxes
- No Restrictions, except as noted on plans. No Restrictions.
- 3. Sheeting/Shoring/Bracing No Restrictions.

3.3 INSPECTION DUTIES OF CONTRACTOR

- A. Provide a Competent Person, as defined in the OSHA Standards, to make frequent inspections of the trenching operations and the Trench Safety System in full conformance with the OSHA Standards.
- B. If evidence of a possible cave-in or landslide is apparent, all work in the trench shall immediately cease and not be resumed until all necessary precautions have been taken to safeguard personnel entering the trench.
- C. In an emergency situation which may threaten or affect the safety or welfare of any persons or properties, the Contractor shall act at his discretion to prevent possible damage, injury or loss. Any additional compensation or time extension claimed for such actions shall be considered in view of the cause of the emergency and in accordance with the Agreement.

END OF SECTION

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SECTION 31 75 00 ACCESS SHAFTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

- The work includes design, procurement, installation, and execution of shaft excavation and support at the tunnel or microtunnel portions of the Wylie-Rockwall-Farmersville 36"/48" Pipeline, Phase 2 Improvements project.
- 2. The work specified includes requirements for excavation and support of the work and exit shafts, and any other excavations required for tunnel or microtunnel construction. Design, furnish, install, and maintain a system of supports, including all bracing and associated items, to retain excavations in a safe manner and to control ground movements. Upon completion of the required tunnel construction, the shafts shall be backfilled as specified.
- 3. All work specified is the responsibility of the Contractor, subject to the approval of the Engineer. Perform work in accordance with all current applicable regulations and codes of Federal, State, and local agencies. In the event of conflict, comply with the strictest requirements. No part of this specification shall be construed as a relaxation of any of these rules, laws, and regulations.
- 4. Construction methods shall satisfy the requirements of this section while utilizing and preserving the inherent strength of the ground surrounding the shafts. The strength of the ground forms the basis of the design for both the initial and the permanent support for these shafts.
- 5. Contractor shall reference the Drawings and this Section for space limitations for shaft excavations. Subject to the approval of the Engineer, the Contractor may select such dimensions as he may require to conduct the work, based on space requirements for the equipment used, installation of components, handling of excavated material, methods of construction, and ancillary services, at no additional cost to the Owner.
- 6. Furnish all labor, materials and equipment to install shaft ground support, as shown on the Drawings, for the shaft ground support type determined by the Contractor. The Contractor's methods of excavation shall be compatible with the requirements for the initial shaft support, as indicated in the referenced specification items or on the Drawings. If the selected shaft ground support type fails to provide satisfactory performance within the encountered ground conditions, another support type shall be provided.
- 7. Furnish all material and labor to install and maintain pumps, piping, drains and other facilities for the control, collection and disposal of groundwater from inside the shaft excavation.
- 8. The Contractor shall be responsible for furnishing and installing all electrical equipment required to complete shaft construction activities. The Contractor shall also furnish the electrical equipment for all of the auxiliary systems which shall include but not be limited to transformers, panel boards, security lighting, grounding, power for vent fans, sump pumps, disconnect switches, voice communication equipment, office trailers, etc.

B. Related Specification Sections include but are not necessarily limited to

- 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
- 2. Division 1 General Requirements.

- 3. Section 33 05 23 Hand Tunneling
- 4. Section 33 05 24 Installation of Carrier Pipe in Casing or Tunnel Liner Plate

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. The Contractor shall have the sole responsibility for the design, construction, maintenance, and backfilling of the shaft, as well as the shaft supply system associated with this work.
- B. The Contractor shall have the sole responsibility for maintenance and protection of existing utilities, structures, and facilities within the zone impacted by the shaft. The zone of impact shall include the zone of ground movement in the vicinity of this work.
- C. The Contractor shall have the sole responsibility for sizing the shaft within the limits specified and shown on the Drawings and in this Section. The size of the excavations shall be adequate to construct all structures required and to gain access to tunneling operations for all materials, equipment, and personnel.
- D. The Contractor shall allow the Engineer and the Owner's representative access to the shafts, and to use the shafts to access tunnel operations.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings
 - 1. Submit the following to the Engineer a minimum of eight weeks before the scheduled start of the applicable activity.
 - a. Name and qualifications of person responsible for shaft support system design. This work shall be prepared and sealed by a Professional Engineer licensed in the State of Texas.
 - b. Shop drawings and design calculations indicating arrangement of supports and construction sequence for proposed shaft support system(s). Show the elevation of struts, braces, or other supports as related to the depth of excavation at intermediate stages of construction. Provide details of working slab, drains, and sump construction. Indicate sizes, shapes, and material specifications for all support elements including lagging, if used. Calculations shall include estimates of likely deflections or deformations of the construction shoring system and maximum tolerable values.
 - c. Break in and breakout plans indicating type of support installed to transfer loads and maintain excavation support and stability of the excavation, and the method utilized for the control of ground water when commencing tunneling.
 - d. Provisions for protecting adjacent facilities and utilities.
 - e. Provisions for dewatering.

1.7 CLOSEOUT SUBMITTALS

- A. Record Documentation
 - 1. Record locations, dimensions, and design of all shaft, pit, and excavation support elements remaining and submit to the Engineer.

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE [NOT USED]

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS

- A. Safety
 - The method of construction shall ensure the safety of the work, project participants, the public, third parties, and adjacent property, whether public or private. All work shall conform to the requirements of all Federal, State, and local laws and regulations. The Contractor is solely and completely responsible for maintaining safe work conditions at the site at all times.
 - 2. The Safety Officer shall administer an accident prevention program, and shall prepare a code of safe practices and an emergency plan. Provide the Engineer with a copy of each prior to starting tunnel excavation. Hold safety meetings and provide safety instruction for new employees.

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel: Structural steel members, such as fabricated connections and accessories, steel W shapes, plate steel, and other structural steel shall conform to the requirements of ASTM A 572 or ASTM A 36, unless otherwise accepted.
- B. Lagging: Lagging between soldier piles or ring beams shall be timber, steel plate, or reinforced concrete.
- C. Timber Lagging: Timber lagging shall be of construction grade and shall be any species that provides a minimum allowable bending stress of 1,100 psi.
- D. Reinforced Concrete Lagging: Reinforced concrete lagging shall be designed by the Contractor to safely resist design ground loads with an appropriate safety factor. As a minimum, design shall include evaluation of methods of connection between the panels and the soldier piles, and bending moments in the panels.
- E. Steel Liner Plate: Steel liner plate shall meet the requirements of AASHTO Standard Specifications for Highway Bridges, Division I Design, Section 16.
- F. Sheet Piles: Steel sheet piling shall be continuous interlocking made in accordance with ASTM A 328 or ASTM A 857 or from steel meeting the requirements of ASTM A 36 or ASTM A 1011.
- G. Lean Concrete: Lean concrete shall have a low strength (in the range of 500 1,000 psi) and small aggregate such that it is easily and evenly chipped away for lagging installation.

- H. Backfill Material: Backfill sand shall conform to ASTM C 778 for 20-40 sand. Plugging material such as Excelsior or dry pack shall be used to prevent backfill sand from running. Alternatively, lean concrete mixed with sand could be used as backfill material.
- I. Geotextile: A non-woven geotextile that provides separation, filtration and retainment of the soils present and compatible with the construction shoring system(s). The geotextile shall have a minimum tensile strength of 225 lbs. in accordance with ASTM D 4632 and a minimum Mullen burst of 450 psi in accordance with ASTM D 3786.
- J. Welded Wire Fabric:
 - 1. Welded Wire Fabric: ASTM A 185.
 - 2. Size: 4 inches x 4 inches W2.9 x W2.9.
- K. Chain Link Fence Fabric:
 - 1. Chain Link Fence Fabric: ASTM A 392.

2.2 DESIGN

- A. Design construction shoring system(s) and working slabs to withstand earth pressures, bottom heave, equipment loads, applicable traffic and construction loads, and other surcharge loads to allow the safe construction of the tunnel without excessive movement or settlement of the ground, and to prevent damage to adjacent structures, streets, and utilities. Design construction shoring system(s) to be compatible with the ground conditions presented in the GBR and lateral earth pressures and in accordance with AISC and ACI code provisions, as applicable.
- B. Design each member or support element to support the maximum loads that can occur during construction with appropriate safety factors.
- C. Employ wales, struts, and beams for bracing and lateral support as required for excavation faces supported by soldier piles and lagging or sheeting systems. Provide struts with intermediate vertical and horizontal supports as required to prevent buckling. Provide timber lagging, pre-cast concrete lagging, liner plate, or steel sheeting as required to retain soil between supports.
- D. Design a working slab for each excavation bottom to provide stable support for construction operations.
- E. Locate shaft excavation as indicated on the Drawings, unless otherwise accepted by the Engineer and Owner.
- F. Design excavation support systems in accordance with all OSHA requirements.
- G. Review of the Contractor's plans and methods of construction by the Engineer does not relieve the Contractor and his/her design consultants of his/her responsibility to provide and maintain an adequate support system achieving the specified requirements.
- H. Shaft Limits
 - 1. Shaft size shall be limited to the water line easement.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Start: Commence shaft excavation only after the Engineer has reviewed and accepted all applicable submittals.

- B. Methods: Methods of construction for shaft excavations shall be such as to ensure the safety of the work, Contractor's employees, the public, and prevent damage to adjacent property and improvements, whether public or private.
- C. Slab: Provide all excavations with a concrete working slab equipped with a sump to pump out construction water and storm water, and to ensure there is no standing water in the shaft.
- D. Protection:
 - Before beginning construction at any location of this project, adequately protect existing utilities and other existing facilities. Design and construct construction shoring system(s) to limit deformations that could damage adjacent utilities. The repair of or compensation for damage to existing facilities shall be at no cost to the Owner. If settlement or deflections of supports indicates that the construction shoring system(s) required modification to prevent excessive movements, the Contractor shall redesign and resubmit revised shop drawings and calculations at no additional cost to the Owner.
 - 2. Shaft initial ground support system shall extend a minimum of 36 inches above grade in the work site in order to prevent surface water runoff from entering the excavation, as well as having the site graded to promote drainage away from the excavation. Additional measures to protect the shafts from 100 year floods may be required, depending upon the specific shaft location.
- E. Excavation: Excavations shall be to the dimensions as necessary to accomplish the work but in no case outside of the construction limits as shown on the drawings without specific acceptance by the Engineer. Do not excavate more than six inches deeper than the elevations shown or accepted. Excavations carried more than six inches deeper than the elevations shown or accepted shall be backfilled in accordance with the Drawings. Methods used in making excavations shall not loosen ground beyond the limits of excavation.
- F. Unsupported Height: The height of unsupported shaft sidewall span shall not exceed three feet in soils or five feet in rock. No unsupported sidewall spans will be allowed to exist for longer than 8 hours.
- G. Welding: All welding shall conform to the applicable provisions of ANSI/AWS D 1.1.

3.2 WATER CONTROL

A. Water control including but not limited to grouting, surface drainage, water removal, and disposal shall be the Contractor's responsibility.

3.3 UTILITIES

- A. Utilities present in the vicinity of the shaft excavation shall be preserved and service continued without interruption.
- B. Locate and size shaft excavation to minimize conflicts with utilities.
- C. Location of utilities shown is only approximate. In field, locate each utility potentially impacted by the work to verify location prior to beginning underground construction at each location.
- D. Coordinate with each utility agency as necessary prior to relocation, hanging, or upgrade of utilities in the vicinity of shaft excavation. The cost of this work shall be borne by the Contractor, whether performed by the Contractor or the utility agency.

3.4 SOLDIER PILES AND LAGGING

- A. Predrilled Holes: Install piles in predrilled holes or by pile driving, to the tip elevations shown in the accepted submittals. Provide casing or drilling mud to prevent caving of holes and loss of ground in predrilled holes. If pile driving is performed, the Contractor shall be solely responsible for all damage to nearby utilities, structures, and other facilities caused by vibrations. Contractor shall abide by all noise regulations and ordinances.
- B. Concrete Encasement: After soldier pile has been seated plumb in the drill hole, encase it with concrete from the tip to the bottom level of the final excavation. Concrete strength shall be in accordance with accepted submittals, and shall be placed by means of a tremie system. Apply vibration through the pile to consolidate the concrete.
- C. Lagging: Provide timber, steel plate, or pre-cast concrete lagging of sufficient strength to withstand lateral earth pressures.
- D. Lagging Installation: Install lagging with no gap between adjacent boards or panels. As installation progresses, backfill the voids between the excavation face and the lagging with sand or pea gravel packed into place. Pack voids with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of ground due to piping.

3.5 STEEL SHEET PILING

- A. Steel sheet piling may be used only where existing subsurface conditions are suitable for installation of sheet piling to the full depth of penetration required, and to proper alignment of the driven sheets and perpendicularity without damage to the sheet piling or rupture of its interlocks.
- B. Drive in perpendicular position with each sheet pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground.
- C. Drive to the depth indicated on the shop drawings, exercise care in driving to avoid damaging adjacent utilities and structures, so that interlocking members can be extracted without damaging adjacent structures or utilities.

3.6 INTERNAL BRACING SUPPORT SYSTEM

- A. Internal Bracing: The internal bracing support system shall include wales, struts, and/or shores.
- B. Struts: Provide struts with intermediate bracing as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.
- C. Web Stiffeners, Plates, and Angles: Include web stiffeners, plates, or angles as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.
- D. Bracing Supports: Install and maintain all bracing support members in tight contact with each other and with the surface being supported.

- E. Preloading: Preload bracing members by jacking struts to 50 percent of the design load if necessary to control shoring movement. Preload bracing members in accordance with methods, procedures, and sequences as described in the accepted submittals. Coordinate excavation work with installation of bracing and preloading. Use steel shims and steel wedges welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure. Install support and preload immediately after installation and prior to continuing excavation.
- F. Procedures: Use procedures that produce uniform loading of bracing members without eccentricities or overstressing and distortion of members of system.

3.7 RING BEAM AND LAGGING

- A. Applications: Ring beams and lagging may be used as an initial ground support system in a circular shaft.
- B. Fabrication and Installation: Ring beams shall be pre-rolled to an appropriate curvature to match the intended excavated diameter of the shaft, and may be composed of several component pieces, with properly designed structural connections, to facilitate easy installation. Ring beams shall be expanded against the excavation wall.
- C. Lagging: Provide timber, steel plate, or pre-cast concrete lagging of sufficient strength to withstand lateral earth pressures.
- D. Lagging Installation: Install lagging with no gap between adjacent boards or panels. As installation progresses, backfill the voids between the excavation face and the lagging with grout, sand or pea gravel packed into place. Pack voids with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of ground due to piping.

3.8 DISPOSAL OF EXCAVATED MATERIAL

A. Excavated material shall be disposed of in accordance with the requirements of the City of McKinney.

3.9 REMOVAL OF SUPPORT SYSTEM

- A. Removal: All shoring elements within five feet of the ground surface, including soldier piles, wales, struts, lagging, and shores shall be removed. Shoring system components greater than five feet below the ground surface shall be removed if practical, or if degradation or decay over time would result in damage to nearby facilities. Removal of the support system shall be performed in a manner that will not disturb or harm adjacent construction or facilities and only after backfill has been fully compacted. All voids created by the removal of the construction shoring system(s) shall be immediately filled with controlled density fill, lean concrete, or cement grout, as accepted by the Engineer. The support system removed from the excavation shall remain the property of the Contractor and shall be removed from the site.
- B. Backfill and Foundation: Furnish, place and compact backfill in the tunnel, shafts, pits, and other excavations in accordance with the Drawings. Backfill in rock excavations shall consist of CLSM per Section 03 34 13, unless otherwise specifically accepted by the Engineer.

END OF SECTION

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SECTION 32 01 20 PAVING REPAIR AND RESURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish labor, materials, equipment, and incidentals necessary to repair and resurface pavement. This section shall govern for the repair or replacement of pavement or other improved surfaces damaged or destroyed in performing the construction of water and sewer lines.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 03 00 00 Cast-in-Place Concrete

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. Texas Department of Transportation (TxDOT):
 - a. Standard Specifications for Construction of Highways, Streets, and Bridges

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Qualification Statements
 - 1. Experience record of proposed paving subcontractor
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

- 1.9 QUALITY ASSURANCE [NOT USED]
- 1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]
- 1.11 FIELD [SITE] CONDITIONS [NOT USED]
- 1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 CONCRETE PAVEMENT

- A. Performance / Design Criteria
 - 1. Concrete shall conform to the requirements specified in Section 03 00 00.
- B. Materials
 - 1. Reinforcing Steel
 - a. Shall be of the same size and spacing as in the existing concrete pavement unless otherwise indicated.
 - b. New billet steel, deformed bards, conforming to ASTM A615, Grade 60.

2.2 ASPHALT PAVEMENT

- A. Hot Mix Asphaltic Concrete
 - 1. HMAC Surface Course
 - a. Conforming to TXDOT Standard Specifications, Item 340, Type D.
 - 2. Asphaltic Materials Used in the Mix
 - a. Conforming to TXDOT Standard Specifications, Item 300.
 - b. The grade of asphalt shall be AC-20.
 - 1) Other grades of asphalt will be considered if weather conditions or mix design appear to warrant change.
 - 3. Aggregate
 - a. Conforming to TXDOT Standard Specification, Item 340.2
 - 4. Prime Coat
 - a. Conforming to TXDOT Standard Specifications, Item 300, Grade MC-30, or an appropriate asphalt emulsion.
 - 5. Tack Coat
 - a. Cut back asphalt RC-250 or MC-30 conforming to TXDOT Standard Specification, Item 300 unless otherwise approved by the Owner's Representative.
 - b. Tack coat shall be provided between HMAC layers when multiple lifts of HMAC are required
- B. Two Course Surface Treatment
 - 1. Conforming to TXDOT Standard Specifications, Item 316.
 - 2. Asphaltic materials shall conform to TXDOT Standard Specifications, Item 300, AC-10 for hot weather and AC-5 for cooler weather.
 - 3. Aggregates shall conform to TXDOT Standard Specifications, Item 302.
 - 4. First course shall be Grade 1 and second course shall be Grade 2.

2.3 FLEXIBLE BASE

- A. Of the depth and to the extent shown on the plans. Unless otherwise shown on plans, flexible base shall be one (1) or more of the following listed options:
 - 1. Flexible Base Material: Conforming to TXDOT Standard Specifications, Item 247, Type A, Grade 1 or 2.
 - 2. Full Depth Asphaltic Concrete: Conforming to TXDOT Standard Specifications, Item 340, Type A, B, or C.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Pavement
 - 1. Cut pavement in parallel straight lines a minimum of 1 foot outside trench walls on each side to permit pavement removal before trench excavation. Make cuts by sawing partial pavement depth to avoid cutting reinforcing steel.
 - 2. After concrete pavement is broken up and removed, cut off existing reinforcing steel to provide a minimum of 30 bar diameters lap with new reinforcing steel on each side and bent back to clear the trench for excavation and pipe laying.
- B. Asphalt Pavement
 - 1. Cut paved surface in parallel straight lines outside trench walls prior to trench excavation. Before pavement replacement has begun, make additional straight line cuts and remove pavement a minimum of 1 foot outside trench walls.
- C. Subgrade
 - 1. The subgrade, including granular trench backfill, shall be approved by the Construction Manager before any base or pavement surface is replaced. Moisten, reshape, and re-compact subgrade as necessary to receive the base material.

3.2 ERECTION / INSTALLATION / APPLICATION

- A. General
 - 1. Do not place materials when, in the opinion of the Owner, weather conditions are unsuitable.
- B. Concrete Pavement Replacement
 - 1. Do not place concrete when the temperature falls outside of the requirements specified in Section 03 00 00.
 - 2. Install reinforcing steel on the approved subgrade and securely tie in place. Bend down existing reinforcing into proper position and securely tie each bar to new reinforcing bars. Support and tie reinforcing to steel bar chairs or other suitable supporting devices. New reinforcement shall be of equal size and spacing to existing steel, unless otherwise indicated. Install substantial forms to proper grade at pavement edges.
 - 3. Rapidly deposit concrete on the subgrade in successive batches and distribute to the required depth and for the entire width of the pavement by shoveling or other approved methods. Do not use rakes in handling concrete. The placing operation shall be continuous. Level the concrete, as soon as placed, and then struck off and screed to such elevation above grade that when consolidated and finished the surface of the pavement shall be at the proper elevation. Tamp the entire surface and consolidate the concrete so as to insure maximum compaction and a minimum of voids.
 - 4. After final floating and while the concrete is still workable, finish the surface to provide a uniform surface of gritty texture by brooming, use of belting, burlap drags or other approved methods.
 - 5. Cure the concrete with an approved curing compound or other approved means. Concrete pavement shall not be opened to traffic until it has gained sufficient strength to withstand traffic without damage unless approved protective devices are provided. Concrete pavement at a strength of 80% of 28-day design strength may be opened to traffic.
- C. Flexible Base Replacement

- 1. Where the base course exceeds 6-inches in thickness, construct the flexible base in two (2) or more courses of equal thickness.
- 2. Wet, manipulate, and compact material to 95 percent maximum density as determined by ASTM D698.
- 3. Apply a uniform application of prime coat asphaltic material to the surface of the prepared subgrade, applied at a rate of not less than 0.30 gallon per square yard of surface.
- 4. Where plant mix asphalt material is used for base, construction shall be in accordance with TXDOT Standard Specifications, Item 351, as applicable to small areas.
- D. Asphalt Pavement Replacement
 - 1. Temperature Requirements
 - a. Do not place asphalt or asphaltic concrete when the temperature is below 50 degrees F and falling.
 - b. Asphalt or asphaltic concrete may be placed when temperature is above 40 F and rising.
 - 2. Hot Mix Asphaltic Concrete
 - a. Apply prime coat to base or tack coat base as indicated. Coat contact surfaces of pavement edges and structures with asphalt before any pavement is placed. Do not place pavement until the Owner has approved the base.
 - b. Hauling or transporting of the material to the project site, placing, compaction, and shaping shall be in accordance with TXDOT Standard Specification Item 340.6 as applicable for small areas.
 - c. After final compaction of the pavement, no vehicular traffic of any kind shall be permitted until the pavement has cooled and hardened for at least six (6) hours.
 - d. Smooth the finished surface course, upon completion of final rolling true to grade and cross section. Immediately correct low or defective areas by cutting out the faulty areas and replacing with fresh, hot mixture. Compact the area to conform to the remainder of the pavement.
 - 3. Two Course Asphalt Surface Treatment
 - a. On the approved surface of the finished base, asphalt at the rate of 0.20 to 0.30 gallons per square yard shall be applied by an approved distributor so operated to result in a uniform, proper distribution at the correct temperature.
 - b. Immediately cover the surface with No. 1 aggregate, distribute at a rate of one cubic yard per 80 square yards, broom as necessary for uniform distribution, and roll with a flat wheel roller of ample weight.
 - c. Make a second application of asphalt in the manner specified for the first application, at a rate of 0.30 to 0.40 gallon per square yard.
 - d. Make the second application with No. 2 aggregate at a rate of one cubic yard per 110 square yards and process as specified for the first application.
 - e. After the work has been completed, there should be a slight excess of aggregate on the surface
- E. Other Improved Surfaces
 - 1. Where water, storm drains, or sewer lines to be constructed traverse or cross through gravel surfaced public roads or shoulders, or private dirt or gravel driveways, or parking areas, replace the surface with any quality material, workmanship and at a thickness at least equal to the existing surfaces.

END OF SECTION

SECTION 32 31 13 CHAIN LINK FENCE AND GATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Chain link fence, gate, and accessories
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 03 00 00 Cast-in-Place Concrete

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM):
 - a. A 36, Standard Specification for Carbon Structural Steel
 - b. A 123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - c. A 392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
 - d. F 567, Standard Practice for Installation of Chain-Link Fence
 - e. F 626, Standard Specification for Fence Fittings
 - f. F 668, Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Polymer-Coated Steel Chain Link Fence Fabric
 - g. F 900, Standard Specification for Industrial and Commercial Steel Swing Gates
 - h. F 934, Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials
 - i. F 1043, Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework
 - j. F 1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
 - k. F 1183, Specification for Aluminum Alloy Chain Link Fence Fabric
 - I. F 1664, Standard Specification for Polyvinyl Chloride (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

B. Shop Drawings

- 1. Layout of fences and gates with dimensions, details, and finishes of components, accessories and post foundations.
- 2. Detail showing how proposed fence will connect to existing fence or other fence materials, if applicable

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.12 WARRANTY [NOT USED]

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 CHAIN LINK FENCE AND GATE

- A. Manufacturers
 - 1. Manufacturer List
 - a. Allied Fence, Inc.
 - b. American Fence Corp.
 - c. Anchor Fence, Inc.
 - d. Master Halco, Inc.
 - e. Viking Fence
 - f. Or approved equal
- B. Performance / Design Criteria
 - 1. Minimum of 5 years of experience manufacturing coated chain link fencing.
 - 2. Comply with CLFMI Product Manual
- C. Chain Link Fence Materials
 - 1. General
 - a. Posts, gate frames, braces, rails, stretcher bars, truss rods and tension wire shall be of steel.
 - b. Gate hinges, post caps, barbed wire supporting arms, stretcher bar bands and other parts shall be of steel, malleable iron, ductile iron or equal
 - c. Post tops, rail end, ties and clips may be of aluminum.
 - d. Use only new material
 - 2. Fabric
 - a. Steel

- 1) Height As indicated on Drawings
- 2) Wire Size No. 9 gauge
- 3) Mesh Size 2-inch
- 4) Selvage Both top and bottom selvages twisted and barbed
- 5) Furnish 1-piece fabric widths.
- 6) Finish: Match existing
- b. Aluminum
 - 1) In accordance with ASTM F 1183
 - 2) Height As indicated on Drawings
 - 3) Wire Size No. 9 gauge
 - 4) Mesh Size 2-inch
 - 5) Selvages Both top and bottom selvages knuckled
 - 6) Furnish 1-piece fabric widths.
 - 7) Finish: Match existing
- 3. Steel Framing
 - a. Steel pipe Type I
 - 1) In accordance with ASTM F 1083
 - 2) Standard weight schedule 40
 - 3) Minimum yield strength: 30,000 psi
 - 4) Sizes as indicated on Drawings
 - 5) Hot-dipped galvanized with minimum average 1.8 oz/ft² of coated surface area.
 - Provide polymer coating over hot dipped galvanized pipe per ASTM F 934.
 - b. Steel pipe Type II
 - 1) In accordance with ASTM F 1043, Group IC
 - 2) Minimum yield strength: 50,000 psi
 - 3) Sizes as indicated on Drawings
 - 4) Protective coating per ASTM F 1043
 - a) External coating Type B
 - (1) Zinc with organic overcoat
 - (2) 0.9 oz/ft² minimum zinc coating with chromate conversion coating and verifiable polymer film
 - b) Internal coating Type B
 - (1) Minimum 0.9 oz/ft² zinc or Type D, zinc pigmented, 81 percent nominal coating, minimum 3 mils
 - c) Provide polymer coating over metallic coating per ASTM F 934.
- 4. Accessories
 - a. General
 - 1) In accordance with ASTM F 626
 - 2) Provide items required to complete fence system.
 - 3) Galvanize each ferrous metal item and finish to match framing.
 - b. Post caps
 - 1) Formed steel or cast malleable iron weather tight closure cap for tubular posts.
 - 2) Provide 1 cap for each post.
 - 3) Cap to have provision for barbed wire when necessary.
 - 4) Where top rail is used, provide tops to permit passage of top rail.
 - 5) Caps shall be watertight.
 - c. Top rail and rail ends
 - 1) 1 5/8 inch diameter galvanized round pipe for horizontal railing
 - 2) Pressed steel per ASTM F626
 - 3) For connection of rail and brace to terminal posts
 - d. Top rail sleeves

- 1) 7-inch expansion sleeve with a minimum 0.137 inch wire diameter and 1.80 inch length spring, allowing for expansion and contraction of top rail
- e. Tie Wires, Clips, and Fasteners
 - 1) According to ASTM F 626
 - 2) 9 gauge galvanized steel wire for attachment of fabric to line posts
 - 3) Double wrap 13 gauge for rails and braces.
 - 4) Hog ring ties of 12-1/2 gauge for attachment
- f. Brace and tension (stretcher bar) bands
 - 1) Pressed steel
 - 2) Minimum 300 degree profile curvature for secure fence post attachment
 - 3) At square post provide tension bar clips.
- g. Tension (stretcher) bars:
 - 1) 1 piece lengths equal to 2 inches less than full height of fabric
 - 2) Minimum cross-section of 3/16 inch x 3/4 inch
 - 3) Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- h. Tension wire
 - 1) Polymer-coated steel wire complying with ASTM F 1664
 - 2) Color Galvanized
 - 3) Wire Size 9 gauge
 - 4) Tensile strength: 75,000 psi
- i. Truss rods & tightener
 - 1) Steel rods with minimum diameter of 5/16 inch
 - 2) Capable of withstanding a tension of minimum 2,000 pounds
- j. Nuts and bolts are galvanized.
- D. Swing Gate Materials
 - 1. General: Comply with ASTM F 900 for gate posts and double swing gate types.
 - a. Gate Leaf Width: As indicated in Drawings.
 - b. Gate Fabric Height: As indicated in Drawings.
 - 2. Pipe and Tubing
 - a. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing
 - b. Gate Posts: Round tubular steel
 - c. Gate Frames and Bracing: Round tubular steel
 - 3. Frame Corner Construction: Welded
 - 4. Hardware:
 - a. Hinges: 360-degree inward and outward swing.
 - 5. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
 - 6. Padlock and Chain: Owner furnished.
 - 7. Cane Bolts Provide 7/8-inch diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates. Provide cast-in-place receivers in concrete footing to receive cane bolts in closed position.
- E. Setting Materials
 - 1. Concrete
 - a. Minimum 28 day compressive strength of 3,000 psi in accordance with Section 03 00 00.
 - b. Bagged concrete allowed.
 - 2. Drive Anchors
 - a. Galvanized angles
 - b. ASTM A 36 steel
 - c. 1 inch x 1 inch x 30 inch galvanized shoe clamps to secure angles to posts.

PART 3 - EXECUTION

3.1 CHAIN LINK FENCE INSTALLATION

- A. Requirements
 - 1. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
- B. Examination
 - 1. Verify areas to receive fencing are completed to final grades and elevations.
 - 2. Ensure property lines and legal boundaries of work are clearly established
- C. Frame Installation
 - 1. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
 - 2. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.
 - 3. Space line posts uniformly at 10 feet on center or closer if required to match existing spacing.
 - 4. Set all posts in concrete
 - a. Drill holes in firm, undisturbed or compacted soil. Post shall be set a minimum of 3 feet deep.
 - b. Drill hole diameter in accordance with Drawings.
 - c. Set post bottom 3 inches above bottom of excavation.
 - d. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - e. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.
 - f. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to a crown to shed water.
 - 5. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
 - 6. Bracing
 - a. Install horizontal pipe brace at mid-height for fences 6 feet and taller, on each side of terminal posts.
 - b. Firmly attach with fittings.
 - c. Install diagonal truss rods at these points.
 - d. Adjust truss rod, ensuring posts remain plumb.
 - 7. Tension wire
 - a. Provide tension wire at bottom of fabric and at top, if top rail is not specified.
 - b. Install tension wire before stretching fabric and attach to each post with ties.
 - c. Secure tension wire to fabric with 12-1/2 gauge hog rings 24 inches on center.
 - 8. Top rail
 - a. Run rail continuously through post caps, bending to radius for curved runs.
 - b. Connect joints with sleeves for rigid connections for expansion/contraction.
 - 9. Center Rails for fabric height 12 feet and taller.
 - a. Install mid rails between posts with fittings and accessories.
 - 10. Bottom Rails: Install bottom rails between posts with fittings and accessories if required in the Drawings.
- D. Fabric Installation
 - 1. Fabric
 - a. Install fabric on security side and attach so that fabric remains in tension after pulling force is released.

- b. Leave approximately 2 inches between finish grade and bottom selvage.
- c. Attach fabric with wire ties to line posts at 15 inches on center and to rails, braces, and tension wire at 24 inches on center.
- 2. Tension (stretcher) bars
 - a. Pull fabric taut.
 - b. Thread tension bar through fabric at 4 inches on center. Attach to terminal posts with bands or clips spaced maximum of 15 inches on center.
- 3. Accessories
 - Tie wires: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons and clothing.
 - 1) Tie fabric to line posts, with wire ties spaced 12 inches on center. Tie fabric to rails and braces, with wire ties spaced 24 inches on center. Tie fabric to tension wires, with hog rings spaced 24 inches on center.
 - b. Fasteners: Install nuts on side of fence opposite fabric side for added security.
 - c. Slats: Install slats in accordance with manufacturer's instructions.
- E. Mow Strip Installation
 - 1. A mow strip shall be required if shown in plans or if existing.
 - a. Mow strip width shall be as shown in plans or match existing
 - b. Install with minimum one-inch above finished ground surface.
 - c. Minimum compressive strength of concrete for mow strip is 3000 psi at 28 days.
 - d. Provide #3 bars @ 18" O.C. or welded steel tube wire fabric 6 x 6-W4 x W4.

3.2 GATE INSTALLATION

- A. General
 - 1. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- B. Adjusting
 - 1. Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION

SECTION 32 31 14 DECORATIVE METAL FENCE AND GATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Wrought iron fence, gate, and accessories
 - 2. Aluminum tube fence, gate, and accessories
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 03 00 00 Cast-in-Place Concrete

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM):
 - a. A 29, Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
 - b. A 36, Standard Specification for Carbon Structural Steel
 - c. A 500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - d. A 653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - e. A 1011, 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
 - f. B 26, Standard Specification for Aluminum-Alloy Sand Castings
 - g. B 209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - h. B 221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - i. B 247, Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings
 - j. B 429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
 - k. C 1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - 3. American Architectural Manufacturers Association (AAMA)
 - 4. Steel Structures Painting Council (SSPC)
 - 5. Master Painters Institute (MPI)
 - 6. American Welding Society (AWS)
 - a. D1.1/D1.1M, Structural Welding Code Steel.
 - b. D1.2/D1.2M, Structural Welding Code Aluminum.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fences and gates.
- B. Shop Drawings
 - 1. Layout of fences and gates with dimensions, details, and finishes of components, accessories and post foundations.
 - 2. Detail showing how proposed fence will connect to existing fence or other fence materials, if applicable
- C. Certificates
 - 1. Welding certificates

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Provide wrought iron fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.
- B. Welding qualifications:
 - 1. Qualify procedures and personnel according to AWS D1.1/D1.1M, Structural Welding Code Steel or AWS D1.2/D1.2M, Structural Welding Code Aluminum.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS

A. Field Measurements: Verify layout information for fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 DECORATIVE ALUMINUM FENCE AND GATE

- A. Manufacturers
 - 1. Manufacturer List

- a. Ameristar Perimeter Security USA, Inc.
- b. Master Halco
- c. Ultra Fence
- d. Or approved equal
- B. Materials
 - 1. General: Provide alloys and tempers with not less than the strength and durability properties of alloy and temper designated in paragraphs below for each aluminum form required.
 - 2. Extrusions: ASTM B 221, Alloy 6063-T5.
 - 3. Tubing: ASTM B 429, Alloy 6063-T6.
 - 4. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
 - 5. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
 - 6. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
- C. Dimensions and Components
 - 1. As specified in the Drawings.
 - 2. When Contractor is directed to match existing style and type of fence, Contractor shall be responsible for field verifying dimensions of existing fence.
- D. Fasteners
 - 1. Manufacturer's standard tamperproof, corrosion-resistant, color-coated fasteners matching fence components.
- E. Fabrication:
 - 1. For wrought iron fence with vertical pickets, assemble fences into sections by welding pickets to rails.
 - a. Fabricate sections with clips welded to rails for fastening to posts in field.
 - b. Drill clips for fasteners before finishing.
 - c. Finish exposed welds to comply with NOMMA Guideline 1
 - 2. For wrought iron fence with horizontal rails, assemble rails to posts using Hollaender joints.
- F. Gate
 - 1. Configuration Double leaf
 - 2. Size As specified in Drawings
 - 3. Hardware
 - a. Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide.
 - b. Provide center gate stops and cane bolts for pairs of gates.
 - c. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
 - d. Hinges: 360-degree inward and outward swing.
 - e. Padlock: Owner furnished.
 - f. Chain: 3/16" Diameter minimum, stainless steel
 - 4. Cane Bolts Provide 7/8-inch diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates.
 - a. Where gate is located across pavement, provide cast-in-place receivers in concrete footing to receive cane bolts in closed position.
- G. Finishes
 - 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

a. Color: Black

2.2 DECORATIVE WROUGHT IRON FENCE AND GATE

- A. Manufacturers
 - 1. Manufacturer List
 - a. Ameristar Perimeter Security USA, Inc.
 - b. Master Halco
 - c. Ultra Fence
 - d. Or approved equal
- B. Materials
 - 1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
 - 3. Tubing: ASTM A 500, cold formed steel tubing.
 - 4. Bar Grating: NAAMM MBG 531.
 - a. Bars: Hot-rolled steel strip, ASTM A 1011/A 1011M, Commercial Steel, Type B.
 - b. Wire Rods: ASTM A 510.
 - Uncoated Steel Sheet: Hot-rolled steel sheet, ASTM A 1011/A 1011M, Structural Steel, Grade 45 or cold-rolled steel sheet, ASTM A 1008/A 1008M, Structural Steel, Grade 50.
 - 6. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G90 coating.
 - 7. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, Grade 50, with AZ60 coating.
- C. Dimensions and Components
 - 1. As specified in Drawings
- D. Fasteners
 - 1. Stainless-steel carriage bolts and tamperproof nuts.
- E. Fabrication
 - 1. Assemble fences into sections by welding pickets to rails.
 - a. Fabricate sections with clips welded to rails for fastening to posts in field.
 - b. Drill posts and clips for fasteners before finishing to maximum extent possible.
 - 2. Finish exposed welds to comply with NOMMA Guideline 1,
- F. Gate
 - 1. Configuration Double leaf
 - 2. Size As specified in Drawings
 - 3. Hardware
 - a. Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide.
 - b. Provide center gate stops and cane bolts for pairs of gates.
 - c. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
 - d. Hinges: 360-degree inward and outward swing.
 - e. Padlock and Chain: Owner furnished.
 - 4. Cane Bolts Provide 7/8-inch diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates. Provide cast-in-place receivers in concrete footing to receive cane bolts in closed position.

- G. Finishes
 - 1. Surface Preparation: Clean surfaces according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning
 - a. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
 - Powder Coating: Immediately after cleaning, apply 2-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than 8 mils. Comply with coating manufacturer's written instructions.
 a. Color: Match existing fence color
 - 3. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that will be exposed after assembly and installation, and to concealed surfaces.
 - a. Primer shall be in accordance with MPI #20 or MPI #101
 - 4. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - a. Color: Match existing fence color.
 - b. Intermediate coating shall comply with MPI #77. Top coat shall comply with MPI #72.

2.3 MISCELLANEOUS MATERIALS

- A. Concrete
 - 1. Minimum 28 day compressive strength of 3,000 psi in accordance with Section 03 00 00.
 - 2. Bagged concrete allowed.
- B. Nonshrink Grout
 - 1. Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.
- C. Welding Rods and Bare Electrodes
 - 1. Select according to AWS specifications for metal alloy welded.
 - 2. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for strength and compatibility in fabricated items.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
- B. Do not begin installation before final grading is completed unless otherwise permitted by Engineer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
 - 1. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.
 - 2. Space line posts uniformly at 8 feet on center or closer if required to match existing spacing.

3.3 FENCE INSTALLATION

- A. Install fences according to manufacturer's written instructions.
- B. Set all posts in concrete
 - 1. Drill holes in firm, undisturbed or compacted soil. Post shall be set a minimum of 3 feet deep.
 - 2. Drill hole diameter in accordance with Drawings.
 - 3. Set post bottom 3 inches above bottom of excavation.
 - 4. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - 5. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.
 - 6. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to a crown to shed water.
 - 7. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

C. Mow Strip Installation

- 1. A mow strip shall be required if shown in plans or if existing.
 - a. Mow strip width shall be as shown in plans or match existing
 - b. Install with minimum one-inch above finished ground surface.
 - c. Minimum compressive strength of concrete for mow strip is 3000 psi at 28 days.
 - d. Provide #3 bars @ 18" O.C. or welded steel tube wire fabric 6 x 6-W4 x W4.

3.4 GATE INSTALLATION

- A. General
 - 1. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- B. Adjusting
 - 1. Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION

SECTION 32 92 19 SEEDING & SODDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. The Work includes furnishing all labor, materials, equipment and incidentals necessary to install and/or replace site grasses including:
 - a. Fine grading
 - b. Soil preparation
 - c. Seeding
 - d. Erosion control blanket
 - e. Sodding
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - a. American Standard for Nursery Stock published by American Association of Nurserymen; October 27, 1980, Edition.
 - b. American Joint Committee on Horticultural Nomenclature; 1942 Edition of Standardized Plant Names.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Erosion control blanket
 - 2. Sample label or specification of the fertilizer proposed to be used in each application
- B. Certificates
 - 1. Receipts for all fertilizer, grass seed, and erosion control blanket.
- C. Manufacturers' Instructions
 - 1. Installation of erosion control blanket
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

- 1.9 QUALITY ASSURANCE [NOT USED]
- 1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY

- A. Special Warranty
 - 1. Provide a uniform stand of grass by watering, mowing, and maintaining lawn areas until final acceptance. Re-seed or re-sod areas which fail to provide a uniform stand of grass with specified materials until all affected areas are accepted by the Engineer.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Seed
 - 1. Fertilizer shall be a commercial product, uniform in composition, free flowing, and suitable for application with approved equipment.
 - 2. Fertilizer shall be 10-20-10 or approved equal.
- B. Sod
 - Fertilizer shall be a commercial product, uniform in composition, free flowing, and suitable for application with approved equipment, Fertilizer shall be delivered to the site in fully labeled original containers. Fertilizer which has been exposed to high humidity and moisture has become caked or otherwise damaged making it unsuitable for use will not be acceptable.
 - Initial Planting Application: Fertilizer for the initial planting application shall be of an organic base containing by weight the following (or other approved) percentages of nutrients: 15-15-15 (N-P-K), also containing 10-15% sulphate and traces of iron and zinc as required and approved by the Owner.
 - Post Planting Application: Fertilizer for the post planting application will be a chemical base fertilizer containing by weight the following percentages of nutrients: 21-0-0 (N-P-K) ammonium sulphate or the nitrogen equivalent of 33-0-0 ammonium nitrate.

2.2 SEEDING

- A. Lawn Seed
 - 1. Provide fresh, clean, new crop hulled seed tested to minimum percentages of purity and germination as established by Official Seed Analysts of North America.
 - 2. Provide seed of grass species, proportions and maximum percentages of purity, germination and be free of: Poa Annua, bent grass, and noxious weed seed.
- B. Types
 - 1. Within wetlands and/or floodplain Riparian Recovery Mix by Native American Seed or approved equal.
 - a. Apply at a rate of nine (9) pounds per acre
 - 2. All other seed locations Midway Mix by Native American Seed or approved equal
 - a. 98% purity, 90% germination.
 - b. Mix contains Blue Gramma, Buffalograss, Cane Bluestem, Curly Mesquite, Green Spangletop, and multiple other varieties.
 - c. Apply at a rate of ten (10) pounds per acre.

2.3 EROSION CONTROL BLANKET

A. Erosion Control Blanket shall be AMXCO Curlex Blanket as manufactured by American Excelsior Company, Arlington, TX or approved equal.

2.4 SOD

- A. Type shall match existing grass and shall consist of stolons, leaf blades, rhizomes, and roots with healthy, virile system of dense, thickly matted roots throughout the soil of the sod for a thickness not less than three-quarters (3/4") inch..
- B. Shall be alive, healthy vigorous, free of insects, disease, stones, and undesirable foreign materials and grasses.
- C. The grass shall have been mowed prior to sod cutting so that the height of the grass shall not exceed two (2") inches. Sod shall have been produced on growing beds of clay or clay-loam topsoil. If sod is stacked, it shall be kept moist and shall be stacked roots-to-roots and grass-to-grass
- D. Dimensions: All sod shall have been machine cut to uniform soil thickness of one (1") inch plus or minus one-quarter (1/4") inch. All sod shall be of the same thickness. Rectangular sections of sod may vary in length, but all shall be of equal width and of a size that permits the sod to be lifted, handled, and rolled without breaking. Broken pads and torn, uneven ends will be unacceptable.

2.5 WATER

- A. Clean and free of industrial wastes or other substances harmful to the germination of the seed or to the growth of the vegetation
- B. Furnish water as an ancillary cost to Contractor by means of temporary metering/irrigation, water truck, or by any other method necessary to achieve an acceptable stand of turf as defined in Paragraph 3.2.
- C. To use fire hydrant, a meter must be obtained from the municipalities Utility Billing Division and a deposit must be paid.
- D. Generally, an amount of water that is equal to the average amount of rainfall plus one half inch per week should be applied until accepted. The Contractor must also comply with the municipalities current Water Conservation Ordinance.
 - 1. Seeding and sodding shall not take place during Stage 3 or Stage 4 water restrictions.

2.6 TOPSOIL

- A. Furnish from stockpiled on-site material. If an insufficient quantity exists, furnish from offsite sources in quantities sufficient to complete the requirements specified. No additional payment will be made if topsoil is required to be imported from offsite.
- B. Natural, friable, fertile soil, characteristic of productive soil on-site, reasonably free of stones, clay lumps, roots and other foreign matter.
- C. Proposed topsoil material shall be subject to approval by the Engineer.

PART 3 - EXECUTION

3.1 SEEDING/SODDING LAWNS OR DISTURBED AREAS

- A. Limits
 - 1. Seeding

- a. Riparian Recovery Mix Within floodplain and wetland limits and as directed by the District Inspector
- b. Midway Mix All other areas disturbed by construction operations unless otherwise specified in the Drawings
- 2. Sod
 - a. As directed by the District Inspector.
- B. Responsibility
 - 1. The Contractor shall utilize all such measures as may be necessary, including, but not limited to, protective fencing, sod, or erosion control netting to produce a finished continuous blanket of turf over all areas designated to receive turf.
- C. Fertilizer
 - 1. No fertilizer shall be applied prior to seeding.
- D. Seeding Operations
 - 1. Dry Seeding
 - a. Seed immediately after preparation of bed. Acceptable seeding times are as specified by the manufacturer.
 - b. Seed indicated areas, within contract limits and areas adjoining contract limits, disturbed as a result of construction operations.
 - c. Perform seeding operations when the soil is dry and when winds do not exceed five (5) miles per hour velocity.
 - d. Apply seed evenly by sowing equal quantities in two directions, at right angles to each other.
 - e. Sow grass seed at specified rate.
 - f. After seeding, lightly rake or drag surface of soil to incorporate seed into top 1/8" of soil. Roll with light lawn roller.
 - g. Thoroughly water seed immediately after planted.
 - h. Water until established.
- E. Sodding Operations
 - 1. Sod shall not be harvested or planted when its moisture condition is so excessively wet or dry that its survival will be affected.
 - 2. All sod is to be harvested, delivered, and planted within a thirty-six (36) hour period of time.
 - 3. Sod shall be protected from exposure to wind, sun, and freezing.
- F. Erosion Control Blanket
 - 1. Application
 - a. Apply erosion control blanket on seeded areas immediately after seeding.
 - b. Place erosion control blanket uniformly, as per industry standards.

3.2 LAWN AND MAINTANENCE

- A. Maintain seeded/sodded lawn areas, including watering, spot weeding, mowing, applications of herbicides, fungicides, insecticides and reseeding until completion and final acceptance of the Project or as directed by the Owner.
- B. Water regularly to maintain adequate surface soil moisture for proper seed germination. Water soil to a minimum depth of 4 inches within 48 hours of seeding.
- C. Water as directed by the Engineer at least twice daily for 14 days after seeding/sodding in such a manner as to prevent washing of the slopes or dislodgement of the seed. The Contractor must also comply with the local municipalities current Water Conservation Ordinance.

- D. Repair, re-seed/re-sod, and re-blanket all areas that are washed out, eroded, or do not catch.
- E. Fertilize with organic fertilizer after germination, but prior to first mowing and acceptance.

3.3 FINAL ACCEPTANCE

- A. Inspection to determine final acceptance of seeded lawns will be made by the Engineer upon Contractor's request. Provide notification at least ten (10) working days before requested inspection date.
 - 1. Seeded/sodded areas will be acceptable provided all requirements, including maintenance, have been completed and a healthy, uniform, close stand of the specified grass is established, free of weeds, undesirable grass species, disease and insects.
 - 2. In areas requested to be inspected, no individual lawn areas shall have bare spots or unacceptable cover totaling more than ten (10) square feet, with 85% total coverage over the entire project.
- B. Upon final acceptance of the re-vegetation, the Owner will assume lawn maintenance.

END OF SECTION

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33 01 31 CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION

1.00 GENERAL

- 1.01 SUMMARY
 - A. Section Includes:
 - 1. Requirements and procedures for Closed Circuit Television (CCTV) Inspection of water mains
 - B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 33 11 10 Ductile Iron Pipe
 - 4. Section 33 11 13 Concrete Pressure Pipe, Bar-Wrapped, Steel Cylinder Type
 - 5. Section 33 11 14 Buried Steel Pipe and Fittings

1.02 PRICE AND PAYMENT PROCEDURES

- A. Pre-CCTV Inspection
 - 1. Measurement
 - a. Measurement for this Item will be by the linear foot of line televised for CCTV Inspection performed prior to any line modification or replacement determined from the distance recorded on the video tape log.
 - 2. Payment
 - a. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per linear foot for "Pre-CCTV Inspection".
 - 1) Contractor will not be paid for unaccepted video.
 - 3. The price bid shall include:
 - a. Mobilization
 - b. Cleaning
 - c. Digital file
- B. Post-CCTV Inspection
 - 1. Measurement
 - a. Measurement for this Item will be by the linear foot of line televised for CCTV Inspection performed following repair or installation determined from the distance recorded on the video tape log.
 - 2. Payment
 - a. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per linear foot for "Post-CCTV Inspection".
 - 1) Contractor will not be paid for unaccepted video.
 - 3. The price bid shall include:
 - a. Mobilization
 - b. Cleaning
 - c. Digital file
- 1.03 REFERENCES
 - A. Reference Standards

1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Meet with Owner to confirm that the equipment, software, standard templates, defect codes and defect rankings are being used, if required.
- 1.05 SUBMITTALS
 - A. Submittals shall be in accordance with Section 01 33 00.
 - B. All submittals shall be approved by the Engineer or the City prior to delivery.

1.06 INFORMATIONAL SUBMITTALS

- A. Pre-CCTV submittals if required
 - 1. Project schedule
 - 2. Listing of CCTV equipment
 - 3. Listing of backup and standby equipment
 - 4. Listing of safety precautions and traffic control measures
- 1.07 CLOSEOUT SUBMITTALS
 - A. Post-CCTV submittals
 - 1. 2 copies of CCTV video results on DVD
 - 2. 2 hard copies of Inspection Report
- 1.08 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]
- 1.09 QUALITY ASSURANCE [NOT USED]
- 1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]
- 1.11 FIELD [SITE] CONDITIONS [NOT USED]
- 1.12 WARRANTY [NOT USED]

2.00 PRODUCTS [NOT USED]

3.00 EXECUTION

3.01 PREPARATION

- A. CCTV Equipment
 - 1. Use equipment specifically designed and constructed for such inspection.
 - 2. Use equipment designed to operate in 100 percent humidity conditions.
 - 3. Use equipment with a pan (±270 degrees), tilt, and rotates (360 degrees).
 - 4. Use camera with an accurate footage counter that displays on the monitor the distance of the camera (to the nearest 1/10 foot) from the centerline of the starting manhole.
 - 5. Use camera with height adjustment so camera lens is always centered at 1/2 the inside diameter, or higher, in the televised pipe.

- 6. Provide sufficient lighting to illuminate the entire periphery of the pipe.
- 7. Provide color video.

3.02 INSPECTION (CCTV)

- A. General
 - 1. Begin inspection immediately after backfilling of the main.
 - 2. Move camera through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the main's condition.
 - 3. Do not move camera at a speed greater than 30 feet per minute.
 - 4. Use manual winches, power winches, TV cable, and power rewinds that do not obstruct the camera view, allowing for proper evaluation.
 - 5. During investigation stop camera at each defect along the main.
 - a. Record the nature, location and orientation of the defect or infiltration location as specified in the CCTV Manual.
 - 6. Pan and tilt the camera to provide additional detail at:
 - a. Joints
 - b. Visible pipe defects such as cracks, broken or deformed pipe, holes, offset joints, obstructions or debris
 - c. Pipe material transitions
 - d. Other locations that do not appear to be typical for normal pipe conditions
 - Provide accurate distance measurement.
 a. The meter device is to be accurate to the nearest 1/10 foot.
 - CCTV inspections are to be continuous.
 a. Do not provide a single segment of main on more than 1 DVD.
- B. Post-Installation Inspection
 - 1. Complete access point installation before inspection begins.
- C. Documentation of CCTV Inspection
 - 1. Follow the CCTV Manual for the inspection video, data logging and reporting.

END OF SECTION

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SECTION 33 04 10 JOINT BONDING AND ELECTRICAL ISOLATION

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Joint bonding requirements for electrical continuity along bar-wrapped Concrete Cylinder Pipe (CCP) and Dielectrically Coated Steel Pipe (DCSP) options.
- B. Electrical isolation devices for installation at connections to existing piping, laterals, cased crossings and at tunnels for both pipe material options.

1.2 RELATED SECTIONS

- A. Section 33 04 11 Corrosion Control Test Stations.
- B. Section 33 04 12 Specification for Zinc Ribbon Anode Cathodic Protection systems.

1.3 REFERENCES

- A. ASTM D 1248 Polyethylene Plastics Molding and Extrusion Material.
- B. AWWA C207 Steel Pipe Flange for Waterworks Service.
- C. AWWA M9 Manual Concrete Pressure Pipe.
- D. ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings.
- E. ANSI B16.5 Pipe Flange and Flanged Fittings.

1.4 SUBMITTALS

- A. Submittals: Submittals shall conform to the requirements of the North Texas Municipal Water District Wylie–Rockwall–Farmersville 36/48 Inch Pipeline Improvements Phase 2 Project.
- B. Catalogue Cuts: Manufacturer's catalog cuts shall be submitted for each item. The catalog cuts shall include the manufacturer's name and shall provide sufficient information to show that the materials meet the requirements of the drawings and specifications. Where more than one item or catalog number appears on a catalog cut, clearly identify the item proposed.
- C. Test Results: Electrical continuity and flange isolation test results shall be submitted to the owner or its designated representative.

1.5 QUALITY CONTROL

- A. Provide manufacturer's certification that all electrical continuity bonding meets the requirements of the drawings and specifications. Reference all certifications to applicable section of specifications and applicable standard details.
- B. Provide manufacturer's certification that all isolation devices meet the published material specifications.
- C. All materials, fabrication, and installations are subject to inspection and testing by the owner or its designated representative.

PART 2- PRODUCTS

2.1 DESCRIPTION OF MATERIALS

- A. Joint bonding and electrical isolation materials to be incorporated into the project include, but are not limited to, the following:
 - 1. Electrical continuity bonds.
 - 2. Flange isolation assemblies.
 - 3. Casing spacers.
 - 4. Casing end seals.

2.2 ELECTRICAL CONTINUITY BONDS

- A. Applications: Applications for electrical continuity bonding include the following:
 - 1 Bonding across bolted joint assemblies.
 - 2. Bonding across gasketed joint assemblies.
- B. Preparation of Concrete Pipe for Bonding:
 - 1. General:
 - a) Fabrication: Use concrete pipe for this project that has been fabricated in such a manner as to establish electrical continuity between metallic components of pipe and joints.
 - b) Acceptable Methods: Establish electrical continuity as indicated in drawings and specifications.

- 2. Criteria for Electric Continuity:
 - a) Tensile Wire: Pipe manufacturer to obtain a resistance no greater than 0.03 ohms between any wire and steel joint ring at end of pipe farthest from that wire. Manufacturer to report values obtained and method of measurement.
 - b) Internal Pipe Joint Components: Pipe manufacturer to obtain resistance of less than 0.03 ohms between any component and steel pipe cylinder.
- 3. Tensile Wire Continuity:
 - a) Establish continuity between tensile wire coils and steel cylinder on embedded cylinder type prestressed pipe by tightly wrapping tensile wire over longitudinal mild steel straps during pipe manufacture.
 - 1) Use and install two continuous straps 180 degrees apart longitudinally along the pipe. These straps must maintain electrical continuity between metallic components.
 - 2) Use steel straps made of mild steel and free of grease, mill scale, or other high resistance deposits.
 - Make longitudinal straps electrically continuous with pipe cylinder by steel fasteners of suitable dimensions placed between steel cylinder and longitudinal straps. Connect fasteners so as to remain intact during pipe fabrication process.
- 4. Steel Cylinder Continuity:
 - a) Establish continuity of all joint components and steel cylinder. These components include the following:
 - 1) Anchor socket brackets.
 - 2) Anchor socket.
 - 3) Spigot ring.
 - 4) Bell ring.
 - b) If mechanical contact does not provide a resistance of less than 0.03 ohms between components, tack weld component to provide electrical continuity.
- C. Preparation of Steel Pipe for Bonding: The installation of bonding wires across mechanical joints are required for welded steel pipe as shown on the project drawings.

- D. Electrical Bond Wires: Electrical bond wires are to be a minimum No. 2 AWG, seven strand copper cable with THHN insulation. Remove one inch of THHN insulation from each end of the bond wire. Exothermic weld the bond wires to the pipeline. Provide the minimum number of bond wires as shown on drawings for the non-welded joints on the DCSP option.
- E. Electrical Bond Clip for Concrete Pipe: Weld two (2) ASTM 366 steel bonding clips, each approximately 0.13 inches thick, 2.5 inches long, and 1.25 inches wide, with 1/8-inch fillet welds to the bell and spigot of adjacent concrete cylinder pipe. Manufacture clips to maintain continuity regardless of small deflections of finished joints.

2.3 FLANGE ISOLATION

- A. Applications: Required applications of dielectric flange isolation assemblies include but are not limited to the following:
 - 1. At selected locations where new piping is mechanically connected to existing piping.
 - 2. At selected below-grade to aboveground piping transitions.
 - 3. At locations shown on the drawings.
- B. For bar-wrapped Concrete Cylinder Pipe (CCP), provide electrical isolation through the installation of the following materials:
 - 1. Flange connection to Lock Joint bell adapter.
 - 2. Flange connection to Lock Joint spigot adapter
 - 3. Insulating Gasket:
 - a) For all piping, provide Pyrox G-10 with nitrile seal, Type "E" LineBacker gasket as manufactured by GPT Industries, Inc., or approved equal.
 - b) Phenolic gaskets will not be allowed.
 - 4. Sleeves and Washers:
 - a) For all piping provide full length mylar sleeves with Pyrox G-10 washers, double washer sets as manufactured by GPT Industries, Inc., or approved equal.
- C. For the Dielectrically Coated Steel Pipe (DCSP) option, provide electrical isolation through installation of the following materials:
 - 1. Insulating Gasket:
 - a) For all piping, provide Pyrox G-10 with nitrile seal, Type "E" LineBacker gasket as manufactured by GPT Industries, Inc., or approved equal.
 - b) Phenolic gaskets will not be allowed.
 - 2. Sleeves and Washers:
 - a) For all piping provide full length mylar sleeves with Pyrox G-10 washers, double washer sets as manufactured by GPT, Inc., or approved equal.
- D. Coatings for buried isolation flanges shall be Densyl Tape system manufactured by Denso, consisting of Densyl Mastic, Densyl Paste, and Densyl Tape, or approved equal.

JOINT BONDING AND ELECTRICAL ISOLATION 33 04 10-4 NTMWD #490 – Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 2

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL CONTINUITY BONDS

- A. Inspection: Use continuous bond wires with no cuts or tears in the insulation covering the conductor.
- B. General: Attach bond wires or bond straps at required locations by thermite welding process.
- C. Thermite Welding Methods: Perform thermite welding of bond wires and bond straps to piping in the following manner:
 - 1. Clean and dry pipe to which wires or straps are to be attached.
 - 2. Use grinding wheel to remove all coating, mill scale, oxide, grease, and dirt from an area approximately 3 inches square. Grind surface to bright metal.
 - 3. Remove approximately 1 inch of insulation from each end of wire to be thermite welded to pipe, exposing clean, oxide-free copper for welding.
 - 4. Select proper size thermite weld mold as recommended by manufacturer. Place wire or strap between graphite mold and the prepared metal surface.
 - 5. Place metal disk in bottom of mold.
 - 6. Pour thermite weld charge into the mold. Squeeze bottom of cartridge to spread ignition powder over charge.
 - 7. Close mold cover and ignite starting powder with flint gun.
 - 8. After exothermic reaction, remove thermite weld mold and gently strike weld with a hammer to remove weld slag. Pull on wire or strap to assure a secure connection. If weld is not secure or the bond breaks, repeat procedure with new wire or strap.
 - 9. If weld is secure, coat all bare metal and weld metal with Kop-Coat. Cover coated weld with a plastic weld cap.
- D. Post-Installation Inspection: Post-installation inspection of all electrical continuity bonds shall be made through a visual examination of each thermite weld connection for strength and suitable coating prior to backfilling. In addition, perform one or more of the following tests:
 - 1. Circulate current through pipe using DC power supply. Calculate resistance through known length of pipe. Resistance must not exceed 150% of theoretical resistance for pipe and bonds.
 - 2. Measure resistance through select bonded joints with a digital low resistance ohmmeter (DLRO). Resistance of 0.001 ohms or less is acceptable.

- 3. Position a copper sulfate reference electrode (CSE) at a stationary location adjacent to bonded pipeline. Impress a temporary current on pipe. Record static, current-applied and instant "off" pipe-to-soil potential readings along the pipe relative to the stationary CSE.
 - a. Static potential measurements referenced to stationary CSE must be nearly identical along the pipe to indicate electrical continuity.
 - b. Instant "off" potentials referenced to stationary CSE must be nearly identical along pipe to indicate electrical continuity.
 - c. The difference between the instant "off" and the static potential referenced to stationary CSE must be equal at each point of contact to pipe to indicate electrical continuity.
- 4. If any of the above procedures indicates a poor quality bond connection, reinstall the bond.
- 5. Record results and submit to the owner or its designated representative for approval prior to backfilling.
- E. Backfilling of Bonded Joints:
 - 1. Perform backfilling of bonded piping in manner that prevents damage to the bonds and all connections to the metallic structures.
 - a. Use appropriate backfill material to completely cover the electrical bond.
 - b. Provide protection so that future construction activities in the area will not destroy the bonded connections.
 - 2. If construction activity damages a bonded connection, install new bond wire.

3.2 INSTALLATION OF FLANGE ISOLATION DEVICES

- A. Placement: Install isolation joints at all locations where pipe option is tied into other existing metallic piping.
- B. Assembly: Place gasket, sleeves, and washers as recommended by the manufacturer. Follow manufacturer's recommendations for even tightening to proper torque.
- C. Testing: Immediately after an insulating fitting has been installed, test electrical isolation with a Gas Electronics model 601 meter, or approved equal. Fully document test results.
- D. Painting: Do not use metal base paints on insulating fittings.
- E. Encapsulation: Encapsulate below-grade isolation joints with the Denso Densyl tape system, or approved equal, after the isolation joint has been tested for effectiveness.

3.3 TESTING OF ELECTRICALLY ISOLATED PIPELINE JOINTS

- A. General: After the completion of the installation of the flange electrical isolation kits at designated joints, but before the pipe is backfilled, each isolation joint shall be tested for electrical continuity.
- B. A DC current shall be impressed on the pipe on one side of the joint under test using a portable 12-volt battery and a driven ground rod. The battery shall be connected such that the positive terminal is connected to the ground rod and the negative terminal is connected to the pipe section under test. The magnitude of test current is not important as long as it causes a change in pipe-to-soil potential on the section of pipe that is in the test current circuit.
- C. The pipe-to soil potential shall be measured on each side of the isolation joint using a high impedance voltmeter and portable copper/copper sulfate reference electrode with the test current "on" and "off'.
- D. A joint is considered electrically continuous if the "on" and "off' potentials are the same on either side of the joint under test.
- E. This same procedure shall be used to test individual isolation joints except that the joint is considered isolated if the pipe-to-soil potential is <u>not</u> the same when measured on each side of the joint when the test current is "on".

3.4 CASED CROSSING ISOLATION TESTS

- A. Immediately after the pipe has been installed in the casing, but prior to connecting the line, perform an electrical continuity test to determine that the casing is electrically isolated from the pipeline. The continuity check shall be fully documented and approved by the owner or its designated representative prior to backfilling.
- B. If the electrical isolation between pipe and casing is not effective, the cause shall be immediately investigated, and the situation remedied. Under no circumstances shall a shorted casing be backfilled.

END OF SECTION

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SECTION 33 04 11 CORROSION CONTROL TEST STATIONS

PART 1GENERAL

1.1 SECTION INCLUDES

- A. Test station materials and installation requirements.
- B. Locations requiring test stations are zinc ribbon anode connection locations, cathodically protected foreign pipeline crossings, cased crossings, tunnels and in-line below-grade electrical isolation joints.

1.2 RELATED SECTIONS

- A. Section 33 04 10 Joint Bonding and Electrical Isolation.
- B. Section 33 04 12 Specification for Zinc Ribbon Cathodic Protection Systems.

1.3 REFERENCES

- A. ASTM D1242 Polyethylene Plastic Molding and Extrusion Material.
- B. NACE RP0169-2002 Recommended Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- C. UL 83 Thermoplastic Insulated Wires.
- D. UL 426A Wire Connectors for Use with Copper Conductors.

1.4 SUBMITTALS

- A. Submittals shall conform to the requirements of the North Texas Municipal Water District Wylie-Rockwall-Farmersville 36-Inch Pipeline Improvements, Phase 2 Project.
- B. Catalogue Cuts: Manufacturer's catalog cuts shall be submitted for each item. The catalog cuts shall include the manufacturer's name and shall provide sufficient information to show that the materials meet the requirements of the drawings and specifications. Where more than one item or catalog number appears on a catalog cut, clearly identify the item proposed.
- C. Drawings: As-built drawings of the corrosion control test stations shall be maintained by the Contractor during installation and construction. Drawings shall be revised to show exact locations of all wiring, connections, anodes and test stations. All items of equipment and material shall be properly identified. The original as-built drawings shall be submitted to the owner or its designated representative.

1.5 QUALITY CONTROL

- A. Provide manufacturer's certifications that all components of the corrosion control system meet the requirements of the drawings and specifications. The certification shall reference the applicable section of the specifications and the applicable standard details.
- B. The drawings for the corrosion control system are diagrammatic and shall not be scaled for exact locations, unless scales are explicitly stated on the specific drawing. Field conditions, non-interference with other utilities or mechanical and structural features shall determine exact locations. Contractor shall note other existing utilities in the area and during excavation, shall not damage these utilities. Any damaged utilities shall be repaired to the satisfaction of the owner at the Contractor's expense.
- C. All materials, fabrication, and installations are subject to inspection and testing by the owner or its designated representative.

PART 2 - PRODUCTS

2.1 FLUSH MOUNT TEST STATIONS

- A. Test stations shall consist of test wires, a terminal box and a traffic box as shown on the project drawings.
- B. The terminal box shall be a seven- (7) terminal Big Fink as manufactured by Cott Manufacturing Company or approved equal.
- C. The precast concrete traffic box shall be a 10.25-inch diameter 3-RT with a cast iron cover marked "CP Test" as manufactured by Brooks Products, Inc or approved equal.
- D. Install a marker sign adjacent to all flush-mounted test stations. As shown on the project drawings.

2.2 ZINC RIBBON ANODE CONNECTION TEST STATIONS

A. Test stations shall be seven- (7) terminal "Big Fink" as manufactured by Cott Manufacturing or approved equal.

2.3 ABOVE-GRADE TEST STATIONS

- A. At test station locations where flush mounted structures cannot be installed, or where stated on drawings, an above-grade test station shall be used, and placed such that possible damage from vandalism, traffic, etc. is minimized.
- B. The test station shall be a seven- (7) terminal "Big Fink" as manufactured by Cott Manufacturing or approved equal.
- C. The test station shall be installed adjacent to a permanent structure, if available, for physical protection.

2.4 PERMANENT REFERENCE ELECTRODES

- A. The permanent reference electrode shall be a copper/copper sulfate Permacell Plus, double membrane ceramic cell in a geomembrane package as manufactured by Corrpro Companies, Inc. or approved equal.
- E. The electrode shall be equipped with No. 14 AWG stranded copper wire with blue HMWPE insulation of suitable length to attach to the terminal board of the test station.
- C. A permanent reference electrode shall be installed at each cased crossing test station.

2.5 TEST STATION LEAD WIRES

- A. Test station lead wires of all sizes shall have TW, THW, THHN or HMWPE insulation.
- B. Type insulation shall be color coded based upon connection to underground structures:
 - 1. Water piping: white.
 - 2. Foreign structures: red.
 - 3. Casings: yellow.
 - 4. Permanent reference cells: blue.
 - 5. Ribbon anode header cable: black
- F. Test station lead wires shall be terminated on the test station terminal board utilizing crimped on solder less ring terminals.
- G. All terminal boards shall be wired by the installer as shown on the drawings.

2.6 REMOTE MONITORING UNIT

- A. Remote monitoring units installed along with the ICL logger, makes the RMU an automated test station. The RMU collects and sends data from ICL loggers to the MetriCorr Webservice, eliminating the requirement for personnel to travel to test stations for in-situ data collection. The solar power option ensures long-term autonomy of data logging. Note: Prior to RMU installation, account setup and activation of ICL unit is required.
 - After proper pipe Thermoweld connections, install ER probes and permanent reference cell, as shown on the drawings U30 B190647 C 006, with an initial 12" of native soil backfill. Be sure to follow detail instructions to maximize exposed surface area of ER probes with native soil contact.
 - 2. Do not cut, trim or extend any probe cables, this will lead to probe malfunction, erroneous data and ultimately equipment failure. Encase both ER probes in mortar concrete (same as pipe) if the option is C303. For C200, continue installation without concrete encasement.
 - 3. For stability, set up RMU stand in quikrete base.

- B. At surface transition, route all lead cables through PVC conduit leaving enough cable slack for strain relief.
- C. Install the remote monitoring unit inside the solar panel junction box directly above the pipeline as shown on the project drawings. All terminal strips shall be wired by the installer following the manufacturer's instructions.
- D. RMU start-up should be followed under the manufacturer's instructions to reduce the likelihood of shorting out the solar charger.
 - 1. Connect the solar charger to the battery.
 - 2. Connect the solar charger to the solar panel.
 - 3. Connect the solar charger's OUT to the ICL's power socket.
- E. Take baseline measurements to validify the ER probe installation. If the readings are out of range, troubleshoot cable connections / equipment and test again. If ER probe installation is validified, continue with backfill operations as shown on drawing U30 B190647 C 006.
- F. Connect to Webservice for upload verification of baseline measurements.

2.7 THERMITE WELD EQUIPMENT

- A. Charges and Molds: Weld charges and mold size shall be specified by the manufacturer for the specific surface configuration. Use only the correct charges for the specific application. Welding charges and molds shall be Erico, Cadweld or Continental Industries.
- B. Thermoweld Weld Coating: Coating for all welds shall be Kop-Coat as manufactured by Carboline or approved equal. Cover coated weld with a plastic weld cap.

PART 3- EXECUTION

3.1 APPLICATIONS

- A. Required applications of corrosion control test stations include locations where future testing is anticipated for the following reasons:
 - 1. Testing to determine the effectiveness of the installed cathodic protection system and to allow for startup adjustments.
 - 2. Testing to determine interference effects from and on adjacent or crossing cathodically protected foreign underground structures.
 - 3. Testing to determine sources and magnitude of stray AC or DC currents and required mitigative measures.
 - 4. Periodic monitoring to determine status of existing cathodic protection systems, stray current, and foreign line influence.

- B. Install test stations at each of the following locations:
 - 1. At all cathodically protected foreign pipeline crossings.
 - 2. At all cased crossings and tunnels (both ends).
 - 3. At all zinc ribbon connection locations.

3.2 GENERAL

- A. Install test stations at locations indicated in specifications. If a flush mounted test station is not feasible in a particular location, then an above-grade test station may be used, subject to approval by the owner or its designated representative.
- B. Use continuous test station lead wires without cuts or tears in the insulation.
- C. Locate test stations as indicated on drawings, as close to the pipe as possible. If the pipe is installed under a road, place the test station at the curb for easy access.
- D. Attach test lead wires to the pipe by thermite welding.
- E. Attach test wires to the pipe prior to backfilling.
- F. Use color coded test wires as indicated on the drawings.
- G. Wire test station terminal board configurations as shown on the drawings
- H. At foreign pipeline crossing test stations, the owners of the foreign pipeline <u>must</u> be notified and <u>must</u> give permission before the test leads are connected to their pipeline. The foreign pipeline owner should have a representative present.

3.3 FLUSH-MOUNT TEST STATIONS

- A. Install flush-mount test stations at locations per drawing.
- B. Sufficient slack shall be coiled beneath the test station to allow for soil settlement and to prevent damage to the leads during backfilling. Additional slack shall be left to allow for withdrawal of the terminal board a minimum of 18 inches above the top of the precast concrete traffic box for test purposes.
- C. Install flush-mount test stations with permanent copper/copper sulfate reference electrodes where indicated in the specifications.
 - 1. Install permanent reference electrode approximately 6 inches from the pipe.
 - 2. Compact native soil by hand around the electrode. The balance of the backfill shall be select granular backfill material.
 - 3. Saturate the backfilled permanent reference electrode with 5 gallons of water.
- D. Set test stations installed outside areas of permanent paving materials in a Portland cement concrete pad. The concrete pad shall be a minimum of 24 inches square and no less than 6 inches thick.

E. Install a marker sign adjacent to all flush mounted test stations as shown on the project drawings.

3.4 ABOVE-GRADE TEST STATIONS

- A. Install above-grade test stations where a flush mounted test station cannot be located. Use and location of above-grade test stations shall be approved by the owner or its designated representative.
- H. Locate test station adjacent to a permanent structure (e.g. a power pole), if available, for physical protection.
- C. Coil sufficient slack beneath the test station to allow for soil settlement and to prevent damage to the leads during backfilling.

3.5 TEST LEAD WIRE ATTACHMENT

- A. Attach test leads to the steel pipe material by thermite welding directly to the pipe. See the cathodic protection drawings.
- B. The pipe to which the wires are to be attached shall be clean and dry.
- C. When connecting directly to the steel option use a grinding wheel to remove all coating, mill scale, oxide, grease and dirt from an area approximately 3 inches square. Grind the surface to bright metal.
- D. The wires to be thermite welded to the pipe shall have approximately 1 inch of insulation removed from each end exposing clean oxide-free copper for welding.
- E. Using the proper size thermite weld mold as recommended by the manufacturer, place the wire between the graphite mold and the prepared metal surface. Use a copper sleeve crimped over the wire for all No. 12 AWG wires.
- F. Place the metal disk in the bottom of the mold.
- G. Pour the thermite weld charge into the mold. Squeeze the bottom of the cartridge to spread ignition powder over the charge.
- H. Close the mold cover and ignite the starting powder with a flint gun.
- I. After the exothermic reaction remove the thermite weld mold and gently strike the weld with a hammer to remove the weld slag. Pull on the wire to assure a secure connection. If the weld is not secure, or the wire breaks repeat the procedure.
- J. If the weld is secure, coat all bare metal and weld metal with Kop-Coat. Cover the coated weld with a plastic weld cap.

Note: Lead wires and bond wires are to be installed on the foreign pipelines by the foreign pipeline owners. Contractor shall coordinate with the foreign pipeline owners (if any) for installation of lead wires and bond wires on the foreign pipelines. Contractor shall submit documentation from pipeline owner approving lead wire and bond wires to North Texas Municipal Water District for approval prior to installation. Contractor SHALL NOT install lead wires or bond wires on foreign pipelines without foreign pipeline owners' permission.

3.6 POST INSTALLATION BACKFILLING OF TEST STATION - LEAD WIRES.

- A. Protect test station wires to prevent damage to the wire insulation and conductor integrity during backfilling.
- B. After completion of the backfilling of the test wires to the pipe, verify the connection by measuring and recording a pipe-to-soil potential.
- C. Replace any test wire found to have a high resistance connection.

END OF SECTION

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SECTION 33 04 12 ZINC RIBBON CATHODIC PROTECTION SYSTEM

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. Requirements for a combined cathodic protection and alternating current (AC) mitigation system on Concrete Cylinder Pipe (CCP) and the Dielectrically Coated Steel Pipe (DCSP) options using galvanic zinc ribbon anodes. The zinc ribbon anode is used both as galvanic anode and AC mitigation conductor. The zinc ribbon is hereafter simply termed as anodes or galvanic anodes.
- B. Work performed under this specification shall consist of providing all supervision, labor, equipment and materials as well as providing all operations necessary to install and test the required cathodic protection system components for the exterior surfaces of North Texas Municipal Water District Wylie–Rockwall-Farmersville 36/48- Inch Pipeline Improvements, Phase 2. The work shall be performed in accordance with the provisions of the specifications, applicable plans, codes and standards, and subject to other terms and conditions for the project.
- C. Cathodic protection components shall be as shown on the project drawings for the project. The cathodic protection system shall include but not be limited to the following:
 - 1. Materials and installation.
 - 2. Post-installation survey.
 - 3. Final report to include recommendations.

1.2 REFERENCES

- A. NEC 70 National Electrical Code
- B. NACE SP-0169 Recommended Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- C. UL 83 Thermoplastic-Insulated Wires.
- D. UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- E. NACE SP0177-2014 Mitigation of Alternating Current and Lightening Effects on Metallic Structures and Corrosion Control Systems.

1.3 QUALITY CONTROL

- A. Installer Qualifications: Cathodic protection installer shall have a minimum of 5 years of documented experience in the type of cathodic protection work required for the project.
- B. Cathodic Protection Tester: Cathodic protection tester shall provide instructions for installation of anodes, field splices, and thermite welding. NACE International certified corrosion personnel shall complete all testing.
- C. All materials, fabrication and installations are subject to inspection and testing by the owner or its designated representative.

ZINC RIBBON CATHODIC PROTECTION SYSTEM

NTMWD #490 – Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 2 33 04 12 - 1 November 2019 F. The drawings for the cathodic protection and AC mitigation system are diagrammatic and shall not be scaled for exact locations unless scales are explicitly stated on the specific drawing. Field conditions, non-interference with other utilities or mechanical and structural features shall determine exact locations. Contractor shall note other existing utilities in the area. Care shall be taken during excavation not to damage these utilities. Any damaged utilities shall be repaired to the satisfaction of the owner at the Contractor's expense.

PART 2- ANODES

2.1 GALVANIC ANODES – ZINC RIBBON

- A. Zinc Ribbon Anodes: For the CCP and the DCSP options use super- size zinc ribbon anodes. The zinc ribbon is made from 99.99 percent pure high-grade zinc.
- B. Zinc ribbon Anode Current Capacity: Zinc ribbon anodes require a current capacity of no less than 335 amp-hours per pound of zinc.
- C. Anode Backfill Material: Use the native soil as backfill.
- D. Anode Lead Wires: The lead wire for all of the zinc ribbon anodes, use a 20-foot length of No. 10 AWG solid copper wire equipped with TW of THW insulation (black).

2.2 SPLICING TAPE

A. Tape used for taping zinc ribbon to anode header cable connections shall be Scotch 33 vinyl electrical tape and Scotch 130C rubber splicing tape, as manufactured by Scotch, 3M, or approved equal. Taped splices shall be covered with a coating of 3M Scotchkote electrical coating, or an approved equal.

2.3 CRIMPING LUGS

A. Crimping lugs used to connect the zinc ribbon to anode header cable shall be copper compression crimpit Catalog No. YC4C8 as manufactured by Burndy or approved equal.

2.4 ANODE HEADER CABLE

A. Anode header cables routed between the anode and the test stations shall be #10 AWG stranded copper conductors with type THHN/THWN insulation (Black).

2.5 TEST STATIONS

A. Anode connection point test stations shall be seven - (7) terminal, "Big Fink" with lockable lid as manufactured by Cott Manufacturing or approved equal.

2.6 WIRE LOOP

- A. Monitoring shunt shall not be used. Instead, a #10 wire with loop is used for measuring the current using a clamp-on ammeter.
- B. There shall be two (2) loops in each connection point anode test station.

2.7 PIPELINE TEST LEAD WIRE

A. Pipeline test station lead wires shall be #10 AWG stranded copper cable with type THHN or THWN insulation white in color.

2.8 PERMANENT REFERENCE ELECTRODE

- A. The permanent reference electrode shall be a copper/copper sulfate Permacell Plus as manufactured by Corrpro Companies or approved equal.
- B. The permanent reference electrode shall be equipped with No. 14 AWG stranded copper wire with blue HMWPE insulation of suitable length to attach to the terminal board of the test station.
- C. The permanent reference electrode shall have a minimum design life of 15 years and a stability of 5 millivolts under a 3.0 microamp load.

2.9 THERMITE WELD EQUIPMENT

Materials required for thermite welding and coating of the welds are described in the following sections.

- A. Charges and Molds: Weld charges and mold size shall be as specified by the manufacturer for the specific surface configuration. Care shall be taken during installation to be sure correct charges are used. Welding charges and molds shall be the product of a manufacturer regularly engaged in the production of such materials.
- B. Weld Coating: Coating for all welds shall be Kop-Coat as manufactured by Carboline or approved equal. The coated weld shall be covered with a plastic weld cap.

PART 3 - CATHODIC PROTECTION SYSTEM INSTALLATION

3.1 INSTALLATION OF GALVANIC ZINC RIBBON ANODES

- A. The recommended galvanic zinc anode cathodic protection system for the DCSP option is twentytwo (22) super-size ribbon, each 500' in length. The zinc ribbon should be placed along the pipeline route. The zinc ribbon shall be installed at the same trench of the pipeline to reduce cost.
- B. The recommended galvanic zinc anode cathodic protection system for the CCP option is thirtyseven (37) super-size ribbon, each 500' in length. The zinc ribbon should be placed along the pipeline route. The zinc ribbon shall be installed at the same trench of the pipeline to reduce cost.
- C. Placement: Each anode ribbon shall be installed horizontally along the pipeline in the same trench. At each ribbon anode section, dual ribbon will be installed on each side of the pipeline and in the native backfill as shown on the project drawings. For the pipeline section that is embedded in crushed rock aggregate, the ribbon is at least 12" above the top of the pipe and approximately 3' away from the centerline of the pipe. For the pipeline section that is embedded in controlled low strength material (CLSM), the ribbon is at least 18" above the top of the pipe and is approximately 3' away from the centerline of the pipe.
- D. Backfilling: Native backfill is used for the anode ribbon.

ZINC RIBBON CATHODIC PROTECTION SYSTEM NTMWD #490 – Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 2 33 04 12 - 3 November 2019

- E. Anode Lead Wire: Lead wires from the anodes shall be run underground at a minimum depth of 24 inches. Each anode lead wire shall be connected to the ribbon as indicated on the project drawings.
- F. Handling: Anodes shall be handled in a manner that will avoid damaging anode materials and wire connections.

3.2 INSTALLATION OF PERMANENT REFERENCE ELECTRODE

- A. Location: One permanent copper sulfate reference electrode shall be installed at cased crossing test station for the CCP and the DCSP options. The permanent reference electrode shall be within 6" of the pipe at pipe depth. The permanent reference electrode shall be prepared and installed in strict accordance with the manufacturer's recommendations.
- B. Placement: The permanent reference electrode shall be placed in the same ditch with the waterline and carefully covered with the same soil as the pipeline backfill.
- C. Lead Wire: The permanent reference electrode lead wire shall be protected during backfill operations and routed to the test station along with the waterline test leads and ribbon anode cables.

3.3 INSTALLATION OF WIRE AND CABLE

- A. Depth: All underground wire and cable shall be installed at a minimum of 24 inches below final grade with a minimum separation of 6 inches from other underground structures.
- B. Anode Header Cable: Each ribbon anode shall be connected to a #10 AWG/HMWPE header cable which shall be routed into a test station.
- C. Ribbon to Header Cable Connection: Each ribbon anode to header cable connection shall be made using a copper compression connector. Each connection shall be taped using rubber tape, vinyl tape and coated with Scotchkote electrical coating as shown on the project drawings.
- D. Anode Connection-To-Pipeline: Each anode ribbon shall be connected to the pipeline through a test station as shown on the project drawings. Each group of ribbon will be divided into two ribbons of 500'. Each ribbon will have its own header cable routed to the test station. Wire shunt shall not be used to connect each anode header cable to the pipeline. Instead, the two ribbons are connected to the pipeline through a #10 wire loop as shown on the project drawings.

3.4 TEST LEAD WIRE ATTACHMENT

- A. Test lead cables shall be attached to the pipe by thermite welding.
- B. The pipe to which the wires are to be attached shall be clean and dry.
- C. The wires to be thermite welded to the pipe shall have approximately 1 inch of insulation removed from each end, exposing clean, oxide-free copper for welding.
- D. Using the proper size thermite weld mold as recommended by the manufacturer, the wire shall be placed between the graphite mold and the prepared metal surface. All wires No. 12 AWG size shall use a copper sleeve crimped over the wire.
- E. The metal disk shall be placed in the bottom of the mold.

- F. The cap from the weld charge container shall be removed and the contents poured into the mold. Squeeze the bottom of the weld charge container to spread ignition powder over the charge.
- G. Close the mold cover and ignite the starting powder with a flint gun. The mold should be held firmly in place until all of the charge has burned and the weld has cooled slightly.
- H. Remove the thermite weld mold and gently strike the weld with a hammer to remove the weld slag. Pull on the wire to assure a secure connection. If the weld is not secure or the wire breaks, repeat the procedure.
- I. If the weld is secure, coat all bare metal and weld metal with Kop-Coat. The coated weld shall be covered with a plastic weld cap.

3.5 POST-MOUNTED TEST STATIONS

- A. Post-mounted test stations shall be installed as shown on the drawings.
- B. Sufficient slack shall be coiled beneath the test station to allow for soil settlement and to prevent damage to the leads during backfilling. Additional slack shall be left to allow for withdrawal of the terminal board a minimum of 18" above the top of the concrete pad for test purposes.

3.6 POST INSTALLATION BACKFILLING OF CABLES

During the backfilling operation, cables shall be protected to prevent damage to the wire insulation and conductor integrity.

3.7 POST INSTALLATION TESTING OF THE CATHODIC PROTECTION SYSTEMS

- A. General: As soon as possible after the cathodic protection equipment has been installed, the system shall be inspected, energized and adjusted (commissioned).
- B. Commissioning: The commissioning of the cathodic protection system shall be performed by a corrosion engineer hired by the contractor to achieve compliance with the referenced corrosion control standards set forth by NACE International and/or AWWA.
- C. Method: The Corrosion Engineer shall:
 - 1. Measure native state structure-to-soil potentials along the waterline using the permanent reference electrodes at each test station prior to energizing the cathodic protection system.
 - 2. Energize the cathodic protection system by connecting each zinc ribbon to the pipeline leads in the test station junction box. Record each anode ribbon current using the wire loop by connecting the respective anode ribbon only.
 - 3. Allow 2 weeks for the pipeline to polarize.
 - 4. Measure and record all final pipe-to-soil potentials measurements and current outputs at each test station.
 - 5. Verify that all electrical isolation devices, isolators and casing spacers, are operating properly.
 - 6. Verify if any interference does exist with foreign structures. Perform joint tests with owners of the foreign structures and mitigate any interference detected. Foreign line test stations have been provided to facilitate the interference testing and installation of any necessary resistance

ZINC RIBBON CATHODIC PROTECTION SYSTEM

NTMWD #490 – Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 2 33 04 12 - 5 November 2019 bonds. It is the corrosion engineer's responsibility to coordinate the interference testing with the owners of foreign structures.

- D. Verification and Responsibilities:
 - 1. Contractor shall correct, at his expense, any deficiencies in materials or installation procedures discovered during the post-installation inspection.
 - 2. Corrosion Engineer shall provide written documentation of any deficiencies discovered during the post installation inspection.
- E. Equipment: All cathodic protection testing instruments shall be in proper working order and calibrated according to factory specifications.
- F. Report: The results of all commissioning procedures along with documentation of ribbon anode current outputs, pipe-to-soil potentials, results of interference testing, results of isolation joint, casing tests and as built drawings shall be compiled in a final report and furnished to the owner along with operating and maintenance instructions.

END OF SECTION

SECTION 33 05 21 TUNNEL LINER PLATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Minimum requirements for manufacturing, furnishing and transporting Tunnel Liner Plate to be used for excavation support as installed Tunnel at the locations shown on the Drawings
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 33 05 23 Hand Tunneling
 - 4. Section 33 05 24 Installation of Carrier Pipe in Casing or Tunnel Liner Plate

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Association of State Highway and Transportation Officials (AASHTO)
 - a. HB-17, Standard Specifications for Highway Bridges, Section 16.
 - b. M190, Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - 3. ASTM International (ASTM):
 - a. A123, Standard Specification for Zinc (Hot- Dip Galvanized) Coating on Iron and Steel Products.
 - b. A153, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 - c. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Los-Alloy with Improved Formability, and Ultra-High Strength.
 - d. F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Allow Steel Bolts, Screws, Washers, Nuts, and Special Thread Fasteners.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Tunnel Liner Plate and fasteners
 - a. Material data
 - 2. Exterior Coating

- a. Material data
- b. Field touch-up procedures
- 3. Grout Mix
 - a. Material data
- B. Shop Drawings
 - 1. Submit calculations for the design of the tunnel liner plate sealed by a Licensed Engineer in the State of Texas.
 - 2. Detailed plan for grouting the void space on the exterior of the tunnel liner plate
 - 3. Grout coupling location and spacing

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

A. Tunnel liner plate shall be inspected and approved in the field by the Owner prior to being installed. Tunnel liner plate deemed to be unfit for use shall be replaced at no additional cost to the Owner.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle and store tunnel liner plate in accordance with the Manufacturer's recommendations to protect coating systems.

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturers
 - 1. The manufacturer must comply with this Specification and related Sections.
 - 2. The following manufacturers are acceptable.
 - a. Contech Construction Products, Inc.
 - b. DSI Underground
 - c. Approved equal.

B. Design Criteria

- 1. Manufacturer to design tunnel liner plate in accordance with the methods and criteria as specified in AASHTO HB-17.
 - a. Soil parameters shall be determined by the tunnel liner plate manufacturer.
 - b. Allow a maximum deflection of 3 percent.
 - c. Thickness of the tunnel liner plate specified herein is the minimum acceptable and shall be increased as necessary to obtain adequate joint strength, stiffness, buckling strength and resistance to deflection.
- C. Materials
 - 1. Tunnel Liner Plate
 - a. Provide new, corrugated metal tunnel liner plates made from steel sheets conforming to the requirements of ASTM A1011.
 - 1) Potable and Reclaimed Water carrier pipe
 - a) Galvanized

- (1) Plate to be galvanized with zinc coating in accordance with ASTM A123 with the following exception:
 - (a) Zinc shall be applied at a rate of 2.0 ounces per square foot on each side.
- b) Coated
 - (1) Plate to be coated with a bituminous coating meeting the performance requirements of AASHTO M190
 - (2) Uniformly coat pipe inside and out to minimum thickness of 0.05 inches, measured on crests of corrugations.
- c) Tunnel liner plate shall either be galvanized or coated.
- 2) Sanitary Sewer carrier pipe
 - a) Galvanized
 - (1) Plate to be galvanized with zinc coating in accordance with ASTM A123 with the following exception:
 - (a) Zinc shall be applied at a rate of 2.0 ounces per square foot on each side.
- 3) Tunnel liner plates and fasteners shall comply with the requirements of AASHTO HB-17.
- 4) Liner plates shall be punched for bolting on both longitudinal and circumferential seams and fabricated to permit complete erection from the inside of the tunnel.
- 5) Bolts and nuts shall be galvanized to conform to ASTM F2329.
- 6) Where groundwater is encountered, gasketed liner plates shall be used.
- 7) Plates shall be of uniform fabrication and those intended for one size tunnel shall be interchangeable.
- 8) Field welding of tunnel liner plate, including grout couplings, shall not be allowed.
- 9) The material used for the construction of these plates shall be **NEW**, unused and suitable for the purpose intended. Construction Manager and Engineer shall be allowed to inspect and approve all liner plate prior to installation. If, in the opinion of the Construction Manager or Engineer, the liner plate proposed is damaged or used the Contractor will not be allowed to install the liner plate. Contractor will be required to provide replacement liner plate acceptable to the Construction Manager and Engineer. No additional payment will be made to Contractor for replacement liner plate.
- 10) Minimum thickness of Tunnel Liner Plate shall be as follows*:

| Tunnel Diameter (inches) | 2-Flanged Liner Plate Thickness (gauge) Bury Depth: 8 | 4-Flanged Liner Plate Thickness (gauge) feet – 16 feet |
|--------------------------------|--|---|
| 48 | 14 | 12 |
| 54 | 14 | 12 |
| 60 | 14 | 11 |
| 66 | 12 | 10 |
| 72 | 12 | 8 |
| Greater than | Project Specific | Project Specific |
| 72 | Design | Design |

*The information in the above table is based on the following assumptions: AASHTO Section 16: "Steel Tunnel Liner Plates", H20 loading angle of 0 and bury depth of 8 feet to 16 feet. For projects not meeting these assumptions, a specific design should be performed to determine the appropriate thickness for the liner plate.

- 2. Casing Insulators
 - a. Casing insulators shall be used for this project in accordance with Section 33 05 24.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Tunnel Liner Plate shall be installed in accordance with appropriate portions of Section 33 05 23.
- B. Carrier pipe shall be installed inside Tunnel Liner Plate in accordance with Section 33 05 24.
- C. Contact grouting of the annulus outside the Tunnel Liner Plate shall be performed in accordance with Section 33 05 23.

END OF SECTION

SECTION 33 05 23 HAND TUNNELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Minimum requirements for Hand Tunneling using tunnel liner plate at the locations shown on the Drawings
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 31 75 00 Access Shaft
 - 4. Section 33 05 21 Tunnel Liner Plate
 - 5. Section 33 05 25 Settlement Monitoring

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - American Association of State Highway and Transportation Officials (AASHTO):
 a. HB-17, Standard Specifications for Highway Bridges.
 - 3. Occupational Safety and Health Administration (OSHA)
 - a. OSHA Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavation.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation
 - 1. The Contractor shall provide written notice to the Owner at least 72 hours in advance of the planned launch of tunneling operations.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings
 - 1. Detailed description of the methods and equipment to be used in completing each reach of tunnel
 - 2. Description of the survey methods that will be used to ensure that the tunnel is advanced as shown on the Drawings and within the line and grade tolerances specified
 - 3. Shaft layout drawings

- a. Detailing dimensions and locations of all equipment, including overall work area boundaries, crane, front-end loader, forklift, spoil stockpiles, spoil hauling equipment, pumps, generator, pipe storage area, tool trailer or containers, fences, and staging area
- b. Shaft layout drawings will be required for all shaft locations and shall be to scale, or show correct dimensions.
- c. Layout such that all equipment and operations shall be completely contained within the allowable construction areas shown on the Drawings
- d. Shaft design shall be signed and sealed by a Professional Engineer in the State of Texas.
- 4. Schedule in accordance with Division 1 to include the following activities as independent items:
 - a. Mobilization
 - b. Shaft excavation and support
 - c. Water control at shafts
 - d. Working slab construction
 - e. Thrust wall construction
 - f. Tunneling
 - g. Shaft backfill
 - h. Site restoration
 - i. Cleanup
 - j. Demobilization
- 5. Contact Grouting submittals per Section 03 60 00.
- For installation with steel casing pipe, provide the following calculations. Calculations shall be consistent with information provided in the Geotechnical Engineering Reports. Calculations shall be prepared, signed, and sealed by a Civil or Structural engineer licensed in the State of Texas.
 - 1) Provide an estimate of the maximum jacking force expected to complete each drive, accounting for both face pressures and frictional resistance along the pipe string.
 - 2) Calculations demonstrating that the soil behind the thrust block can transfer the maximum planned jacking forces exerted by the main jacks to the ground pipe installation with an acceptable factor of safety of at least 1.5, without excessive deflection or displacement.

B. Daily Records

- 1. Submit samples of the tunneling logs or records to be used at least 7 days prior to beginning Hand Tunneling.
- 2. Submit daily records to the Owner's Inspector by noon on the day following the shift for which the data or records were taken.
- 3. Daily records shall include:
 - a. Date
 - b. Time
 - c. Name of operator
 - d. Tunnel drive identification
 - e. Installed liner ring and corresponding tunnel length
 - f. Time required to tunnel each ring
 - g. Time required to set subsequent ring
 - h. Spoil volumes (muck carts per liner ring and estimated volume of spoil in each muck cart)
 - i. Grout volumes and pressures
 - j. Soil conditions, including occurrences of unstable soils and estimated groundwater inflow rates, if any
 - k. Line and grade offsets

- I. Any movement of the guidance system
- m. Problems encountered during tunneling
- n. Durations and reasons for delays
- o. Manually recorded observations made:
 - 1) At intervals of not less than 2 every 5 feet
 - 2) As conditions change
 - 3) As directed by the Owner and/or Engineer

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Qualifications
 - 1. Failure to meet the qualification requirements is failure to fulfill the Contract and the Contractor will be required to obtain a subcontractor that meets the qualification requirements.
 - 2. All tunneling work shall be performed by an experienced subcontractor or Contractor who has at least 5 years of experience in performing tunneling work and has completed at least 5 projects of similar diameter in similar ground conditions.
 - 3. All Work by the Contractor shall be done in the presence of the Owner unless the Owner grants prior written approval to perform such work in Owner's absence.
 - 4. The Contractor shall allow access to the Owner and/or Engineer and shall furnish necessary assistance and cooperation to aid in the observations, measurements, data and sample collection including, but not limited to, the following:
 - a. The Owner and/or Engineer shall have access to the tunneling system prior to, during and following all tunneling operations.
 - b. The Owner and/or Engineer shall have access to the tunneling shafts prior to, during and following all tunneling operations.
 - 1) This shall include, but not be limited to, visual inspection of installed pipe and verification of line and grade.
 - 2) The Contractor shall provide safe access in accordance with all safety regulations.
 - c. The Owner and/or Engineer shall have access to spoils removed from the tunnel excavation prior to, during and following all tunneling operations.
 - The Owner shall be allowed to collect soil samples from the muck buckets or spoil piles a minimum of once every 10 feet and at any time when changes in soil conditions or obstructions are apparent or suspected.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Description
 - 1. Tunnel liner plate shall be in accordance with Section 33 05 21.
- B. Design Criteria

1. Design excavation methods and spoil conveyance system for the full range of ground conditions described in the Geotechnical Report.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Tunneling shall not begin until the following have been completed:
 - 1. All required submittals have been made and the Owner and/or Engineer has reviewed and accepted all submittals.
 - 2. Review of available utility drawings and location of conduits and underground utilities in all areas where excavation is to be performed.
 - a. Notify the Texas One Call system (800-344-8377) to request marking of utilities by utility owners / operators that subscribe to One Call, and shall individually notify all other known or suspected utilities to request marking of these utilities.
 - Repair damage to existing utilities resulting from excavation at no additional cost to the Owner.
 - 3. Shaft excavations and support systems for each drive completed in accordance with the requirements of the Specifications.
 - 4. Site safety representative has prepared a code of safe practices in accordance with OSHA requirements.
 - a. Provide the Engineer and Owner with a copy of each prior to starting shaft construction or tunneling.
 - b. Hold safety meetings and provide safety instruction for new employees as required by OSHA.
 - 5. All specified settlement monitoring points have been installed, approved and baselined in accordance with the Contract Documents.
- B. Verification of Stability
 - 1. Confirm that the ground will remain stable without movement of soil or water while the entry/exit location shoring is removed and while the tunnel is launched or received into a shaft.
 - 2. Demonstrate that all soils have been stabilized at all tunnel portal locations to:
 - a. Prevent the inflow of weak, running or flowing soils.
 - b. Prevent the inflow of loose rock.
 - c. Prevent and control groundwater inflows.

3.2 INSTALLATION

- A. Tunnel Methods
 - 1. Tunnel liner plate shall not be used where bore or jack methods are used, or where not allowed on the Drawings or permits.
 - 2. The Contractor shall be fully responsible to:
 - a. Ensure the methods used are adequate for the protection of workers, pipe, property and the public
 - b. Provide a finished product as required.
- B. General
 - 1. The Contractor shall immediately notify the Owner, in writing, if and when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those represented within the Contract Documents.

- 2. Properly manage and dispose of groundwater inflows to the shafts in accordance with requirements of Specifications and all permit conditions.
 - a. Discharge of groundwater inflow into sanitary sewers is not allowed without proper approval and permits.
- 3. Furnish all necessary equipment, power, water and utilities for tunneling, spoil removal and disposal, grouting and other associated work required for the methods of construction.
- 4. Promptly clean up. Remove and dispose of any spoil or slurry spillage.
- 5. Whenever there is a condition that is likely to endanger the stability of the excavation or adjacent structures, operate with a full crew 24 hours a day, including weekends and holidays, without interruption, until those conditions no longer jeopardize the stability of the Work.
- C. Installation with Steel Casing Pipe
 - 1. Jack the pipe from the low or downstream end, unless specified otherwise.
 - a. Provide heavy duty jacks suitable for forcing the pipe through the embankment.1) When operating jacks, apply pressure evenly.
 - b. Provide a suitable jacking head and bracing between jacks so that pressure will be applied to the pipe uniformly around the ring of the pipe.
 - c. Provide a suitable jacking frame or back stop.
 - d. Set the pipe to be jacked on guides, properly braced together, to support the section of the pipe and to direct it in the proper line and grade.
 - e. Place the whole jacking assembly so as to line up with the direction and grade of the pipe.
 - f. In general, excavate embankment material just ahead of the pipe and remove material through the pipe.
 - g. Force the pipe through the embankment with jacks into the space excavated.
 - 2. The excavation for the underside of the pipe, for at least 1/3 of the circumference of the pipe, shall conform to the contour and grade of the pipe.
 - a. Provide a clearance of not more than 2 inches for the upper half of the pipe.
 - 1) This clearance shall be tapered off to 0 at the point where the excavation conforms to the contour of the pipe.
 - b. Extend the distance of the excavation beyond the end of the pipe depending on the character of the material, but do not exceed 2 feet in any case.
 - Decrease the distance if the character of the material being excavated makes it desirable to keep the advance excavation closer to the end of the pipe.
 - 3. If desired, use a cutting edge of steel plate around the head end of the pipe extending a short distance beyond the end of the pipe with inside angles or lugs to keep the cutting edge from slipping back onto pipe.
 - 4. When jacking of pipe has begun, carry on the operation without interruption to prevent the pipe from becoming firmly set in the embankment.
 - a. Remove and replace any pipe damaged in the jacking operations.
 - b. The Contractor shall absorb the entire expense.
- D. Installation with Tunnel Liner Plate
 - Install the tunnel liner plates to the limits indicated on the Drawings and as specified in AASHTO HB-17, Section II-26, Construction of Tunnels Using Steel Tunnel Liner Plates.
 - a. Assemble liner plates into circumferential rings.
 - b. Liner plates shall be of the type to permit segments to be installed completely from inside the tunnel.
 - 2. Accurately maintain the face of the excavation inside the tunnel so as to allow the absolute minimum of void space outside the casing/liner plate.

- a. Maintain a maximum of ½ inch tolerance between the outside of the casing/liner plate and the excavation wherever possible. In no case shall the tunnel diameter be 2 inches larger than the casing/liner outer diameter.
- 3. Liner plate installation shall proceed as closely as possible behind the excavation.
 - a. Excavation shall at no time be more than 6 inches ahead of the required space to install an individual tunnel liner plate.
 - b. Use breast plates, poling boards or other suitable devices to maintain accurate excavation with the minimum of unsupported excavation at any time.
 - c. Casing/Tunnel liner plate shall not be allowed to deflect vertically during installation.
- 4. Tunneling operations shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities and improvements.
 - a. In no case shall ground movements cause damage to adjacent structures, roadways, or utilities.
 - b. The Contractor shall repair any damage resulting from construction activities, at no additional cost to the Owner and without extensions of schedule for completion.
- E. Contact Grouting
 - 1. Contact grout shall be in accordance with Section 03 60 00.
- F. Control of Line and Grade
 - 1. Confirm that all established benchmarks and control points provided for the Contractor's use are accurate.
 - a. Use these benchmarks to furnish and maintain all reference lines and grades for tunneling.
 - b. Use lines and grades to establish the location of the pipe using a laser or theodolite guidance system.
 - c. Submit to the Owner copies of field notes used to establish all lines and grades and allow the Engineer to check guidance system setup prior to beginning each tunneling drive.
 - d. Provide access for the Owner to perform survey checks of the guidance system and the line and grade of the carrier pipe on a daily basis during tunneling operations.
 - e. The Contractor remains fully responsible for the accuracy of the work and the correction of it, as required.
 - 2. The casing/tunnel liner shall be installed in accordance with the following tolerances:
 - a. Variations from design line or grade: ± 2 inches maximum
 - 1) If the installation is off line or grade, make the necessary corrections and return to the design alignment and grade at a rate of not more than 1 inch per 25 feet.
 - 3. Monitor line and grade continuously during tunneling operations.
 - a. Record deviation with respect to design line and grade once at each pipe joint and submit records to Engineer daily.
 - 4. If the pipe installation does not meet the specified tolerances, correct the installation, including any necessary redesign of the pipeline or structures and acquisition of necessary easements.
- G. Obstructions
 - 1. If the tunneling operations should encounter an object or condition that impedes the forward progress of the shield, notify the Owner immediately.
 - 2. Correct the condition and remove, clear or otherwise make it possible for the shield to advance past any objects or obstructions that impede forward progress.

- 3. Proceed with removal of the object or obstruction by methods submitted by the Contractor and accepted by the Owner and/or Engineer.
- 4. Compensation
 - a. The Contractor will receive compensation by change order for removal of obstructions, as defined as metallic debris, reinforced concrete, rocks, whole trees and other hard objects with a maximum dimension larger than 50 percent of the outer diameter of the shield which:
 - 1) Cannot be broken up by the cutting tools with diligent effort, and
 - 2) Are located partially or wholly within the cross-sectional area of the bore
 - 3) Contain utilities or ditch lines located longitudinally within the tunnel horizon
 - b. Payment will be negotiated with the Contractor on a case-by-case basis.
 - c. The Owner and/or Engineer shall be provided an opportunity to view obstruction prior to removal.
 - 1) Any removal process that does not allow direct inspection of the nature and position of the obstruction will not be considered for payment.
 - d. No additional compensation will be allowed for removing, clearing or otherwise making it possible for the shield to advance past objects consisting of cobbles, boulders, wood, reinforced concrete, and other objects or debris with maximum lateral dimensions less than 50 percent of the outer diameter of the shield.

3.3 CLEANUP AND RESTORATION

- A. After completion of the tunneling, all construction debris, spoils, oil, grease and other materials shall be removed from the tunneling pipe, shafts and all work areas.
 - 1. Cleaning shall be incidental to the construction.
- B. Restoration shall follow construction as the Work progresses and shall be completed as soon as reasonably possible.
 - 1. Restore and repair any damage resulting from surface settlement caused by shaft excavation or tunneling.
 - 2. Any property damaged or destroyed, shall be restored to a condition equal to or better than that to which it existed prior to construction.
 - 3. Restoration shall be completed no later than 30 days after tunneling is complete, or earlier if required as part of a permit or easement agreement.
 - 4. This provision for restoration shall include all property affected by the construction operations.

3.4 SITE QUALITY CONTROL

- A. Safety
 - 1. No gasoline powered equipment shall be permitted in receiving shafts/pits.
 - a. Diesel, electrical, hydraulic and air powered equipment are acceptable, subject to applicable local, State, and Federal regulations.
 - 2. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground.
 - a. Perform all required air and gas monitoring.
 - b. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.
 - 3. Perform all Work in accordance with all current applicable regulations and safety requirements of the Federal, State, and Local agencies. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations.
 - a. In the event of conflict, comply with the more stringent requirements.

- 4. If personnel will enter the pipe during construction, the Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe.
 - a. Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction.

END OF SECTION

SECTION 33 05 24 INSTALLATION OF CARRIER PIPE IN CASING OR TUNNEL LINER PLATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the installation of carrier pipe into steel casings or tunnel liner plate at locations shown on the Drawings
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 33 05 21 Tunnel Liner Plate
 - 4. Section 33 05 23 Hand Tunneling

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Definitions
 - 1. Carrier Pipe: Permanent pipe for operational use that is used to convey flows
 - 2. Casing: A steel pipe or tunnel liner installed by trenchless methods that supports the ground and provides a stable underground excavation for installation of the carrier pipe
- B. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Society of Testing and Materials (ASTM)
 - a. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - b. C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or [50 mm] Cube Specimens).
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - 3. International Organization for Standardization (ISO):
 - a. 9001, Quality Management Systems Requirements.
 - 4. Occupational Safety and Health Administration (OSHA)
 - a. OSHA Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavation.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

A. Product Data

- 1. Casing Isolators/Spacers
 - a. Material Data
- 2. Low Density Cellular Grout (LDCG) Mix
 - a. Material Data
- B. Shop Drawings
 - 1. Required for 24-inch and larger carrier pipe installations
 - 2. Submit Work Plan describing the carrier pipe installation equipment, materials and construction methods to be employed.
 - 3. Casing Spacers/Isolators
 - a. Detail drawings and manufacturer's information for the casing isolators/spacers that will be used.
 - 1) Include dimension and component materials and documentation of manufacturer's ISO 9001:2000 certification.
 - b. Alternatives to casing spacers/isolators may be allowed by the Owner on a case-by-case basis.
 - c. For consideration of alternate method, submit a detailed description of method including details.
 - 4. End seal or bulkhead designs and locations for casing/liners, including location of vent lines to allow for adequate ventilation during grout filling.
 - 5. Annular Space (between carrier pipe and casing/tunnel liner plate) Grouting Work Plan and Methods including:
 - a. Grouting methods
 - b. Details of equipment
 - c. Grouting procedures and sequences including:
 - 1) Injection methods
 - 2) Injection pressures
 - 3) Monitoring and recording equipment
 - 4) Pressure gauge calibration data
 - 5) Materials
 - d. LDCG mix details including:
 - 1) Proportions
 - 2) Admixtures including:
 - a) Manufacturer's literature
 - b) Laboratory test data verifying the strength of the proposed grout mix
 - c) Proposed grout densities
 - d) Viscosity
 - e) Initial set time of grout
 - (1) Data for these requirements shall be derived from trial batches from an approved testing laboratory.
 - e. Submit a minimum of 3 other similar projects where the proposed LDCG mix design was used.
 - f. Submit anticipated volumes of LDCG to be pumped for each application and reach grouted.
 - g. For carrier pipe installations 36-inches and greater, without hold down jacks or a restrained spacer, provide buoyant force calculations during grouting and measures to prevent flotation.
 - 1) Calculations sealed by a licensed Engineer in the State of Texas.
 - h. Description of methods and devices to prevent buckling of carrier pipe during grouting of annular space, if required
- C. Field Quality Control Submittals
 - 1. Grouting logs
 - 2. Grout strength tests

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Certifications
 - 1. Casing isolator/spacer manufacturer shall be certified against the provisions of ISO9001:2000.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Design Criteria and Materials
 - 1. Carrier pipe shall meet the specification requirements as outlined in the applicable Section.
 - 2. Grout of annular space
 - a. For gravity sewer carrier pipe installation:
 - 1) Fill all voids between the carrier pipe and the casing or liner with grout.
 - 2) All exterior carrier pipe surfaces and all interior casing or liner surfaces shall be in contact with the grout.
 - b. For water line installation:
 - 1) Fill all voids between the carrier pipe and the casing or liner with grout.
 - 2) All exterior carrier pipe surfaces and all interior casing or liner surfaces shall be in contact with the grout.
 - 3. Grout Mixes
 - a. Low Density Cellular Grout (LDCG)
 - 1) Annular space (between carrier pipe and casing/liner) grout shall be LDCG.
 - 2) The LDCG shall be portland cement based grout mix with the addition of a foaming agent designed for this application.
 - 3) Develop 1 or more grout mixes designed to completely fill the annular space based on the following requirements:
 - a) Provide adequate retardation to completely fill the annular space in 1 monolithic pour.
 - b) Provide less than 1 percent shrinkage by volume.
 - c) Compressive Strength
 - (1) Minimum strength of 10 psi in 24 hours, 50 psi in 3 days, 300 psi in 28 days
 - d) Design grout mix with the proper density and use proper methods to prevent floating of the carrier pipe.
 - e) Proportion grout to flow and to completely fill all voids between the carrier pipe and the casing or liner.
 - 4. End Seals
 - a. Provide end seals at each end of the casing or liner to contain the grout backfill or to close the casing/liner ends to prevent the inflow of water or soil. End seals shall be one of the following:
 - 1) Use pull-on, 1/8 inch thick, synthetic rubber end seals, Model C, as manufactured by GPT Industries or approved equal.

- 2) Brick and Mortar
- b. Design end seals to withstand the anticipated soil or grouting pressure, provide adequate ventilation, and be watertight to prevent groundwater from entering the casing.
- 5. Casing Spacers/Insulators
 - a. Casing spacers/insulators or mortar bands may be utilized in conjunction AWWA C200 steel pipe. Mortar bands may be utilized in conjunction with AWWA C303 bar-wrapped concrete cylinder pipe.
 - b. Provide casing spacers/insulators to support the carrier pipe during installation and grouting (where grout is used).
 - c. Casing Spacers/Isolators material and properties:
 - 1) Shall be minimum 14 gage
 - 2) For water pipe, utilize Stainless Steel.
 - 3) For sewer pipe, utilize Coated Steel.
 - 4) Suitable for supporting weight of carrier pipe without deformation or collapse during installation
 - d. Provide restrained-style casing spacers to hold all pipes stable during grouting operations and prevent floating or movement.
 - e. Provide dielectric strength sufficient to electrically isolate each component from one another and from the casing.
 - f. Design risers for appropriate loads, and, as a minimum:
 - 1) Provide 10 gage steel risers
 - a) Provide stainless steel bands and risers for water installations.
 - g. Band material and criteria
 - 1) Provide polyvinyl chloride inner liner with:
 - a) Minimum thickness of 0.09 inches
 - b) Durometer "A" of 85-90 hardness
 - c) Minimum dielectric strength of 58,000 volts
 - h. Runner material and criteria
 - 1) Provide pressure-molded glass reinforced polymer or UHMW with:
 - a) Minimum of 2 inches in width and a minimum of 11 inches in length.
 - 2) Attach to the band or riser with 3/8 inch minimum welded steel or stainless steel studs.
 - 3) Runner studs and nuts shall be recessed well below the wearing surface of the runner
 - a) File recess with a corrosion inhibiting filler.
 - i. Riser height
 - Provide sufficient height with attached runner allow a minimum clearance of 2 inches between the outside of carrier pipe bells or couplings and the inside of the casing liner surface.
 - j. Casing spacers shall be manufactured by GPT Industries or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General
 - 1. Carrier pipe installation shall not begin until the following tasks have been completed:
 - a. All required submittals have been provided, reviewed and accepted.
 - b. All casing/liner joints are watertight and no water is entering casing or liner from any sources.
 - c. All contact grouting is complete.

- d. Casing/liner alignment record drawings have been submitted and accepted by Owner to document deviations due to casing/liner installation.
- e. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with applicable requirements.
- 2. The carrier pipe shall be installed within the casings or liners between the limits indicated on the Drawings, to the specified lines and grades and utilizing methods which include due regard for safety of workers, adjacent structures and improvements, utilities and the public.
- B. Control of Line and Grade
 - 1. Install Carrier pipe inside the steel casing within the following tolerances:
 - a. Horizontal
 - 1) ± 2 inches from design line
 - b. Vertical
 - 1) ±1 inch from design grade
 - 2. Check line and grade set up prior to beginning carrier pipe installation.
 - 3. Perform survey checks of line-and-grade of carrier pipe during installation operations.
 - 4. The Contractor is fully responsible for the accuracy of the installation and the correction of it, as required.
 - a. Where the carrier pipe installation does not satisfy the specified tolerances, correct the installation, including if necessary, redesign of the pipe or structures at no additional cost to Owner.
- C. Installation of Carrier Pipe
 - 1. Pipe Installation
 - a. Remove all loose soil from casing or liner.
 - b. Grind smooth all rough welds at casing joints.
 - c. Steel pipe shall be installed so as not to damage heat shrink sleeves. Contractor shall submit proposed method for approved.
 - 2. Installation of Casing Spacers
 - a. Provide casing spacers, insulators or other approved devices to prevent flotation, movement or damage to the pipe during installation and grout backfill placement.
 - b. Assemble and securely fasten casing spacers to the pipeline to be installed in casings or tunnels.
 - c. Correctly assemble, evenly tighten and prevent damage during tightening of the insulators and pipe insertion.
 - d. Install spacers in accordance with manufacturer's recommendations.
 - e. Install carrier pipe so that there is no metallic contact between the carrier pipe and the casing.
 - f. Carrier pipe shall be installed without sliding or dragging it on the ground or in the casing/liner in a manner that could damage the pipe or coatings.
 1) If guide role are ellowed place eccent metter on both sides of the role.
 - 1) If guide rails are allowed, place cement mortar on both sides of the rails.
 - g. Coat the casing spacer runners with a non-corrosive/environmentally safe lubricant to minimize friction when installing the carrier pipe.
 - h. The carrier pipe shall be electrically isolated from the carrier pipe and from the casing.
 - i. Grade the bottom of the trench adjacent to each end of the casing to provide a firm, uniform and continuous support for the pipe. If the trench requires some backfill to establish the final trench bottom grade, place the backfill material in 6-inch lifts and compact each layer.
 - j. After the casing or tunnel liner has been placed, pump dry and maintain dry until the casing spacers and end seals are installed.

- 3. Casing Spacer Spacing
 - a. Maximum distance between spacers is to be 6 feet.
 - b. For flanged pipe or bell and spigot pipe, install spacers within 1 foot on each side of the bell or flange and 1 in the center of the joint where 18 foot or 20 foot long joints are used.
 - c. If the casing or pipe is angled or bent, reduce the spacing.
 - d. The end spacer must be within 6 inches of the end of the casing pipe, regardless of size of casing and pipe or type of spacer used.
 - e. Install spacers on PVC pipe at the insertion line to prevent over-insertion of the spigot into the bell.
- 4. After installation of the carrier pipe:
 - a. Mortar inside and outside of the joints, as applicable
 - b. Verify electrical discontinuity between the water carrier pipe and casing/tunnel liner.
 - 1) If continuity exists, remedy the short, by all means necessary including removing and reinstalling the carrier pipe, prior to applying LDCG.
 - c. If hold down jacks or casing spacers are used, seal or plug the ends of the casing.
 - d. If steel pipe is used and not welded prior to installation in casing/liner, welding of pipe will only be allowed after grouting of annular space is complete.
- D. Annular Space Grouting
 - 1. Prepare pipe as necessary to prevent the pipe from floating during grouting operation as necessary.
 - 2. Mixing of Grout
 - a. Mix material in equipment of sufficient size to provide the desired amount of grout material for each stage in a single operation.
 - The equipment shall be capable of mixing the grout at the required densities for the approved procedure and shall be capable of changing the densities as required by field conditions.
 - 3. Backfill Annular Space with Grout
 - a. Verify the maximum allowable pressure with the carrier pipe manufacturer and do not exceed this pressure.
 - b. After the installation of the carrier pipe, the remaining space (all voids) between the casing/liner and the carrier shall be filled with LDCG.
 - 1) All surfaces of the exterior carrier pipe wall and casing/liner interior shall be in contact with the grout.
 - 2) Grout shall be pumped through a pipe or hose.
 - 3) Use grout pipes, or other appropriate materials, to avoid damage to carrier pipe during grouting.
 - 4. Injection of LDCG
 - a. Grout injection pressure shall not exceed the carrier pipe manufacturer's approved recommendations or 5 psi (whichever is lower).
 - b. Pumping equipment shall be of a size sufficient to inject grout at a volume, velocity and pressure compatible with the size/volume of the annular space.
 - c. Once grouting operations begin, grouting shall proceed uninterrupted, unless grouting procedures require multiple stages.
 - d. Grout placements shall not be terminated until the estimated annular volume of grout has been injected.
 - 5. Block the carrier pipe during grouting to prevent flotation during grout installation.
 - 6. Protect and preserve the interior surfaces of the casing from damage.

3.2 FIELD QUALITY CONTROL

- A. Reports and Records required for pipe installations greater than 48-inches and longer than 350 feet
 - 1. Maintain and submit daily logs of grouting operations.
 - a. Include:
 - 1) Grouting locations
 - 2) Pressures
 - 3) Volumes
 - 4) Grout mix pumped
 - 5) Time of pumping
 - 2. Note any problems or unusual observations on logs.
- B. Grout Strength Tests
 - 1. Owner will perform testing for 24-hour and 28-day compressive strength tests for the cylinder molds or grout cubes obtained during grouting operations.
 - 2. Owner will perform field sampling during annular space grouting.
 - a. Owner will collect at least 1 set of 4 cylinder molds or grout cubes for each 100 cubic yards of grout injected but not less than 1 set for each grouting shift.
 - b. Owner will perform 24-hour and 28-day compressive strength tests per ASTM C39 (cylindrical specimens) or ASTM C109 (cube specimens).
 - c. Remaining samples shall be tested as directed by Owner.
- C. Safety
 - 1. The Contractor is responsible for safety on the job site.
 - a. Perform all Work in accordance with the current applicable regulations of the Federal, State and local agencies.
 - b. In the event of conflict, comply with the more restrictive applicable requirement.
 - 2. No gasoline powered equipment shall be permitted in jacking shafts and receiving shafts/pits.
 - a. Diesel, electrical, hydraulic and air powered equipment is acceptable, subject to applicable local, State and Federal regulations.
 - 3. Methods of construction shall be such as to ensure the safety of the Work, Contractor's and other employees on site and the public.
 - 4. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground.
 - a. Perform all required air and gas monitoring.
 - b. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.
 - 5. Perform all Work in accordance with all current applicable regulations and safety requirements of the federal, state and local agencies.
 - a. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations.
 - b. In the event of conflict, comply with the more stringent requirements.
 - 6. If personnel will enter the pipe during construction, the Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe.
 - a. Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction

END OF SECTION

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SECTION 33 05 25 SETTLEMENT MONITORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. The Work includes, but is not limited to: installing surface control points, installing subsurface monitoring points, furnishing monitoring equipment, and recording observations and measurements from the monitoring points on a periodic basis before, during, and after trenchless installation, shaft construction, and tie-ins to monitor ground movements around and above tunneling operations, and all excavations.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 03 60 00 Contact Grouting
 - 4. Section 33 05 23 Hand Tunneling

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Definitions
 - 1. Surface Control Points: Control points established as a reference for measuring elevation of the ground surface using optical survey methods.
 - 2. Subsurface Monitoring Point: A cased borehole settlement monitoring point located above the tunnel crown used for detecting settlement between the location of the settlement point and the tunnel excavation.
- B. Geotechnical Report
 - 1. Geotechnical Engineering Study; CMJ Report 103-19-286; 48-Inch Pipeline Improvements WRF Phase 2, Wylie, TX; CMJ Engineering Inc., October 2019

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery. Review and acceptance of the Contractor's submittals by the Engineer shall not be construed in any way as relieving the Contractor of its responsibilities under this Contract.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings
 - 1. Submit the following at least one (1) month before scheduled installation of monitoring points:
 - a. Instrumentation Schedule: Submit the proposed schedule for installing the surface control points and subsurface monitoring points.
 - b. Description of methods and materials for installing and protecting surface control points and subsurface monitoring points.

- c. Drawings with locations of proposed monitoring points shown in plan and profile.
- 2. Within 72 hours following installation of the instruments, submit drawings showing the actual as-built installed location, the instrument identification number, the instrument type, the installation date and time, and the tip elevation and instrument length. Include details of installed instruments, accessories and protective measures including all dimensions and materials used.
- B. Test and Evaluation Reports
 - 1. The Contractor shall submit all reports of monitoring data to the Engineer within 48 hours of data acquisition.
 - Submit surveyed baseline measurements of all monitoring points at least fourteen (14) days prior to commencing excavation to establish baseline readings.
 - 3. Submit surveyed measurements of monitoring points during and after construction in accordance with Part 3 of this Specification.
- C. Qualification Statements
 - 1. Submit surveying personnel qualifications at the time of bid in accordance with the requirements herein.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Qualifications
 - 1. Surveyor
 - a. All surveying shall be performed by a land surveyor licensed in the State of Texas with previous experience surveying for the detection of surface and subsurface deformations.

1.10 DELIVERY, STORAGE, AND HANDLING [NOT USED]

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 MONITORING

- A. Performance / Design Criteria
 - 1. Any ground movements (settlement/heave) shall be limited to values that shall not cause damage to adjacent utilities and facilities. In no case shall settlements exceed the applicable values listed in the table below.

| Site Feature | Allowable Settlement / Heave (inches) |
|-------------------------|--|
| State Highways | 0.50 |
| City Streets | 1.00 |
| Sidewalks, Curb, Gutter | 1.00 |
| Underground Utilities | 1.00 |

B. Materials

1. All instrumentation shall remain the property of the Contractor following completion of the Work, and shall be removed or abandoned according to applicable codes and standards unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions
 - Locate and confirm all utilities and protect utilities or relocate monitoring points as necessary to protect all utilities. Follow accepted industry procedures for one-call notification and visual confirmation of locations of all crossing or adjacent utilities. Instrument locations shall be modified, as approved by the Engineer, to avoid interference with the existing conduit and utilities. Repair damage to existing utilities resulting from instrument installations at no additional cost to the Owner.

3.2 ERECTION / INSTALLATION / APPLICATION

- A. Installation of monitoring points shall be performed in the presence of the Engineer.
 - Minimum monitoring requirements shall be two monitoring points per tunnel, one on either side. Monitoring points shall be a maximum distance of 10 feet from the tunnel shaft. Additionally, the Contractor shall install other monitoring points as necessary or as requested by the Engineer, to control operations, monitor ground conditions and ground response to achieve specified project requirements and to prevent damage to existing structures and facilities.
- B. The Contractor is responsible for surveying the elevations of the surface control points, the subsurface monitoring points, and other instrumentation locations in accordance with the requirements herein. Elevations shall be determined before tunneling and shaft construction begin to establish a baseline, and during and after operations to monitor any movements related to the tunneling, shaft construction, and tie-ins.
- C. Surveying for monitoring settlement instrumentation shall be referenced to the same control points and benchmarks established for setting out the Work. Control points shall be tied to benchmarks and other monuments outside of the zone of influence of the excavation or trenchless construction.
 - Surface control points shall be established by an inscribed marking or approved surveyors nail driven flush with the surface in asphalt or concrete paved areas. In landscaped areas, surface control points shall be established by driving a 2-inch by 2-inch by 18-inch long timber stake flush with the ground. Each control point shall have a tag or marking indicating the station and offset from centerline. Surveying of surface control points will consist of determining the elevation of each control point with respect to a benchmark selected by the Engineer to an accuracy of 0.01 foot.

D. Contractor shall provide access and assistance to the Engineer for obtaining supplemental monitoring data, as requested by Engineer.

3.3 MONITORING FREQUENCY

- A. Surface Control Points
 - 1. Initial survey measurements shall be obtained at least one week prior to any excavation and at not greater than two-day intervals after beginning excavation, tunneling operations, or more frequently, as directed by the Engineer.
- B. Subsurface Monitoring Points
 - 1. Once tunneling begins, subsurface monitoring points shall be surveyed once for every 10 feet of tunnel progress. Additionally, all monitoring points shall be surveyed at least once per day during tunneling operations. Once these operations are complete, all settlement monitoring devices shall be surveyed once per day for the first seven days, once at 14 days and once at 30 days after completion of the trenchless work.
- C. Provide data from readings of all monitoring points to the Engineer within 24 hours of reading.

3.4 SUBSURFACE MONITORING POINTS

- A. Subsurface monitoring points shall be established and installed as indicated on the approved shop drawing. The Engineer may modify subsurface monitoring point locations depending on field conditions, conflicting utilities and monitoring objectives.
- B. Each point shall consist of a #6 rebar settlement rod installed within and isolated from a PVC cased borehole.
 - 1. The settlement rod shall be driven 6 to 12 inches past the bottom of the PVC borehole casing and the tip of the rod shall be located at five feet above the pipe crown centerline as noted on the Plans, or as directed by the Engineer.
 - 2. The settlement rod shall be secured to the PVC casing with a 12-inch length of loose cable or chain to prevent the rod from falling more than approximately 12 inches.
 - 3. The PVC casing shall be flush with pavement or recessed, and capped and protected with a road box if installed within traffic lanes, shoulders, parking lots, or bike lanes and shall be in accordance with TxDOT and other applicable permit requirements.
- C. Notify the Engineer at least 3 days in advance of installing subsurface monitoring points.
- D. Subsurface monitoring point installations shall be completed at least 14 days in advance of commencing shaft construction or tunneling operations.
- E. Conduct drilling operations using appropriate methods that are consistent with anticipated geologic conditions. Use mud rotary wash methods or provide casing as required to hold drill hole open.
- F. Subsurface monitoring rods shall move freely with the soil and shall be isolated from the soil surrounding the borehole by the casing.

3.5 CLEANING

- A. Abandonment of Instruments
 - 1. Surface Control Points

- a. All surface control points on public property shall remain in place at the completion of the Work. Remove all surface control points on private property during the cleanup and restoration work, or as required by the Engineer.
- 2. Subsurface monitoring points
 - a. Properly abandon all monitoring point boreholes, by grouting drilled holes with cement-bentonite grout conforming to the requirements of Section 03 60 00 CONTACT GROUTING.

3.6 MAINTENANCE

A. Protect the instruments and surface control points from damage. Damaged installations shall be replaced or repaired prior to continuing excavation or tunneling unless permitted otherwise in writing by the Engineer.

END OF SECTION

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SECTION 33 11 10 DUCTILE IRON PIPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - This Work includes furnishing labor, materials, equipment, and incidentals necessary to install ductile iron pressure pipe and specials, including connections and appurtenances as required for the proper installation and function of the system.
 - 2. Polyethylene encasement for ductile iron pipe is detailed in this Section.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 33 11 11 Ductile Iron Fittings

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - American National Standards Institute (ANSI)/American Water Works Association (AWWA)
 - a. ANSI/AWWA C104/A21.4 American National Standard for cement Mortar Lining for Ductile-Iron Pipe and Fittings for water.
 - b. ANSI/AWWA C105/A21.5 American National Standard for Polyethylene Encasement.
 - c. ANSI/AWWA C111/A21.11 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - d. ANSI/AWWA C115/A21.15 American National Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - e. ANSI/AWWA C150/A21.50 American National Standard for the Thickness Design of Ductile-Iron Pipe.
 - f. ANSI/AWWA C151/A21.51 American National Standard for the Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
 - g. ANSI/AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - h. AWWA M-41 Ductile-Iron Pipe and Fittings.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Exterior painting to include recommendation for preparation, application and storage.
- B. Shop Drawings

- 1. Product cut sheets
- C. Certificates
 - 1. Prior to delivery of the pipe to the project site, the manufacturer shall furnish an affidavit certifying that all pipe, specials, and other products and materials furnished comply with this specification.
- D. Test and Evaluation Reports
 - 1. If requested by the Owner, the manufacturer shall submit certified reports of all testing.

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Finished pipe shall be the product of one (1) manufacturer.
- B. Pipe manufacturing operations (pipe, fittings, lining, coating) shall be performed at one (1) location.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements
 - 1. Delivery and Storage shall be in accordance with ANSI/AWWA C600 and AWWA M41

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE

A. Manufacturers

- 1. The following manufacturers are acceptable
 - a. American Cast Iron Pipe Company
 - b. US Pipe
 - c. Or Approved Equal

B. Description

- 1. Regulatory Requirements
 - a. Pipe shall be in accordance with AWWA C110, AWWA C111, AWWA C115, AWWA C150, and AWWA C151.
 - b. All pipe shall meet the requirements of NSF 61.
 - c. Dimensions and tolerances of each nominal pipe size shall be in accordance with ANSI/AWWA C151/A21.
- C. Performance / Design Criteria

1. All pipe and fittings shall be restrained

- a. Vault piping shall be flanged unless otherwise specified in the drawings
- b. All buried pipe joints shall be mechanically restrained using TR-Flex by US Pipe, Flex-Ring by ACIPCO, or approved equal.
- c. All joints at valves and fittings shall be mechanically restrained with Megalugs or approved equal.
- 2. Pressure Rating

- a. Refer to Section 01 45 16.16 for pipe pressure requirements.
- 3. Ductile iron pipe shall have nominal lay lengths of 18 or 20 feet.
- 4. Markings
 - a. Pipe markings shall meet the minimum requirements of ANSI/AWWA C151/A21, latest revision. Minimum pipe markings shall be as follows:
 - 1) "DI" or "DUCTILE" shall be cast or metal stamped on each pipe
 - 2) Weight, pressure class, and nominal thickness of each pipe
 - 3) Year and country pipe was cast
 - 4) Manufacturer's mark
- 5. Joints
 - a. All ductile-iron pressure pipe shall be furnished with one of the types of joints indicated below:
 - 1) Push-On Joints (AWWA C111)
 - 2) Mechanical Joints (AWWA C111)
 - 3) Restrained Joints
 - 4) Flanged Joints (AWWA C115/A21.15, ANSI B16.1, Class 125)
 - b. All rubber joint gaskets utilized on ductile-iron pipe shall be in conformance with ANSI/AWWA C111/A21.11, latest revision.
- D. Materials
 - 1. Water lines shall be Special Thickness Class 53 pipe.
 - 2. Iron used in the manufacture of pipe for these specifications shall have:
 - a. Minimum tensile strength 60,000 psi
 - b. Minimum yield strength 42,000 psi
 - c. Minimum elongation 10%
 - 3. Bolts and Nuts
 - a. For buried applications, provide ASTM A193 Grade B8M bolts and ASTM A194 Grade 8M Nuts.
 - b. All buried T-bolts shall be 316 stainless steel.
 - c. Bolts and nuts located within vaults shall be considered a buried application and shall be provided as stainless steel.
 - d. All non-buried bolts and nuts for mechanical joints or flanged ends shall be of a high strength corrosion resistant low-alloy steel in accordance with ANSI/AWWA C111/A21.11 and ASTM A307, "Standard Specification for Carbon Steel Bolts and Nuts".
 - 1) For mechanical joints, the bolts and nuts shall be coated with a ceramicfilled, baked on fluorocarbon resin.
 - a) Coated bolts and nuts shall be prepared "near white" or "white" when coated to manufacturer's recommended thickness by a certified applicator.
 - b) Coating shall be Xylan®, as manufactured by Whitford Corporation, or approved equal.
 - c) Coating shall conform to the performance requirements of ASTM B117, "Salt Spray Test" and shall include, if required, a certificate of conformance"

E. Finishes

- 1. Finish Materials
 - a. All ductile iron pipe shall have an asphaltic coating, minimum of 1 mil thick, on the pipe exterior, unless otherwise specified.
 - b. Pipes shall have an interior cement mortar lining applied in accordance with ANSI/AWWA C104/A21.04, or latest revision.

- c. Pipe exposed to view in the finished work shall not receive the standard asphaltic coat on the outside surfaces, but shall be shop-coated with rust inhibitive primer and field coated in accordance with Section 09 96 00. Primer shall have a minimum dry film thickness of 4 mils and be certified in accordance with ANSI/NSF 61.
- d. For gravity sewer applications, all ductile iron pipe shall have an approved corrosion resistant coating applied to the interior.
 - 1) Coating shall be Protecto 401 or approved equal.
- F. Polyethylene Encasement
 - 1. All buried ductile iron pipe shall be polyethylene encased in accordance with AWWA C105.
 - 2. Use only virgin polyethylene material
 - 3. Encasement for buried pipe shall be 4 mil high density cross-laminated (HDCL) polyethylene encasement conforming to AWWA C105/A21.5.
 - 4. Polyethylene film must be marked as follows:
 - a. Manufacturer's name or trademark
 - b. Year of manufacturer
 - c. ANSI/AWWA C105/A21.5
 - d. Minimum film thickness and material type
 - e. Applicable range of nominal diameter size(s).
 - f. Warning-Corrosion Protection-Repair Any Damage
 - 5. Special Markings/Colors
 - a. Reclaimed Water, perform one of the following:
 - 1) Label polyethylene encasement with "RECLAIMED WATER",
 - 2) Provide purple polyethylene in accordance with the American Public Works Association Uniform Color Code; or
 - 3) Attach purple reclaimed water marker tape to the polyethylene wrap.
 - b. Wastewater, perform one of the following:
 - 1) Label polyethylene encasement with "WASTEWATER";
 - 2) Provide green polyethylene in accordance with the American Public Works Association Uniform Color Code; or
 - 3) Attach green sanitary sewer marker tape to the polyethylene wrap.
 - 6. Minimum Widths

Polyethylene Tube and Sheet Sizes for Push-On Joint Pipe

| Nominal Pipe Diameter (inches) | Min. Width – Flat Tube (inches) | Min. Width – Sheet (inches) |
|-----------------------------------|------------------------------------|-----------------------------|
| 3 | 14 | 28 |
| 4 | 14 | 28 |
| 6 | 16 | 32 |
| 8 | 20 | 40 |
| 10 | 24 | 48 |
| 12 | 27 | 54 |
| 14 | 30 | 60 |
| 16 | 34 | 68 |
| 18 | 37 | 74 |
| 20 | 41 | 82 |
| 24 | 54 | 108 |
| 30 | 67 | 134 |
| 36 | 81 | 162 |

| 42 | 81 | 162 |
|----|-----|-----|
| 48 | 95 | 190 |
| 54 | 108 | 216 |
| 60 | 108 | 216 |
| 64 | 121 | 242 |

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pipe, fittings, and appurtenances as special in accordance with AWWA M41, AWWA C600, and in accordance with the pipe manufacturer's recommendations.
- B. All pipe shall be mechanically restrained at fittings and joints.
- C. Polyethylene encasement shall be installed in accordance with AWWA C105 and AWWA M41, Method A or B. Method C will not be allowed.

3.2 PIPE HANDLING

- A. Haul and distribute pipe and fittings at the project site.
- B. Handle piping with care to avoid damage.
 - 1. Inspect each joint of pipe and reject or repair any damaged pipe prior to lowering into the trench.
 - 2. Do not handle the pipe in such a way that will damage the interior lining.
 - 3. Use only nylon ropes, slings or other lifting devices that will not damage the surface of the pipe for handling the pipe.
- C. At the close of each operating day:
 - 1. Keep the pipe clean and free of debris, dirt, animals and trash during and after the laying operation.
 - 2. Effectively seal the open end of the pipe using a gasketed night cap.

3.3 JOINT MAKING

- A. Mechanical Joints
 - 1. Assemble mechanical joints in accordance with ANSI/AWWA C111/A21.11 Appendix A, AWWA C600 and AWWA Manual M41.
 - 2. Bolt the follower ring into compression against the gasket with the bolts tightened down evenly then cross torqued in accordance with AWWA C600.
 - 3. Overstressing of bolts to compensate for poor installation practice will not be permitted.
- B. Push-on Joints
 - 1. Install Push-on joints as defined in AWWA/ANSI C111/A21.11.
 - 2. Wipe clean the gasket seat inside the bell of all extraneous matter.
 - 3. Place the gasket in the bell in the position prescribed by the manufacturer.
 - 4. Apply a thin film of non-toxic vegetable soap lubricant to the inside of the gasket and the outside of the spigot prior to entering the spigot into the bell.
 - 5. When using a field cut plain end piece of pipe, refinish the field cut and scarf to conform to AWWA C600.
- C. Flanged Joints
 - 1. Install in accordance with ASME PCC-1-2012.

- 2. During assembly, tighten nuts gradually and equally using a three-pass method in accordance with ASME PCC-1-2012.
 - a. For the first pass, tighten the nuts to 50 percent at diametrically opposite sides to prevent misalignment and to ensure that all bolts carry equal loads.
 - b. For the second pass, tighten the nuts to 100 percent again in a diametrically opposite pattern.
 - c. Allow a minimum of 1 hour to pass to provide time for settlement between bolts and nuts and gasket relaxation.
 - d. Complete the third pass by checking each bolt in a clockwise pattern. Each nut should be tightened until it will no longer turn. This step compensates for elastic interaction and brings all bolts into parity.
- 3. The threads of the bolts should protrude a minimum of ½-inch from the nuts.
- 4. The fitting must be free to move in any direction while bolting.a. Install flange bolts with all bolt heads faced in one direction.
- D. Joint Deflection
 - 1. Deflect the pipe only when necessary to avoid obstructions or to meet the lines and grades and shown in the Drawings.
 - 2. The deflection of each joint must be in accordance with AWWA C600 Table 3.
 - 3. The maximum deflection allowed is 80 percent of that indicated in AWWA C600.
 - 4. The manufacturer's recommendation may be used with the approval of the Engineer.

3.4 POLYETHYLENE ENCASEMENT INSTALLATION

- A. Preparation
 - 1. Remove all lumps of clay, mud, cinders, etc., on pipe surface prior to installation of polyethylene encasement.
 - a. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.
 - 2. Fit polyethylene film to contour of pipe to affect a snug, but not tight encasement with minimum space between polyethylene and pipe.
 - a. Provide sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces such as bell-spigot interfaces, bolted joints or fittings and to prevent damage to polyethylene due to backfilling operations.
 - b. Secure overlaps and ends with adhesive tape and hold.
 - 3. For installations below water table and/or in areas subject to tidal actions, seal both ends of polyethylene tube with adhesive tape at joint overlap.
- B. Tubular Type (Method A)
 - 1. Cut polyethylene tube to length approximately 2 feet longer than pipe section.
 - 2. Slip tube around pipe, centering it to provide 1-foot overlap on each adjacent pipe section and bunching it accordion-fashion lengthwise until it clears pipe ends.
 - 3. Lower pipe into trench and make up pipe joint with preceding section of pipe.
 - 4. Make shallow bell hole at joints to facilitate installation of polyethylene tube.
 - 5. After assembling pipe joint, make overlap of polyethylene tube, pull bunched polyethylene from preceding length of pipe, slip it over end of the new length of pipe and wrap until it overlaps joint at end of preceding length of pipe.
 - 6. Secure overlap in place.
 - 7. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points.
 - 8. Repair cuts, tears, punctures or other damage to polyethylene.
 - 9. Proceed with installation of next pipe in same manner.

- C. Tubular Type (Method B)
 - 1. Cut polyethylene tube to length approximately 1 foot shorter than pipe section.
 - 2. Slip tube around pipe, centering it to provide 6 inches of bare pipe at each end.
 - 3. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points; secure ends.
 - 4. Before making up joint, slip 3-foot length of polyethylene tube over end of proceeding pipe section, bunching it accordion-fashion lengthwise.
 - 5. After completing joint, pull 3-foot length of polyethylene over joint, overlapping polyethylene previously installed on each adjacent section of pipe by at least 1 foot; make each end snug and secure.
- D. Sheet Type
 - 1. Cut polyethylene sheet to a length approximately 2 feet longer than piece section.
 - 2. Center length to provide 1-foot overlap on each adjacent pipe section, bunching it until it clears the pipe ends.
 - 3. Wrap polyethylene around pipe so that it circumferentially overlaps top quadrant of pipe.
 - 4. Secure cut edge of polyethylene sheet at intervals of approximately 3 feet.
 - 5. Lower wrapped pipe into trench and make up pipe joint with preceding section of pipe.
 - 6. Make shallow bell hole at joints to facilitate installation of polyethylene.
 - 7. After completing joint, make overlap and secure ends.
 - 8. Repair cuts, tears, punctures or other damage to polyethylene.
 - 9. Proceed with installation of next section of pipe in same manner.
- E. Pipe-Shaped Appurtenances
 - 1. Cover bends, reducers, offsets and other pipe-shaped appurtenances with polyethylene in same manner as pipe and fittings.
- F. Odd-Shaped Appurtenances
 - 1. When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in tube, wrap with flat sheet or split length polyethylene tube by passing sheet under appurtenances and bringing it up around body.
 - 2. Make seams by bringing edges together, folding over twice and taping down.
 - 3. Tape polyethylene securely in place at the valve stem and at any other penetrations.
- G. Repairs
 - 1. Repair any cuts, tears, punctures or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrap around fitting to cover damaged area and secure in place.
- H. Openings in Encasement
 - 1. Provide openings for branches, service taps, blow-offs, air valves and similar appurtenances by making an X-shaped cut in polyethylene and temporarily folding back film.
 - 2. After appurtenance is installed, tape slack securely to appurtenance and repair cut, as well as other damaged area in polyethylene with tape.
 - 3. Service taps may also be made directly through polyethylene, with any resulting damaged areas being repaired as described above.
- I. Junctions between Wrapped and Unwrapped Pipe:

- 1. Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, extend polyethylene wrap to cover adjacent pipe for distance of at least 3 feet.
- 2. Secure end with circumferential turns of tape.
- 3. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for minimum clear distance of 3 feet away from Cast or Ductile Iron Pipe.

3.5 FIELD QUALITY CONTROL

- A. Field [OR] Site Tests and Inspections
 - 1. Purging, sterilization, and testing shall be performed in accordance with Section 01 45 16.16 Hydrostatic Testing and Disinfection.

END OF SECTION

SECTION 33 11 11 DUCTILE IRON FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. This Work includes furnishing labor, materials, equipment, and incidentals necessary to install ductile-iron fittings and specials, including connections and appurtenances as required for the proper installation and function of the system.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.
 - 3. Section 33 11 10 Ductile Iron Pipe

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American National Standards Institute (ANSI)/American Water Works Association (AWWA)
 - a. ANSI/AWWA C104/A21.4 American National Standard for cement Mortar Lining for Ductile-Iron Pipe and Fittings for water.
 - b. ANSI/AWWA C105/A21.5 American National Standard for Polyethylene Encasement.
 - c. ANSI/AWWA C110/A21.10 American National Standard for Ductile Iron and Grey Iron Fittings, 3-inch through 48 inches for water and other liquids.
 - d. ANSI/AWWA C111/A21.11 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. ANSI/AWWA C153/A21.53, "Ductile-Iron Compact Fittings For Water Service"
 - f. ANSI/AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - g. AWWA M-41 Ductile-Iron Pipe and Fittings.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS [NOT USED]

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Exterior painting to include recommendation for preparation, application and storage.
- B. Shop Drawings
 - 1. Product cut sheets
- C. Certificates

- 1. Prior to delivery of the fittings to the project site, the manufacturer shall furnish an affidavit certifying that all fittings, specials, and other products and materials furnished comply with this specification.
- D. Test and Evaluation Reports
 - 1. If requested by the Owner, the manufacturer shall submit certified reports of all testing.
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

Pipe manufacturing operations (pipe, fittings, lining, coating) shall be performed at one (1) location.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements
 - 1. Delivery and Storage shall be in accordance with ANSI/AWWA C600 and AWWA M41

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE FITTINGS

- A. Manufacturers
 - 1. The following manufacturers are acceptable
 - a. American Cast Iron Pipe Company
 - b. US Pipe
 - c. Or Approved Equal
- B. Performance / Design Criteria
 - 1. Fittings shall be full body per AWWA C110/A21.10 or compact per AWWA C153/A21.53.Joints
 - a. Fittings shall have flanged, mechanical restrained, push-on joints or any combination of these.
 - b. Joints must comply with the latest version of ANSI/AWWA C111/A21.11 (AWWA C115/A21.15, ANSI B16.1, Class 125 for flanged joints)
 - c. All joints at fittings shall be mechanically restrained with Megalugs or approved equal
 - 2. Pressure Rating
 - a. Unless specified otherwise, the rated working pressures for fittings and mechanical restraint are as follows:
 - 1) Ductile Iron Compact Fittings (AWWA C153/A21.53)

| Nominal Size (in) | 0 | Pressure Rating (PSI) |
|-------------------|---|-----------------------|
| 3" – 24" | | 350 PSI |
| 30" – 48" | | 250 PSI |
| 54" – 64" | | 250 PSI |

2) Ductile-Iron Full Body Fittings (AWWA C110/A21.10)

| aotho non r an Doay r han | go (, |
|---------------------------|-----------------------|
| Nominal Size (in) | Pressure Rating (PSI) |
| 3" – 24" | 350 PSI |
| 30" – 48" | 250 PSI |
| | |

- Mechanical Restraint (Megalugs or Approved Equal) 250 psi pressure rating
- b. Test pressure shall be in accordance with Section 01 45 16.16.
- 3. Dimensions and Thickness
 - a. Fittings and joints shall conform to the thickness and dimensions shown in the various standards referenced above.
- 4. Flange
 - Unless specified otherwise, the bolt circle and the bolt-holes shall match those of ANSI B16.1 Class 125. Field fabrication of flanges shall be prohibited, unless approved otherwise.
- 5. Gland
 - Dimensions of the gland shall be such that it can be used with the standardized joint bell and tee-head bolts conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.
- 6. Accessories
 - a. Unless otherwise specified, gaskets, glands, bolts, and nuts shall be furnished with mechanical joints, and gaskets and lubricant shall be furnished with pushon joints; all in sufficient quantity for assembly of each joint.
- 7. Markings
 - a. Fitting marking shall meet the requirements of ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 shall have distinctively cast on them the following information:
 - 1) C-153 or C-110, depending on which type of fitting provided.
 - 2) Pressure Rating
 - 3) Weight
 - 4) Nominal diameter of openings
 - 5) Manufacturer's identification
 - 6) Year and country where cast
 - 7) Number of degrees or fraction of the circle on all bends
 - 8) Letters "DI" or "DUCTILE" cast on them.
- C. Materials
 - 1. Flanges
 - a. All screwed-on flanges shall be ductile iron.
 - 2. Glands
 - a. Glands shall be manufactured of ductile iron conforming to ASTM A536.
 - b. Restraining devices shall be of ductile iron.
 - 3. Bolts and Nuts
 - a. For buried applications, provide ASTM A193 Grade B8M bolts and ASTM A194 Grade 8M Nuts.
 - b. All buried T-bolts shall be 316 stainless steel.
 - c. Bolts and nuts located within vaults shall be considered a buried application and shall be provided as stainless steel.
 - d. All non-buried bolts and nuts for mechanical joints or flanged ends shall be of a high strength corrosion resistant low-alloy steel in accordance with ANSI/AWWA C111/A21.11 and ASTM A307, "Standard Specification for Carbon Steel Bolts and Nuts".
 - 1) For mechanical joints, the bolts and nuts shall be coated with a ceramicfilled, baked on fluorocarbon resin.

- a) Coated bolts and nuts shall be prepared "near white" or "white" when coated to manufacturer's recommended thickness by a certified applicator.
- b) Coating shall be Xylan®, as manufactured by Whitford Corporation, or approved equal.
- c) Coating shall conform to the performance requirements of ASTM B117, "Salt Spray Test" and shall include, if required, a certificate of conformance"

D. Finishes

- 1. Finish Materials
 - a. Exterior Coatings
 - 1) All ductile fittings shall be coated in accordance with Section 09 96 00.
 - b. Interior Coatings
 - 1) All ductile iron fittings are to be furnished with a cement-mortar lining of standard thickness as defined in referenced ANSI/AWWA C104/A21.4 and given a seal coat of asphaltic material, unless otherwise specified.
 - Fusion bonded interior coatings shall comply with ANSI/AWWA C116/A21.16, shall have a minimum dry film thickness of 4 mils, and be certified in accordance with ANSI/NSF 61.
- E. Polyethylene Encasement
 - 1. All buried ductile iron fittings shall be polyethylene encased in accordance with AWWA C105.
 - 2. Use only virgin polyethylene material
 - 3. Encasement for buried pipe shall be 4 mil high density cross-laminated (HDCL) polyethylene encasement conforming to AWWA C105/A21.5.
 - 4. Polyethylene film must be marked as follows:
 - a. Manufacturer's name or trademark
 - b. Year of manufacturer
 - c. ANSI/AWWA C105/A21.5
 - d. Minimum film thickness and material type
 - e. Applicable range of nominal diameter size(s).
 - f. Warning-Corrosion Protection-Repair Any Damage
 - 5. Special Markings/Colors
 - a. Reclaimed Water, perform one of the following:
 - 1) Label polyethylene encasement with "RECLAIMED WATER",
 - 2) Provide purple polyethylene in accordance with the American Public Works Association Uniform Color Code; or
 - 3) Attach purple reclaimed water marker tape to the polyethylene wrap.
 - b. Wastewater, perform one of the following:
 - 1) Label polyethylene encasement with "WASTEWATER";
 - 2) Provide green polyethylene in accordance with the American Public Works Association Uniform Color Code; or
 - 3) Attach green sanitary sewer marker tape to the polyethylene wrap.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fittings in accordance with AWWA M41, AWWA C600, and in accordance with the pipe manufacturer's recommendations.
- B. All pipe shall be mechanically restrained at fittings and joints.

C. Polyethylene encasement shall be installed in accordance with AWWA C105 and AWWA M41, Method A or B. Method C will not be allowed.

3.2 JOINT MAKING

- A. Mechanical Joints
 - 1. Assemble mechanical joints in accordance with ANSI/AWWA C111/A21.11 Appendix A, AWWA C600, and AWWA Manual M41
 - 2. Bolt the follower ring into compression against the gasket with the bolts tightened down evenly then cross torqued in accordance with AWWA C600.
 - 3. Overstressing of bolts to compensate for poor installation practice will not be permitted.
- B. Push-on Joints
 - 1. Install Push-on joints as defined in AWWA/ANSI C111/A21.11.
 - 2. Wipe clean the gasket seat inside the bell of all extraneous matter.
 - 3. Place the gasket in the bell in the position prescribed by the manufacturer.
 - 4. Apply a thin film of non-toxic vegetable soap lubricant to the inside of the gasket and the outside of the spigot prior to entering the spigot into the bell.
 - 5. When using a field cut plain end piece of pipe, refinish the field cut and scarf to conform to AWWA C600.
- C. Flanged Joints
 - 1. Install in accordance with ASME PCC-1-2012.
 - 2. During assembly, tighten nuts gradually and equally using a three-pass method in accordance with ASME PCC-1-2012.
 - a. For the first pass, tighten the nuts to 50 percent at diametrically opposite sides to prevent misalignment and to ensure that all bolts carry equal loads.
 - b. For the second pass, tighten the nuts to 100 percent again in a diametrically opposite pattern.
 - c. Allow a minimum of 1 hour to pass to provide time for settlement between bolts and nuts and gasket relaxation.
 - d. Complete the third pass by checking each bolt in a clockwise pattern. Each nut should be tightened until it will no longer turn. This step compensates for elastic interaction and brings all bolts into parity.
 - 3. The threads of the bolts should protrude a minimum of ½-inch from the nuts.
 - 4. The fitting must be free to move in any direction while bolting.a. Install flange bolts with all bolt heads faced in one direction.

3.3 POLYETHYLENE ENCASEMENT INSTALLATION

- A. Odd-Shaped Appurtenances
 - 1. When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in tube, wrap with flat sheet or split length polyethylene tube by passing sheet under appurtenances and bringing it up around body.
 - 2. Make seams by bringing edges together, folding over twice and taping down.
 - 3. Tape polyethylene securely in place at the valve stem and at any other penetrations.
- B. Repairs
 - 1. Repair any cuts, tears, punctures or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrapped around fitting to cover damaged area and secured in place.

3.4 FIELD [OR] SITE QUALITY CONTROL

- A. Field [OR] Site Tests and Inspections
 - 1. Purging, sterilization, and testing shall be performed in accordance with Section 01 45 16.16 Hydrostatic Testing and Disinfection.

END OF SECTION

SECTION 33 11 13 CONCRETE PRESSURE PIPE, BAR-WRAPPED, STEEL CYLINDER TYPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - Concrete Pressure Pipe, Bar-Wrapped, Steel Cylinder Type (Concrete Pressure Pipe) 18-inch through 72-inch for potable water applications in conformance with AWWA C303
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 01 45 16.16 Hydrostatic Testing and Disinfection
 - 4. Section 31 23 33 Trenching, Backfilling and Compaction
 - 5. Section 33 04 10 Joint Bonding and Electrical Isolation

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125 and 250).
 - b. PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly
 - c. BPVC, Boiler Pressure Vessel Code
 - 3. American Society of Testing and Materials (ASTM):
 - a. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
 - b. A194, Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
 - c. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - d. B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - e. B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - f. C33, Standard Specification for Concrete Aggregates.
 - g. C144, Standard Specification for Aggregate for Masonry Mortar.
 - h. C150, Specification for Portland Cement.

- i. C293, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading).
- j. C497, Methods of Testing Concrete Pipe.
- k. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
- I. C1090, Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.
- m. E165, Standard Practice for Liquid Penetrant Examination for General Industry.
- 4. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code Steel.
- 5. American Water Works Association (AWWA):
 - a. M9, Concrete Pressure Pipe.
- 6. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - b. C206, Field Welding of Steel Water Pipe.
 - c. C207, Steel Pipe Flanges for Waterworks Service Sizes 4 IN through 144 IN.
 - d. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings
 - e. C303, Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
- 7. International Organization for Standardization (ISO).
- 8. NSF International (NSF):
 - a. NSF 61, Drinking Water System Components Health Effects

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Exterior Coating
 - a. Material data
 - b. Application recommendations
 - c. Field touch-up procedures
 - 2. Joint Wrappers
 - a. Material data
 - b. Installation recommendations

- 3. Flexible Joint Couplings
 - a. Manufacturer
 - b. Model
- 4. Mixes
 - a. Mortar for interior joints and patches
 - b. Bonding agents for patches
- 5. Gaskets (if applicable)
- B. Shop Drawings
 - 1. Wall thickness design calculations sealed by a Licensed Professional Engineer in Texas including:
 - a. Internal pressure
 - 1) Maximum design pressure (Working + Surge)
 - 2) Test Pressure
 - b. External pressure
 - 1) Deflection
 - 2) Buckling
 - c. Special physical loading such as supports or joint design
 - d. Thermal expansion and/or contraction, if applicable for the proposed installation
 - e. Outlet reinforcing
 - 2. Thrust restraint calculations for all fittings and valves, including the restraint length, sealed by a Licensed Professional Engineer in Texas.
 - a. When connecting into existing piping, thrust restraint calculations shall include evaluating existing piping to identify if existing pipe joints are required to be restrained.
 - b. For the purpose of thrust calculations, in-line valves shall be evaluated as a dead end thrust condition.
 - 3. Fabrication and lay drawings showing a schematic location with profile and a tabulated layout schedule that is sealed by a Licensed Professional Engineer in Texas and includes:
 - a. Pipe class
 - b. Joint types
 - c. Fittings
 - d. Thrust Restraint
 - e. Stationing (in accordance with the Drawings)
 - f. Transitions
 - g. Joint deflection
 - h. Outlet locations for welding, ventilation, and access

- i. Welding requirements
- 4. Pipe within Casing
 - a. Provide drawings detailing how pipe is restrained to prevent floating within the casing.
- 5. Pipe stulling plan
- C. Certificates and Test Reports
 - 1. Prior to shipment of the pipe, the Pipe Manufacturer shall submit the following:
 - a. A Certificate of Adequacy of Design stating that the pipe to be furnished complies with AWWA C303 and these Specifications
 - b. Copies of results of factory hydrostatic tests shall be provided to the Engineer
 - c. Mill certificates, including chemical and physical test results for each heat of steel
 - The manufacturer shall perform the tests described in AWWA C303, for all pipe, fittings, and specials, except that the absorption test detailed in this Specification shall supersede the requirements of the applicable portion of AWWA C303.
 - d. Certified test reports for welder certification for factory welds in accordance with AWWA C303, Section 5 and for field welds in accordance with AWWA C206.
 - e. Certified test reports for cement mortar tests
 - f. Certified test reports for steel cylinder tests

1.7 CLOSEOUT SUBMITTALS

- A. Certificates
 - 1. Contractor letter verifying removal of pipe stulls.

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturers
 - a. Shall be American Concrete Pressure Pipe Association (ACPPA) Quality Program certified, ISO Quality Certification Program certified, or approved equal, for Concrete Pressure Pipe and accessory manufacturing.
 - b. Pipe manufacturing operations (pipe, lining, and coatings) shall be performed under the control of the manufacturer.
 - c. Pipe shall be the product of one manufacturer which has not less than 5 years successful experience manufacturing AWWA C303 pipe of the particular type and size indicated.
 - 1) This experience record will be thoroughly investigated by the Engineer, and acceptance will be at the sole discretion of the Engineer and Owner.
 - 2) Pipe manufacturing operations (pipe, fittings, lining, and coating) shall be performed at one location, unless otherwise approved by the Engineer.
 - d. Pipe shall be manufactured in accordance with AWWA C303.

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- B. Factory Testing
 - 1. Cement Mortar Lining Shop-applied cement mortar linings shall be tested in accordance with AWWA C303.
 - 2. Cement Mortar Coating Absorption Test
 - a. A water absorption test shall be performed on samples of cured mortar coating taken from each working shift.
 - 1) The mortar coating samples shall have been cured in the same manner as the pipe.
 - 2) A test value shall consist of the average of a minimum of 3 samples taken from the same working shift.
 - 3) The test method shall be in accordance with ASTM C497, Method A.
 - 4) The average absorption value for any test shall not exceed 9 percent and no individual sample shall have an absorption exceeding 10 percent.
 - 5) Tests for each working shift shall be performed on a daily basis until conformance to the absorption requirements has been established by 10 consecutive passing test results, at which time testing may be performed on a weekly basis for each working shift.
 - a) Daily testing shall be resumed for each working shift with failing absorption test results and shall be maintained until conformance to the absorption requirements is re-established by 10 consecutive passing test results.
 - 3. Hydrostatic Pressure Testing
 - a. Hydrostatic pressure testing shall meet or exceed the requirements of AWWA C303 Section 4.6 Fabrication.
 - 1) Each pipe cylinder, with rings welded to its ends, shall be hydrostatically tested prior to application of lining or coating.
 - 2) The internal test pressure shall be that which results in a fiber stress equal to 75 percent of the minimum yield strength of the steel used.
 - 3) Each pipe cylinder tested shall be completely watertight under maximum test pressure.
 - 4) Test pressure shall be held for sufficient time, but not less than 30 seconds, to observe the weld seams.
 - 5) Pipe manufacturer shall maintain a recording of the pressure gauge report and provide to the Engineer.
 - b. Fittings shall be fabricated from hydrostatically tested pipe or fabricated of welded steel sheets or plates.
 - 1) Fittings shall be tested in accordance with AWWA C303.
- C. Manufacturer's Technician for Pipe Installation
 - 1. Pipe Manufacturer's Representative
 - a. During the construction period, the pipe manufacturer shall furnish the services of a factory trained, qualified, job experienced technician to advise and instruct, as necessary, in pipe laying and pipe jointing.

- 1) The technician shall assist and advise the Contractor in his pipe laying operations and shall instruct construction personnel in proper joint assembly and joint inspection procedures.
- 2) The technician is not required to be on-site full time; however, the technician shall be regularly on-site during the first 2 weeks of pipe laying and thereafter as requested by the Engineer, Owner or Contractor.
- D. Owner Testing and Inspection
 - 1. The Owner reserves the option to have an independent testing laboratory, at the Owner's expense, inspect pipe and fittings at the pipe manufacturer's plant.
 - a. The Owner's testing laboratory and Engineer shall have free access to the manufacturer's plant.
 - b. The pipe manufacturer shall notify the Owner, in writing, at least 2 weeks prior to pipe fabrication as to start of fabrication and fabricating schedule. The Owner will then advise the manufacturer as to the Owner's decision regarding tests to be performed by an independent testing laboratory.
 - c. In the event the Owner elects to retain an independent testing laboratory to make material tests and weld tests, it is the intent that the tests be limited to 1 spot testing of each category unless the tests do not show compliance with the standard.
 - 1) If these tests do not show compliance, the Owner reserves the right to have the laboratory make additional tests and observations.
 - 2. The inspection and testing by the independent testing laboratory anticipates that production of pipe shall be done over a normal period of time and without "slow downs" or other abnormal delays.
 - a. In the event that an abnormal production time is required, and the Owner is required to pay excessive costs for inspection, then the Contractor shall be required to reimburse the Owner for such costs over and above those which would have been incurred under a normal schedule of production as determined by the Engineer.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packing
 - 1. Prepare pipe for shipment to:
 - a. Afford maximum protection from normal hazards of transportation
 - b. Allow pipe to reach project site in an undamaged condition
 - 2. Pipe damaged in shipment shall not be delivered to the project site unless such damaged pipe is properly repaired.
 - 3. After the completed pipe and fittings have been removed from the final cure at the manufacturing plant:
 - a. Protect pipe lining from drying by means of plastic end covers banded to the pipe ends.
 - b. Maintain covers over the pipe ends at all times until ready to be installed.
 - c. Moisture shall be maintained inside the pipe by periodic addition of water as necessary.

- 4. Pipes shall be carefully supported during shipment and storage.
 - a. Pipe, fittings and specials shall be separated so that they do not bear against each other and the whole load shall be securely fastened to prevent movement in transit.
 - b. Ship pipe on padded bunks with tie-down straps approximately over stulling.
 - c. Store pipe on padded skids, sand or dirt berms, tires or other suitable means to protect the pipe from damage.
 - d. Each end and each length of pipe, fitting or special (30-inches and larger) and the middle of each pipe joint shall be internally supported and braced with stulls to maintain a true circular shape.
 - 1) Internal stulls shall consist of timber or steel firmly wedged and secured so that stulls remain in place during storage, shipment and installation.
 - 2) Pipe shall be rotated so that one stull remains vertical during storage, shipment and installation.
- B. Delivery, Handling, and Storage
 - 1. Once the first shipment of pipe has been delivered to the site, the Engineer and the Contractor shall inspect the pipe's interior coating for excessive cracking.
 - a. If excessive cracking is found, exceeding the allowance in AWWA C303, modify shipping procedures to reduce or eliminate cracking.
 - 2. Deliver, handle and store pipe in accordance with the manufacturer's recommendations to protect coating systems.
- C. Point of Delivery
 - 1. The Contractor is responsible for securing and maintaining a location to store the material.

1.11 FIELD CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 EQUIPMENT, PRODUCT TYPES, AND MATERIALS

- A. Manufacturers
 - 1. Thompson Pipe Group,
 - 2. or approved equal.
- B. Materials
 - 1. General
 - a. Pipe shall be manufactured in accordance with the latest revisions of AWWA C303, AWWA M9, as well as the special requirements of this Specification.
 - b. All pipe in contact with potable water shall meet the requirements of NSF 61.
 - 2. Cement
 - a. Cement for use in concrete and mortar shall be Type I or II Portland Cement.

- 3. Aggregates
 - a. Aggregates for concrete lining and coating shall conform to ASTM C33.
- 4. Sand
 - a. Sand used for inside and outside joints shall be of silica base, conforming to ASTM C144.
- 5. Mortar Rings
 - a. Pipe to be installed in casing shall have 2 built-up mortar rings, each approximately 2 feet long and a minimum of 2-inches higher than the pipe bell, to prevent the pipe from being supported by the pipe bell.
 - b. Built-up mortar rings are to be applied per the pipe manufacturer's recommendation.
- 6. Bushings, Couplings and Plugs
 - a. Where outlets or taps are threaded, furnish and install brass reducing bushings in larger steel half couplings for the outlet size indicated.
 - b. Threaded plugs shall be brass.
- 7. Mixes
 - a. Cement Mortar
 - 1) Cement mortar used for pouring joints shall consist of:
 - a) 1 part Portland Cement
 - b) 2 parts clean, fine, sharp silica sand
 - c) Mixed with water
 - d) No manufactured sand shall be permitted.
 - e) Exterior joint mortar shall be mixed to the consistency of thick cream.
 - f) Interior joint mortar shall be mixed with as little water as possible so that the mortar is very stiff, but workable.
 - g) Cement shall be ASTM C150, Type I or Type II.
 - h) Sand shall conform to ASTM C144.
 - 2) Cement mortar used for patching shall be mixed as per cement mortar for inside joints.
- 8. Joint Wrappers
 - a. Joint wrappers shall be manufactured by Mar-Mac Manufacturing Company, or approved equal.
 - b. For pipe within casing, Flex Protex joint filler, or approved equal, may be used for pipes that can be welded from the interior.
- 9. Pipe Ends
 - a. The standard pipe end shall include steel joint ring and a continuous solid rubber ring gasket as per AWWA C303.
 - b. Other allowable pipe ends are as follows:1) Field welded joints

- a) Single welded joints may be welded from the inside or outside
- b) For pipes 72" and larger, joints shall be welded both inside and outside.
- 2) Flexible Joint Couplings
 - a) Flexible couplings shall be provided where specified on the Drawings.
 - b) Ends to be joined by flexible couplings shall be:
 - (1) Plain end type.
 - (2) Welds on ends to be joined by couplings shall be ground flush to permit slipping the coupling in at least 1 direction to clear the pipe joint.
 - (3) Harness bolts and lugs shall comply with AWWA M11.
- 3) Butt Straps
 - a) Split butt straps will be allowed unless otherwise specified in the Drawings
 - If split steel butt straps are utilized, longitudinal seams shall be joined by complete joint penetration (CJP) butt welds and circumferential welds shall be double-welded lap joints.
- 4) Flanged joint
 - a) Pipe flanges shall conform to AWWA C207.
 - b) Flange Class
 - Flanges shall be Class D with 150 psi working pressure for pipe where the maximum pressure (test or total) is less than or equal to 225 psi and the working pressure is less than or equal to 150 psi.
 - (2) Flanges shall be Class E with 275 psi working pressure for pipe where the maximum pressure (test or total) is greater than 225 psi and the working pressure is between 150 psi and 275 psi.
 - (3) In no case shall the working pressure of the pipe exceed the working pressure of the flange.
 - c) Flanges shall be drilled in accordance with ASME B16.1 Class 125 drilling. Drilling shall match class of valves or appurtenances which are attached.
 - When Isolation Flanges are required by the Drawings, Drillings shall accommodate the required spacing for mylar sleeves according to Section 33 04 10.
- 10. Flange Coatings
 - a. Coatings for buried flanges shall be Densyl Tape system manufactured by Denso, consisting of Densyl Mastic, Densyl Paste, and Densyl Tape.
 - b. Petrolaturm tape system shall be in accordance with AWWA C217.

- 11. Gaskets
 - a. Isolation Flanges
 - 1) Flanges which are required by the drawings to be Isolation Flanges shall conform to Section 33 04 10.
 - 2) Isolation flanges shall be required at all changes in pipe material.
 - b. Class D Flanges
 - 1) Full face
 - 2) Manufactured true to shape from minimum 80 durometer SBR rubber stock of a thickness not less than 1/8 inch
 - 3) Virgin stock
 - Conforming to the physical and test requirements specified in AWWA/ANSI C111/A21.11
 - 5) Finished gaskets shall have holes punched by the manufacturer and shall match the flange pattern in every respect.
 - 6) Frayed cut edges resulting from job site gasket fabrication are not acceptable.
 - 7) Furnish Viton® Rubber gaskets hydrocarbon restraint gaskets, when required.
 - c. Class E Flanges
 - 1) Full Face
 - 2) Provide a 1/8-inch Nonasbestos gasket in accordance with AWWA C207.
 - 3) Finished gaskets shall have holes punched by the manufacturer and shall match the flange pattern in every respect.
 - 4) Frayed cut edges resulting from job site gasket fabrication are not acceptable.
 - d. Push-on Gaskets
 - 1) Gaskets shall be the size and shape required to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances.
- 12. Bolts and Nuts
 - a. Flanged Ends
 - 1) Meet requirements of AWWA C207.
 - 2) Class D and E Flanges
 - a) For buried and non-buried applications, provide ASTM A193 Grade B8M Bolts and ASTM A194 Grade 8M Nuts.
- 13. Threaded Outlets
 - a. Threaded outlets will not be permitted unless specifically identified in the Drawings
 - b. Where taps are threaded, thread with CC Threads and furnish and install brass bushings for the outlet size indicated.

- 14. Weld Lead Outlets (if applicable)
 - a. If weld leads are required for constructability, they should be provided as a fabricated flanged outlet. Following use, they shall be wrapped in petrolatum tape system and embedded is CLSM.
 - b. Use of threaded outlets for access for weld leads is not permitted.
- C. Performance / Design Criteria
 - 1. Pipe Design
 - a. Pipe shall be designed, manufactured and tested in accordance with the latest revisions of AWWA C303, AWWA M9, as well as the special requirements of this Specification.
 - b. Sizes shall be as specified in the Drawings.
 - c. For the purposes of pipe design, working pressure plus transient pressure shall be as indicated below.
 - d. Pipe design shall be based on trench conditions and design pressure class specified in the Drawings and shown below.
 - e. Pipe shall be designed according to the methods indicated in AWWA C303 and AWWA M9 for trench construction, using the following parameters:
 - 1) Unit Weight of Fill (w) = 130 pounds per cubic foot
 - 2) Live Load = AASHTO H-20 truck at all locations except at railroads
 - 3) Live Load = Cooper E-80 loading for railroad crossings
 - 4) Trench Depth = As indicated on Drawings.
 - a) Vertical alignment changes required because of existing utility or other conflicts shall be accommodated by an appropriate change in pipe design depth.
 - b) In no case shall pipe be installed deeper than its design allows.
 - 5) Coefficient $K_u' = 0.11$
 - 6) Trench Width (B_d) as indicated on Drawings
 - 7) Bedding Conditions = as indicated on Drawings
 - 8) Deflection Lag Factor = 1.0
 - 9) Soil Reaction Modulus (E') < 1,000
 - 10) Pressures
 - a) Working Pressure
 - (1) Station 1+00 to 70+00 200 psi
 - (2) Station 70+00 to 145+00 225 psi
 - (3) Station 145+00 to End 200 psi
 - b) Surge Allowance = 100 psi, minimum
 - (1) Where Total Pressure (including surge) =
 - (a) Station 1+00 to 70+00 200 psi + 100 psi = 300 psi

- (b) Station 70+00 to 145+00 225 psi + 100 psi = 325 psi
- (c) Station 145+00 to End 200 psi + 100 psi = 300 psi
- c) Field Test Pressure = As specified in Section 01 45 16.16
- 2. Provisions for Thrust
 - a. Thrust at bends, tees, or other fittings shall be resisted by welding joints.
 - 1) Thrust at bends adjacent to casing shall be restrained by welding joints through the casing and a sufficient distance each side of the casing.
 - a) No thrust restraint contribution shall be allowed for pipe in casing, even if the annular space in the casing is filled with grout.
 - 2) For the purpose of thrust calculations, in-line valves shall be evaluated as a dead end thrust condition.
 - b. The pipe and field welded joints shall be designed to transmit the thrust forces.
 - 1) Manufacturer shall be responsible for determining the required amount of thrust restraint. Manufacturer and Contractor shall assume all liability associated with thrust restraint lengths.
 - 2) Restrained joints shall consist of welded joints, snap rings will not be allowed unless otherwise stated in the Drawings.
 - 3) The pipe shall be designed with adequate cylinder thickness to transmit the thrust forces without exceeding 50% of the cylinder yield strength.
 - 4) Pipe manufacturer shall be responsible for determining if and where double (interior and exterior) welded joints are required to transmit thrust forces.
 - a) Regardless of calculations, double (interior and exterior) welds will be required from Station 70+00 to 145+00.
 - c. Thrust restraint design
 - The length of pipe with restrained joints to resist thrust forces shall be verified by the pipe manufacturer in accordance with AWWA M9 and the following:
 - a) The Weight of Earth (We) shall be calculated as the weight of the projected soil prism above the pipe.
 - (1) Soil Density = 110 pounds per cubic foot (maximum value to be used for unsaturated soil).
 - b) If indicated on the Drawings and the Geotechnical Borings that ground water is expected, account for reduced soil density.
 - d. Thrust collars will only be permitted for temporary plugs. Thrust collars may not be used for any other application, unless approved in writing by the Engineer.
- 3. Inside Diameter
 - a. The inside diameter of the cement mortar lining shall be the nominal diameter specified unless otherwise indicated on the Drawings.
- 4. Joint Bonds, Insulated Connections and Flange Gaskets
 - a. Joint Bonds, Insulated Connection and Flange Gaskets shall be in accordance with Section 33 04 10.

- 5. Bend Fittings
 - a. All bend fittings shall have a minimum radius of 2.5 times the nominal pipe diameter to permit easy passage of pipeline pigs.
 - b. Crotch plates will not be allowed on fittings. When the pressure-diameter value (PDV) exceeds 6,000, fitting shall be designed in accordance with ASME BPVC Section VIII Division 1.
- 6. Fittings with Flanges
 - 1) Flanged joints shall be provided at connections to valves and where indicated on the Drawings.
 - 2) Ends to be fitted with slip-on flanges shall have the longitudinal or spiral welds ground flush to accommodate the type of flanges provided.
 - 3) Pipe flanges and welding of flanges to Concrete Pressure Pipe shall conform to the requirements of AWWA C206 and AWWA C207.
 - 4) Flanges shall match the fittings or appurtenances which are to be attached.
- 7. Butt Strap Closure Joints
 - a. Where necessary to make closure to pipe previously laid, closure joints shall be installed using butt strap joints in accordance with AWWA C206 and applicable provisions of this Specification.

2.2 SOURCE QUALITY CONTROL

- A. Marking for Identification
 - 1. For each joint of pipe and each fitting, plainly mark on 1 end:
 - a. Class for which it is designated
 - b. Date of manufacturer
 - c. Identification number
 - d. Field top centerlines shall be marked on all specials.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General
 - 1. Install Concrete Pressure Pipe, fittings, specials and appurtenances as required for the proper functioning of the completed pipe line.
 - 2. Install pipe, fittings, specials and appurtenances as specified herein, as specified in AWWA M9, and in accordance with the pipe manufacturer's recommendations.
 - 3. Lay pipe to the lines and grades shown on the Drawings.
 - a. Do not lay pipe in submerged or partially submerged conditions.
 - b. Do not allow the pipe to be submerged within 24 hours after placement.
 - 4. Excavate, embed and backfill trenches in accordance with Section 31 23 33.
 - a. Contractor shall verify all stulls have been removed from pipeline prior hydrostatic testing and disinfection. Contractor shall submit a letter to the Owner confirming all stulls have been removed.

- 5. At the close of each operating day:
 - a. Keep the pipe clean and free of debris, dirt, animals and trash during and after the laying operation.
 - Effectively seal the open end of the pipe using a manufactured gasketed night cap. Night cap shall be Foreman Night Cap as manufactured by Pioneer Works or approved equal.
- 6. If pipe is placed in casing, restrain pipe from floating as required in Article 1.6.B.4.
- B. Pipe Handling
 - 1. Haul and distribute pipe fittings at the project site.
 - 2. Handle piping with care to avoid damage.
 - a. Pipe shall be handled at all times with a minimum of 1 wide non-abrasive sling, belts or other equipment designed to prevent damage to the coating or lining.
 - b. The equipment shall be kept in such repair that its continued use is not injurious to the coating.
 - c. The spacing of pipe supports required to handle the pipe shall be adequate to prevent cracking or damage to the lining or coating.
 - 3. Before lowering into the trench, inspect each joint of pipe and reject or repair any damaged pipe.
- C. Pipe Jointing
 - 1. General
 - a. Thoroughly clean the bell and spigot rings before laying each joint of pipe by brushing and wiping.
 - b. If any damage to the protective coating on the metal has occurred, repair the damage before laying the pipe.
 - c. Lubricate the gasket and the inside surface of the bell with an approved lubricant (flax soap) which will facilitate the telescoping of the joint.
 - d. Tightly fit together sections of pipe and exercise care to secure true alignment and grade.
 - e. When a joint of pipe is being laid, place the gasket on the spigot ring and enter the spigot end of the pipe into the bell of the adjoining pipe and force into position.
 - 1) The inside joint space between ends of the pipe sections shall have an opening within the tolerances as recommended by the pipe manufacturer.
 - f. No "blocking up" of pipe or joints will be permitted
 - 1) If the pipe is not uniformly supported or the joint not made up properly, remove the joint and properly prepare the trench.
 - g. After joining, check the position of the gasket with a feeler gauge.
 - 1) If the gasket is out of position, disassemble the joint and repeat the joint laying procedure.
 - h. For interior welded joints, complete backfilling before welding.

- i. For exterior field-welded joints, provide adequate working room under and beside the pipe.
- 2. Exterior Joint Grouting
 - a. Make the exterior joint by placing a joint wrapper around the pipe and secure in place with 2 metal straps.
 - 1) The wrapper shall be 9 inches wide for pipe 36-inches and larger, and 7 inches wide for smaller pipe, hemmed on each side.
 - 2) The wrapper shall be fiberglass reinforced or burlap cloth, with lengths encircling the pipe, leaving enough opening between ends to allow the mortar to be poured inside the wrapper into the joint.
 - 3) Fill the joint with mortar from 1 side in 1 continuous operation until it has flowed entirely around the pipe.
 - 4) During the filling of the joint, pat or manipulate the sides of the wrapper to settle the mortar and expel any entrapped air.
 - 5) Leave wrappers in place undisturbed until the mortar has set-up.
- 3. Interior Joint Grouting
 - a. Upon completion of backfilling of the pipe trench, fill the inside joint recess with a stiff cement mortar/high-strength grout.
 - b. Prior to placing of mortar/grout, clean out dirt or trash which has collected in the joint and moisten the concrete surfaces of the joint space by spraying or brushing with a wet brush.
 - c. Ram or pack the stiff mortar/grout into the joint space and take extreme care to insure that no voids remain in the joint space.
 - d. After the joint has been filled, level the surfaces of the joint mortar/grout with the interior surfaces of the pipe with a steel trowel so that the surface is smooth.
 - 1) Inspect joints for proper mortar installation prior to filling.
 - e. Interior joints of pipe smaller than 30-inches shall have the bottom of the bell buttered with grout, prior to inserting the spigot, such that when the spigot is pushed into position it will extrude surplus grout from the joint.
 - 1) The surplus grout shall be struck off flush with the inside of the pipe by pulling a filled burlap bag or an inflated ball through the pipe with a rope.
- 4. Welded Joints
 - a. Weld joints in accordance with the AWWA M9.
 - 1) Contractor shall provide adequate ventilation for welders and for the Owner to observe welds.
 - 2) Unless otherwise specified on the Drawings, welds shall be full circle fillet welds.
 - b. Adequate provisions for reducing temperature stresses shall be the responsibility of the Contractor.
 - c. After the pipe has been joined and properly aligned and prior to the start of the welding procedure:

- 1) The spigot and bell shall be made essentially concentric by shimming or tacking to obtain clearance tolerance around the periphery of the joint.
- 2) In no case shall the clearance tolerance be permitted to accumulate.
- d. Before welding:
 - 1) Thoroughly clean pipe ends.
 - 2) Weld pipe by machine or by the manual shielded electric arc process.
 - a) Welding shall be performed so as not to damage lining or coating.
- e. Furnish labor, equipment, tools and supplies, including shielded type welding rod.
 - 1) Protect welding rod from any deterioration prior to its use.
 - 2) If any portion of a box or carton is damaged, reject the entire box or carton.
- f. Hand Welding
 - 1) The metal shall be deposited in successive layers.
 - 2) Not more than 1/8 inch of metal shall be deposited in each pass.
 - Each pass except the final 1, whether in butt or fillet welds, shall be thoroughly bobbed or peened to relieve shrinkage stresses and to remove dirt, slag or flux before the succeeding bead is applied.
 - 4) Each pass shall be thoroughly fused into the plates at each side of the welding groove or fillet and shall not be permitted to pile up in the center of the weld.
 - 5) Undercutting along the side shall not be permitted.
- g. Welds shall be free from pin holes, non-metallic inclusions, air pockets, undercutting and/or any other defects.
- h. If the ends of the pipe are laminated, split or damaged to the extent that satisfactory welding contact cannot be obtained, remove the pipe from the line.
- i. Furnish each welder employed with a steel stencil for marking the welds so that the work of each welder may be identified.
 - 1) Have each welder stencil the pipe adjacent to the weld with the stencil assigned to him.
 - a) In the event any welder leaves the job, his stencil shall be voided and not duplicated if another welder is employed.
- j. Welders
 - Use only competent, skilled and qualified workmen. Each welder employed by the Contractor shall be required to satisfactorily pass a welding test in accordance with AWWA C206 before being allowed to weld on the line. Field welding shall be provided by one of the following firms:
 - a) Thompson Pipe Group
 - b) Fuller's Service Company, Barry Fuller, 817-477-3841
 - c) Scott's Welding, Scott Fowler, 972-978-7865
 - d) Eddie's Welding Service, Eddie Pierce, 817-909-6089

e) National Welding Corporation, Nash Williams, 801-225-5959

f)No others will be accepted

- 2) After each welder has qualified in the preliminary tests referred to above, inspections shall be made of joints in the line.
 - a) The inspection will be done by a Certified Welding Inspector retained by the Contractor.
- Any welder making defective welds shall not be allowed to continue to weld.
- 5. Flanged Joints
 - a. Install in accordance with ASME PCC-1-2012.
 - b. During assembly, tighten nuts gradually and equally using a three-pass method in accordance with ASME PCC-1-2012.
 - For the first pass, tighten the nuts to 50 percent at diametrically opposite sides to prevent misalignment and to ensure that all bolts carry equal loads.
 - 2) For the second pass, tighten the nuts to 100 percent again in a diametrically opposite pattern.
 - 3) Allow a minimum of 1 hour to pass to provide time for settlement between bolts and nuts and gasket relaxation.
 - Complete the third pass by checking each bolt in a clockwise pattern. Each nut should be tightened until it will no longer turn at the target torque. This step compensates for elastic interaction and brings all bolts into parity.
 - c. The threads of the bolts should protrude a minimum of $\frac{1}{2}$ -inch from the nuts.
- 6. Protection of Exposed Metal
 - a. Protect exposed ferrous metal by a minimum of 1 inch coating of cement mortar as previously specified for inside joints, unless otherwise specified in the Drawings.
 - 1) Thoroughly clean and wet the surface receiving a cement mortar coating with water just prior to placing the cement mortar coating.
 - 2) After placing, take care to prevent cement mortar from drying out too rapidly by covering with damp earth or burlap.
 - 3) Cement mortar coating shall not be applied during freezing weather.
 - b. Coat buried bolts and flanges, which cannot be protected with factory applied mortar coating, with petrolatum tape system. Petrolatum tape system shall consist of of Densyl Mastic, Densyl Paste, and Densyl Tape as manufactured by Denso.

3.2 REPAIR

- A. Patching
 - 1. Excessive field-patching of lining or coating shall not be permitted.
 - 2. Patching of lining or coating will be allowed where area to be repaired does not exceed 100 square inches and has no dimensions greater than 12 inches.

- 3. In general, there shall not be more than 1 patch on either the lining or the coating of any 1 joint of pipe.
- 4. Wherever necessary to patch the pipe, make patch with cement mortar as previously specified for interior joints.
- 5. Do not install patched pipe until the patch has been properly and adequately cured and approved for laying by the Owner.
- 6. Promptly remove rejected pipe from the site.

3.3 FIELD QUALITY CONTROL

- A. Field Tests and Inspections
 - 1. Weld Testing
 - a. Magnetic particle test in accordance with AWWA C206 and set forth in AWS D.1.1. shall be performed by the Contractor under the supervision and inspection of the Owner's Representative or an independent testing laboratory, on all full welded joints.
 - 1) Welds that are defective will be replaced or repaired, whichever is deemed necessary by the Engineer, at the Contractor's expense.
 - 2) If the Contractor disagrees with the Engineer's interpretation of welding tests, test sections may be cut from the joint for physical testing. The Contractor shall bear the expense of repairing the joint, regardless of the results of physical testing.
 - a) The procedure for repairing the joint shall be approved by the Engineer before proceeding.
 - 3) Cement mortar lining at joints intended to be welded shall be held back a sufficient distance from the weld location to allow for a full magnetic particle test to be performed on the weld.
 - 2. Cleaning and Testing
 - a. Clean, flush, disinfect, hydrostatic test and bacteriological test the water main as specified in Section 01 45 16.16.

END OF SECTION

SECTION 33 11 14 BURIED STEEL PIPE AND FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Buried Steel Pipe for potable water applications
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 01 45 16.16 Hydrostatic Testing and Disinfection
 - 4. Section 31 23 33 Trenching, Backfilling and Compaction
 - 5. Section 33 04 10 Joint Bonding and Electrical Isolation

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Association of State Highway and Transportation Officials (AASHTO).
 - 3. American Architectural Manufacturers Association (AAMA).
 - 4. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125 and 250.
 - b. PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly
 - c. PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly
 - 5. American Society of Testing and Materials (ASTM):
 - a. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
 - b. A194, Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
 - c. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - d. B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - e. B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - f. C33, Standard Specifications for Concrete Aggregates.
 - g. C144, Standard Specification for Aggregate for Masonry Mortar.

- h. C150, Standard Specification for Portland Cement.
- i. D16, Standard Terminology for Paint, Related Coatings, Materials, and Applications.
- j. D522, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
- k. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
- I. D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- m. E165, Standard Practice for Liquid Penetrant Examination for General Industry.
- 6. American Welding Society (AWS)
 - a. D1.1, Structural Welding Code Steel.
- 7. American Water Works Association (AWWA):
 - a. M11, Steel Pipe A Guide for Design and Installation.
- 8. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - b. C200, Steel Water Pipe 6 Inches and Larger.
 - c. C205, Cement Mortar Protective Lining and Coating for Steel Water Pipe 4 Inches and Larger Shop-Applied.
 - d. C206, Field Welding of Steel Water Pipe.
 - e. C207, Steel Pipe Flanges for Waterworks Service Sizes 4 Inch through 144 Inch
 - f. C208, Dimensions for Fabricated Steel Water Pipe Fittings.
 - g. C210, Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
 - h. C216, Heat Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines
 - i. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings
 - j. C222, Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings
 - k. C604, Installation of Buried Steel Water Pipe 4 In. (100 mm) and Larger
- 9. International Organization for Standardization (ISO).
- 10. NACE International (NACE):
 - a. SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
- 11. NSF International (NSF):

- a. 61, Drinking Water System Components Health Effects.
- 12. Steel Plate Fabricators Associatioin (SPFA).
- 13. Society for Protective Coatings (SSPC)
 - a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
 - b. SP 1, Solvent Cleaning.
 - c. SP 2, Hand Tool Cleaning.
 - d. SP 3, Power Tool Cleaning.
- 14. Society for Protective Coatings (SSPC)/National Associate of Corrosion Engineers (NACE)
 - a. SP 10/NACE No. 2, Near-White Blast Cleaning

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
 - 1. Exterior Coating
 - a. Material data
 - b. Application recommendations
 - c. Field touch-up procedures
 - 2. Heat Shrink Sleeves, if applicable
 - a. Material data
 - b. Installation recommendations
 - 3. Joint Wrappers, if applicable
 - a. Material data
 - b. Installation recommendations
 - 4. Mixes
 - a. Mortar for interior joints and patches
 - b. Bonding agents for patches
 - 5. Butt Straps
- B. Shop Drawings
 - 1. Wall thickness design calculations sealed by a Licensed Professional Engineer in Texas including:

- a. Internal pressure
 - 1) Maximum design pressure (Working + Surge)
 - 2) Test pressure
- b. External pressure
 - 1) Deflection
 - 2) Buckling
 - 3) Extreme loading conditions
- c. Special physical loading such as supports or joint design
- d. Thermal expansion and/or contraction
- e. Outlet reinforcing
- 2. Thrust restraint calculations for all fittings and valves, including the restraint length, sealed by a Licensed Professional Engineer in Texas.
 - a. When connecting into existing piping, thrust restraint calculations shall include evaluating existing piping to identify if existing pipe joints are required to be restrained.
 - b. For the purpose of thrust calculations, in-line valves shall be evaluated as a dead end thrust condition.
- 3. Fabrication and lay drawings showing a schematic location with profile and a tabulated layout schedule that is sealed by a Licensed Professional Engineer in Texas and includes:
 - a. Pipe class
 - b. Joint types
 - c. Fittings
 - d. Outlets
 - e. Thrust Restraint
 - f. Stationing (in accordance with the Drawings)
 - g. Transitions
 - h. Joint deflection
 - i. Interior lining
 - j. Outlet locations for welding, ventilation, and access
 - k. Welding requirements and provisions for thermal stress control
- 4. Pipe within Casing
 - a. Provide drawings detailing how pipe is restrained to prevent floating within the casing.
- 5. Pipe stulling plan

- C. Certificates and Test Reports
 - 1. Prior to shipment of the pipe, the pipe manufacturer shall submit the following:
 - a. A Certificate of Adequacy of Design stating that the pipe to be furnished complies with AWWA C200, AWWA C205, AWWA C210, AWWA C222 and these Specifications.
 - b. Copies of results of factory hydrostatic tests shall be provided to the Engineer.
 - c. Mill certificates, including chemical and physical test results for each heat of steel.
 - d. A Certified Test Report from the polyurethane coating manufacturer indicating that the coatings were applied in accordance with manufacturer's requirements and in accordance with this Specification.
 - e. Certified test reports for welder certification for factory welds in accordance with AWWA C200, Section 4.11 and field welds in accordance with AWWA C206.
 - f. Certified test reports for cement mortar tests.
 - g. Certified test reports for steel cylinder tests per AWWA C200.

1.7 CLOSEOUT SUBMITTALS

- A. Certificates
 - 1. Contractor letter verifying removal of pipe stulls

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturers
 - a. Shall be certified under SPFA or ISO quality certification program for steel pipe and accessory manufacturing
 - b. Finished pipe shall be the product of one (1) manufacturer.
 - c. Pipe manufacturing operations (pipe, fittings, lining and coatings) shall be performed under the control of one steel pipe supplier and at one location. All pipe shall be manufactured domestically.
 - d. The pipe manufacturer shall not have less than five (5) years successful experience manufacturing pipe of the particular type and size indicated or demonstrate an experience record that is satisfactory to the Engineer and Owner.
 - 1) This experience record will be thoroughly investigated by the Engineer, and acceptance will be at the sole discretion of the Engineer and Owner.
 - e. Manufacture pipe in accordance with AWWA C200, AWWA C205, AWWA C208, AWWA C210 and AWWA C222.
- B. Factory Testing

- 1. Cement Mortar Lining Shop-applied cement mortar linings shall be tested in accordance with AWWA C205.
- 2. Polyurethane Coating The polyurethane coating shall be tested in accordance with AWWA C222.
 - a. Thickness: Test thickness of coating in accordance with SSPC PA 2.
 - Test coating system applied to the pipe for holidays according to the procedures outlined in NACE SP0188 using a high voltage spark tester (operating at 100 volts per mil), for the dry film thickness (DFT) specified of 35 mil.
 - b. Adhesion Testing
 - 1) Polyurethane coatings or linings shall have an adhesion to steel of 1,500 pounds per square inch, minimum.
 - Test polyurethane coating adhesion to steel substrates using pneumatic pull off equipment, such as HATE Model 108 or Delfesko Positest, in accordance with ASTM D4541 and AWWA C222, except as modified in this Section.
 - 3) Adhesion testing records shall include:
 - a) Pipe identification
 - b) Surface tested (exterior)
 - c) Surface temperature
 - d) Coating thickness
 - e) Tensile force applied
 - f) Mode of failure
 - g) Percentage of substrate failure relative of dolly surface
 - 4) Glue dollies for adhesion testing to the coating surface and allow to cure for a minimum of 12 hours.
 - a) Because of high cohesive strength, score polyurethane coatings around the dolly prior to conducting the adhesion test.
 - 5) Failure shall be by adhesive and cohesive failure only.
 - a) Adhesive failure is defined as separation of the coating from the steel substrate.
 - b) Cohesive failure is defined as failure within the coating, resulting in coating remaining both on the steel substrate and dolly.
 - 6) Retest partial adhesion and glue failure if the substrate failure is less than 50 percent relative of the dolly surface area and the applied tension was less than the specified adhesion.
 - 7) Glue failures in excess of the minimum required tensile adhesion are accepted as meeting the specified adhesion requirements.

- 8) Conduct, accept and reject adhesion tests on polyurethane pipe coating and lining independently (where applicable).
- 9) Frequency of adhesion testing shall be in accordance with AWWA C222.
- 10) Randomly select repair patches on the polyurethane coating for adhesion testing in a manner as described herein and at the discretion of the coating inspector conducting the adhesion tests.
 - a) Adhesion of repairs shall be as specified by the coating manufacturer for the type of repair.
- 3. Hydrostatic Pressure Testing
 - a. Perform hydrostatic pressure testing in accordance with AWWA C200.
 - b. Hydrostatically test each joint of pipe prior to application of lining or coating.
 - 1) The internal test pressure shall be that which results in a fiber stress equal to 75 percent of the minimum yield strength of the steel used.
 - 2) Each joint of pipe tested shall be completely watertight under maximum test pressure.
 - 3) Test pressure shall be held for sufficient time, but no less than 30 seconds, to observe the weld seams.
 - 4) Maintain a recording pressure gauge, reference number of pipe tested, etc.
 - a) The pipe shall be numbered in order that this information can be recorded.
 - c. Fittings shall be fabricated from hydrostatically tested pipe. Test fittings and special sections by one of the following nondestructive test methods:
 - 1) Hydrostatic test
 - 2) Magnetic particle test
 - 3) Ultrasonic
 - 4) Radiography
 - 5) Dye penetrant test
- C. Manufacturer's Technician for Pipe Installation
 - 1. Pipe Manufacturer's Representative
 - a. During the construction period, the pipe manufacturer shall furnish the services of a factory trained, qualified, job experienced technician to advise and instruct as necessary in pipe laying and pipe jointing.
 - The technician shall assist and advise the Contractor in his pipe laying operations and shall instruct construction personnel in proper joint assembly and joint inspection procedures.
 - 2) The technician is not required to be on-site full time; however, the technician shall be regularly on-site during the first 2 weeks of pipe laying and thereafter as requested by the Engineer, Owner or Contractor.

- 2. Polyurethane Coating Manufacturer's Representative
 - a. The pipe manufacturer shall provide services of polyurethane coating manufacturer's representative and a representative from the heat shrink joint manufacturer for a period of not less than 3 days at beginning of actual pipe laying operations to advise Contractor and Owner regarding installation, including but not limited to:
 - 1) Handling and storage
 - 2) Cleaning and inspecting
 - 3) Coating repairs
 - 4) Field applied coating
 - 5) Heat shrink installation procedures
 - 6) General construction methods and how they may affect pipe coating
 - b. Representative shall be required to return if, in the opinion of the Engineer, the polyurethane coating or the Contractor's construction methods do not comply with Contract Specifications.
 - 1) Cost for the manufacturer's representatives to return to the site shall be at no additional cost to the Owner.
- D. Owner Testing and Inspection
 - 1. Pipe may be subject to inspection at the manufacturer's facility by an independent testing laboratory. Laboratory shall be selected and retained by the Owner.
 - a. Representatives of the Owner, Owner's laboratory, or the Engineer shall have access to the work whenever it is in preparation or progress.
 - b. Pipe manufacturer shall provide proper facilities for access and for inspection.
 - c. Pipe manufacturer shall notify the Owner in writing, a minimum of 2 weeks prior to the pipe fabrication so that the Owner may advise the manufacturer as to the Owner's decision regarding tests to be performed by an independent testing laboratory.
 - d. Material, fabricated parts and pipe, which are discovered to be defective, or which do not conform to the requirements of this Specification shall be subject to rejection at any time prior to Owner's final acceptance of the product.
 - 2. The inspection and testing by the independent testing laboratory anticipates that production of pipe shall be done over a normal period of time and without "slow downs" or other abnormal delays.
 - a. The pipe manufacturer shall coordinate their manufacturing schedule with the Contractor and advise the Contractor of any changes in the schedule.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packing
 - 1. Prepare pipe for shipment to:
 - a. Afford maximum protection from normal hazard of transportation

- b. Allow pipe to reach project site in an undamaged condition
- 2. Pipe damaged in shipment shall not be delivered to the project site unless such damaged pipe is properly repaired.
- 3. After the completed pipe and fittings have been removed from the final cure at the manufacturing plant:
 - a. Protect pipe lining from drying by means of plastic end covers banded to the pipe ends.
 - b. Maintain covers over the pipe ends at all times until ready to be installed.
 - c. Moisture shall be maintained inside the pipe by periodic addition of water, as necessary.
- 4. Pipes shall be carefully supported during shipment and storage.
 - a. Pipe, fittings and specials shall be separated so that they do not bear against each other and the whole load shall be securely fastened to prevent movement in transit.
 - b. Ship pipe on padded bunks with tie-down straps approximately over stulling.
 - c. Store pipe on padded skids, sand or dirt berms, tires or other suitable means to protect the pipe from damage.
 - d. Each end of each length of pipe, fitting or special and the middle of each pipe joint shall be internally supported and braced with stulls to maintain a true circular shape.
 - 1) Internal stulls shall consist of timber or steel firmly wedged and secured so that stulls remain in place during storage, shipment and installation.
 - 2) Pipe shall be rotated so that 1 stull remains vertical during storage, shipment and installation.
 - 3) At a minimum, stulls shall be placed at each end and center.
 - a) Additional stulls may be required depending upon the length of the joints and pipe design.
 - 4) Stulls shall not be removed until backfill operations are complete (excluding final clean up), unless it can be demonstrated to the Owner's satisfaction that removal of stulls will not adversely affect pipe installation.
- B. Delivery, Handling, and Storage
 - 1. Shall be in accordance with AWWA C604.
 - 2. Once the first shipment of pipe has been delivered to the site, the Engineer and the Contractor shall inspect the pipe's interior coating for excessive cracking.
 - 3. If excessive cracking is found, the Contractor shall modify shipping procedures to reduce or eliminate cracking.
 - 4. Deliver, handle and store pipe in accordance with the manufacturer's recommendations to protect coating systems.
 - 5. Secure and maintain a location to store the material

1.11 FIELD CONDITIONS [NOT USED]

1.12 WARRANTY [NOT USED]

PART 2 - PRODUCTS

2.1 EQUIPMENT, PRODUCT TYPES, AND MATERIALS

- A. Manufacturers
 - 1. Northwest Pipe,
 - 2. Thompson Pipe Group,
 - 3. or approved equal.
- B. Materials
 - 1. General
 - Pipe and fittings shall be manufactured in accordance with the latest revisions of AWWA C200, AWWA C205, AWWA C208, AWWA C210, AWWA C222, and AWWA M11.
 - b. All pipe lining material in contact with potable water shall meet the requirements of NSF 61.
 - 2. Exterior Polyurethane Coating
 - a. For Buried Pipe:
 - Polyurethane Coating shall be factory applied and meet the requirements of AWWA C222. Use a Coating Standard ASTM D16, Type V system which is a 100 percent solids, 2-component polyurethane (or 2-package polyisocyanate, polyol-cured urethane) coating.
 - a) Components shall have balanced viscosities in their liquid state and shall not require agitation during use.
 - b) Conversion to Solids by Volume: 97 percent ± 3 percent
 - c) Temperature Resistance: Minus 40 degrees F and plus 150 degrees F
 - d) Minimum Adhesion: 1500 psi, when applied to steel pipe which has been blasted to comply with SSPC SP 10/NACE No. 2
 - (1) Cure Time: For handling in 2-3 minutes at 120 degrees F and full cure within 7 days at 70 degrees F
 - e) Maximum Specific Gravities
 - (1) Polyisocyanate resin, 1.20
 - (2) Polyol resin, 1.15
 - f) Minimum Impact Resistance: 80 inch-pounds using 1-inch diameter steel ball
 - g) Minimum Tensile Strength: 2000 psi
 - h) Hardness: Minimum Durometer hardness of 65 on the Shore D scale in accordance with ASTM D2240

- i) Flexibility Resistance
 - (1) ASTM D522 using 1-inch mandrel
 - (2) Allow coating to cure for 7 days.
 - (3) Perform testing on test coupons held for 15 minutes at temperature extremes specified above.
- j) Minimum Dry Film Thickness: 35 mils
- k) Coating shall be a self priming, plural component, 100 percent solids, non-extended polyurethane, suitable for burial or immersion and shall be:
 - (1) CorroPipe 3000 (External), CorroPipe II PW (Internal) by Valspac, Minneapolis, MN.
 - (2) Durashield 110, 210, 310 (External); 110-61 NSF, 210-61 NSF, 310-61 NSF (Internal) as manufactured by LifeLast, Inc., Pflugerville, TX,
 - (3) Protec II (External), Protec II PW (Internal) by ITW PolySpec Futura Coatings, Inc., Houston, TX,
 - (4) Polyclad 777PL (External), Polyclad 767 (Internal) by Carboline, St. Louis, MO,
 - (5) or approved equal.
- I) The coating manufacturer shall have a minimum of 5 years experience in the production of this type coating.
- 2) Cement Mortar Coating
 - a) Cement mortar coating will only be allowed where specifically identified in the plans. All other buried piping shall be polyurethane coated.
- b. For Vault and Valve Pit Piping and Fittings
 - 1) Reference Specification 09 96 00, PIPING AND EQUIPMENT PAINTING
- c. For Buried Specials, Fittings, Repair and Connections
 - 1) Provide shop-applied and field-applied coating as follows:
 - a) Durashield 210, Durashield 310, or Durashield 310 JARS as manufactured by LifeLast, Inc., or
 - b) Protec II as manufactured by ITW Futura Coatings, Inc.
 - c) As recommended by the coating manufacturer.
 - 2) Coatings shall have the properties specified above in Paragraph 2.1.A.2.a.1.
 - 3) Mix and apply polyurethane coatings in accordance with the coating manufacturer's recommendations.
- 3. Cement Mortar Linings
 - a. Cement mortar linings shall be shop-applied.

- b. Shop-applied cement mortar linings shall conform to the requirements of AWWA C205 with the following modifications:
 - 1) Sand used for cement mortar shall be silica sand ASTM C33.
 - 2) Curing of the linings shall conform to the requirements of AWWA C205.
- c. Cement mortar lining at joints shall be held back a sufficient distance from the weld location to allow for a full magnetic particle test to be performed on the weld.
- 4. Gaskets
 - a. Isolation Flanges
 - 1) Flanges which are required by the drawings to be Isolation Flanges shall conform to Section 33 04 10.
 - b. Class D Flanges
 - 1) Full face
 - 2) Manufactured true to shape from minimum 80 durometer SBR rubber stock of a thickness not less than 1/8 inch
 - 3) Virgin stock
 - Conforming to the physical and test requirements specified in AWWA/ANSI C111/A21.11
 - 5) Finished gaskets shall have holes punched by the manufacturer and shall match the flange pattern in every respect.
 - 6) Frayed cut edges resulting from job site gasket fabrication are not acceptable.
 - 7) Furnish Viton® Rubber gaskets hydrocarbon resistant gaskets, when required.
 - c. Class E Flanges
 - 1) Full face
 - 2) 1/8-inch Nonasbestos gasket in accordance with AWWA C207.
 - 3) Finished gaskets shall have holes punched by the manufacturer and shall match the flange pattern in every respect.
 - 4) Frayed cut edges resulting from job site gasket fabrication are not acceptable.
 - d. Push-on Gaskets
 - Gaskets shall be the size and shape required to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances.
- 5. Bolts and Nuts
 - a. Flanged Ends
 - 1) Meet requirements of AWWA C207.

- 2) Class D and E Flanges
 - a) For buried and non-buried applications, provide ASTM A193 Grade B8M Bolts and ASTM A194 Grade 8M Nuts.
- 6. Flanges
 - a. Pipe flanges shall conform to the requirements of AWWA C207.
 - b. Flanges shall be drilled in accordance with ASME B16.1 Class 125. Drilling shall match class of valves or appurtenances which are attached.
 - c. Flange Class
 - 1) Flanges shall be Class D with 150 psi working pressure for pipe where the maximum pressure (test or total) is less than 225 psi and working pressure is less than or equal to 150 psi.
 - 2) Flanges shall be Class E with 275 psi working pressure for pipe where the maximum pressure (test or total) is greater than 225 psi or working pressure is between 150 psi and 275 psi.
 - 3) In no case shall the working pressure of the pipe exceed the working pressure of the flange.
 - d. When Isolation Flanges are required by the Drawings, Drillings shall accommodate the required spacing for mylar sleeves according to Section 33 04 10.
- 7. Flange Coatings
 - a. Coatings for buried flanges shall be a petrolatum tape system manufactured by Denso, consisting of Densyl Mastic, Densyl Paste, and Densyl Tape.
 - b. Petrolaturm tape system shall be in accordance with AWWA C217
- 8. Steel shall
 - a. Meet the requirements of AWWA C200
 - b. Be of continuous casting
 - c. Be homogeneous
 - d. Be suitable for field welding
 - e. Be fully killed
 - f. Be fine austenitic grain size
- 9. Bend Fittings
 - a. Fabricate all fittings from hydrostatically tested pipe.
- 10. Threaded Outlets
 - a. Threaded outlets are not permitted unless specifically identified in the Drawings.
 - b. Where taps are threaded, thread with CC Threads and furnish and install brass bushings for the outlet size indicated.
- 11. Weld Lead Outlets

- a. If weld leads are required for constructability, they should be provided as a fabricated flanged outlet. Following use, they shall be wrapped in petrolatum tape system and embedded is CLSM.
- b. Use of threaded outlets for access for weld leads is not permitted.
- 12. Mixes
 - a. Mortar for Joints
 - 1) Mortar shall be 1 part cement to 2 parts sand.
 - 2) Cement shall be ASTM C150, Type I or II.
 - 3) Sand shall be of sharp silica base.
 - a) Sand shall conform to ASTM C144.
 - 4) Interior joint mortar shall be mixed with as little water as possible so that the mortar is very stiff, but workable.
 - 5) Water for cement mortar shall be from a potable water source.
 - 6) Mortar for patching shall be as per interior joints.
 - b. Bonding Agent
 - 1) Bonding Agent for Cement Mortar Lining must meet NSF 61, if cement lining is in contact with potable water.
 - 2) Bonding agent for cement mortar lining patching shall be:
 - a) Probond Epoxy Bonding Agent ET-150, parts A and B
 - b) Sikadur 32 Hi-Mod, or
 - c) Approved equal
- 13. Heat Shrink Sleeves for Polyurethane Coated Steel Pipe
 - a. Primer: Provide as recommended by the sleeve manufacturer.
 - b. Filler Mastic: Provide mastic filler as recommended by the heat shrink sleeve manufacturer.
 - 1) Size and type shall be as recommended by the sleeve manufacturer for type of pipe and joint.
 - c. Joint Coating: Cross-linked polyolefin wrap or sleeve with a mastic sealant, 85 mils total thickness, suitable for pipeline operating temperature, sleeve material recovery as recommended by the manufacturer.
 - 1) High recovery sleeves shall be provided for bell and spigot and coupling style joints with a minimum of 50 percent recovery.
 - 2) Sleeve length shall provide a minimum of 3 inches overlap onto intact pipe coating on each side of the joint.
 - 3) Width to take into consideration shrinkage of the sleeve due to installation and joint profile
 - d. Heat shrink sleeves shall meet AWWA C216, as manufactured by:

- 1) Canusa,
- 2) Raychem,
- 3) Approved equal
- e. Provide heat shrink sleeve suitable to interior joint welding without damage to heat shrink sleeve.
- 14. Mortar Bands
 - a. Mortar bands may be used in lieu of steel casing spacers for pipe within casing.
 - 1) Pipe manufacturer is responsible for ensuring the bands adhere adequately to the polyurethane coating
 - 2) Pipe manufacturer is responsible for ensuring that bands will be suitable for use with the anticipated bore and tunnel distances required in the project.
 - b. Mortar Bands shall be approximately 2 feet long and a minimum of 2-inches higher than the pipe bell.
 - 1) Number and spacing of mortar bands shall be in accordance with the Manufacturer's recommendation.
- C. Performance / Design Criteria
 - 1. Pipe Design
 - a. Steel pipe and fittings shall be designed, manufactured and tested in conformance with AWWA C200, AWWA C208, AWWA M11 and these Specifications.
 - b. Fittings, specials and connections shall be designed for the same pressures as the adjacent pipe.
 - c. Pipe design shall be based on trench conditions and design pressures specified in the Drawings and shown below.
 - d. Pipe shall be designed using the following parameters:
 - 1) Unit Weight of Fill (W) = 130 pounds per cubic foot
 - 2) Live Load
 - a) = AASHTO HS 20, at all locations except at railroads
 - b) = Cooper E80, at Railroads
 - 3) Trench Depth = As shown in the Drawings or as identified during exploratory excavation; whichever is greater.
 - a) Vertical alignment changes required because of existing utility or other conflicts shall be accommodated by an appropriate change in pipe design depth.
 - b) In no case shall pipe be installed deeper than its design allows.
 - 4) Deflection Lag Factor $(D_i) = 1.0$
 - 5) Bedding Coefficient (K) = 0.10

- 6) Maximum Calculated Deflection:
 - a) Dx = 3 percent (for polyurethane coated pipe)
 - b) Dx = 2 percent (for cement mortar coated pipe)
 - c) Dx = 0.25 percent for pipe directly adjacent to direct buried butterfly valves
- 7) Soil Reaction Modulus (E') < 1,000
- 8) Pressures
 - a) Working Pressure
 - (1) Station 1+00 to 70+00 200 psi
 - (2) Station 70+00 to 145+00 225 psi
 - (3) Station 145+00 to End 200 psi
 - b) Surge Allowance = 100 psi, minimum
 - (1) Where Total Pressure (including surge) =
 - (a) Station 1+00 to 70+00 200 psi + 100 psi = 300 psi
 - (b) Station 70+00 to 145+00 225 psi + 100 psi = 325 psi
 - (c) Station 145+00 to End 200 psi + 100 psi = 300 psi
 - c) Field Test Pressure = As specified in Section 01 45 16.16
- e. Where the pipe requires additional external support to achieve the specified maximum deflection, the Contractor and pipe supplier will be required to furnish alternate methods for pipe embedment.
 - 1) No additional compensation will be made to the Contractor by the Owner where this method is required.
- f. Field fabrication or cutting is not allowed, unless otherwise approved by the Owner.
- 2. Provisions for Thrust
 - a. Every joint shall be restrained via welding joints.
 - b. The pipe and lap welded slip joints shall be designed to transmit the thrust forces.
 - Manufacturer shall be responsible for determining the required amount of thrust restraint. Manufacturer and Contractor shall assume all liability associated with thrust restraint lengths.
 - 2) Pipe manufacturer shall be responsible for determining if and where double lap welded joints are required to transmit thrust forces.
 - a) Regardless of calculations, double lap welds will be required from Station 70+00 to 145+00.
 - 3) No thrust restraint contribution shall be allowed for pipe in casing, even if the annular space in the casing is filled with grout.

- 4) For the purpose of thrust calculations, in-line valves shall be evaluated as a dead end thrust condition.
- c. Thrust restraint design
 - 1) The length of pipe with restrained joints to resist thrust forces shall be verified by the pipe manufacturer in accordance with AWWA M11 and the following:
 - a) The Weight of Earth (We) shall be calculated as the weight of the projected soil prism above the pipe.
 - (1) Soil Density = 110 pounds per cubic foot (maximum value to be used for unsaturated soil).
 - b) If indicated on the drawings and geotechnical report that ground water is expected, account for reduced soil density.
 - (1) Saturated soil density = 65 lbs/ft3.
 - c) Coefficient of Friction
 - (1) 0.28 Polyurethane
 - (2) 0.32 Tape
 - (3) 0.40 Cement Mortar
- d. Thrust collars will only be permitted for temporary plugs. Thrust collars may not be used for any other application, unless approved in writing by the Engineer.
- 3. Inside Diameter
 - a. The inside diameter, including the cement-mortar lining, shall be a minimum of the nominal diameter of the pipe specified, unless otherwise indicated on the Drawings.
- 4. Wall Thickness
 - a. The minimum pipe wall steel thickness shall be as designed, but not less than 3/16 inches or pipe D/240, whichever is greater for pipe and fittings, with no minus tolerance, where D is the nominal inside pipe diameter.
 - b. Where indicated on the Drawings, pipe and fittings shall have thicker steel pipe wall.
 - c. The minimum steel wall thickness shall also be such that the fiber stress shall not exceed:
 - 1) 50 percent of the minimum yield strength of the steel for working pressure and
 - 2) 75 percent of the minimum yield strength of the steel at the maximum pressure (including transient pressure), nor the following, at the specified working pressure:

| Ріре Туре | Maximum Hoop Stress at Working Pressure |
|-----------|--|
| | |

| Polyurethane Coated Steel | 23,000 psi |
|---------------------------|------------|
| Mortar Coated Steel | 18,000 psi |

- d. Pipe which is placed in casing or tunnel shall have a minimum pipe wall steel thickness of 0.375 inches or pipe D/144, whichever is greater, where D is the nominal pipe diameter.
- e. Pipe and fittings which are placed inside vaults or exposed above grade shall have a minimum pipe wall steel thickness of 0.375 inches or pipe D/144, whichever is greater, where D is the nominal pipe diameter.

5. Seams

- a. Except for mill-type pipe, the piping shall be made from steel plates rolled into cylinders or sections thereof with the longitudinal and girth seams butt welded or shall be spirally formed and butt welded.
 - 1) There shall be not more than 2 longitudinal seams.
 - 2) Girth seams shall be butt welded and shall not be spaced closer than 6 feet except in specials and fittings.
- 6. Joint Length
 - a. Maximum joint length shall not exceed 50 feet.
 - b. Maximum joint length of steel pipe installed in casing shall meet the project requirements.
 - c. Manufactured random segments of pipe will not be permitted for straight runs of pipe.
 - 1) Closing piece segments, however, shall be acceptable.
- 7. Joint Bonds, Insulated Connections and Flange Gaskets
 - a. Joint Bonds, Insulated Connection, and Flange Gaskets shall be in accordance with Section 33 04 10.
- 8. Bend Fittings and Specials
 - a. Designed in accordance with AWWA C208 and AWWA M11.
 - Crotch plates will not be allowed on fittings. When the pressure-diameter value (PDV) exceeds 9,000, fitting shall be designed in accordance with ASME BPVC Section VIII Division 1.
 - b. All bend fittings shall have a minimum radius of 2.5 times the nominal pipe diameter to permit easy passage of pipeline pigs.
 - 1) Where the minimum radius cannot be accomplished, manufacturer shall be responsible for designing the fitting with increased wall thickness as necessary to achieve the smaller radius.
- 9. Pipe Ends
 - a. Pipe ends shall be:

- 1) Lap welded slip joints
- 2) Butt strap joint
- 3) Flanged joint
- 4) Flexible coupled joint
- 5) Roll groove gasket joint will not be allowed
- b. Lap Welded Slip Joint
 - 1) Lap welded slip joint shall be provided in all locations unless otherwise specified in the Drawings.
 - a) Single lap welded slip joints may be welded from the inside or outside.
 - (1) Pipe manufacturer shall be responsible for providing adequate access to the inside of the pipe to allow for the internal joint welding during construction.
 - b) For pipes 72" and larger, lap welded slip joints shall be welded both inside and outside.
 - Ends of pipe, fittings and specials for field welded joints shall be prepared with 1 end expanded in order to receive a plain end making a bell and plain end type of joint.
 - a) Clearance between the surfaces of lap joints shall not exceed1/8 inch at any point around the periphery.
 - 3) In addition to the provisions for a minimum lap of 1½ inches as specified in AWWA C200, the depth of bell shall be such as to provide for a minimum distance of 1 inch between the weld and the nearest tangent of the bell radius when welds are to be located on the inside of the pipe.
- c. Butt Strap Closure Joints
 - Where necessary to make closure to pipe previously laid, closure joints shall be installed using butt strap joints in accordance with AWWA C206 and applicable provisions of this Specification.
 - 2) Split butt straps will be allowed unless otherwise specified in the Drawings.
 - a) If utilized, longitudinal seams shall be joined by complete joint penetration (CJP) butt welds and circumferential welds shall be double-welded lap joints.
- d. Flanged Joints
 - 1) Flanged joints shall be provided at connections to valves and where indicated on the Drawings.
 - 2) Ends to be fitted with slip-on flanges shall have the longitudinal or spiral welds ground flush to accommodate the type of flanges provided.
- e. Flexible Coupling Joints
 - 1) Flexible couplings shall be provided where specified on the Drawings.
 - 2) Ends to be joined by flexible couplings shall be:

- a) Plain end type, prepared as stipulated in AWWA C200.
- b) Welds on ends to be joined by couplings shall be ground flush to permit slipping the coupling in at least 1 direction to clear the pipe joint.
- c) Harness bolts and lugs shall comply with AWWA M11.
- f. Roll Groove Gasket Joint
 - 1) Rubber gasketed joints (O-ring or Carnegie Joints) will not be allowed.
- 10. Polyurethane Coating
 - a. Applicator Qualifications
 - 1) Equipment shall be certified by the coating manufacturer to meet the requirements for:
 - a) Material mixing
 - b) Temperature control
 - c) Application rate
 - d) Ratio control for multi-part coatings
 - 2) Equipment not meeting the written requirements of the coating manufacturer shall be rejected for coating application until repairs or replacement of the equipment is made to the satisfaction of the Owner.
 - 3) Personnel responsible for the application of the coating system shall:
 - a) Provide certification of attendance at the coating manufacturer's training class within the last 3 years
 - b) Be present during all coating application work and shall have responsibility for controlling all aspects of the coating application
 - b. Surface Preparation
 - 1) Remove visible oil, grease, dirt and contamination in accordance with SSPC SP 1.
 - 2) Remove surface imperfections such as metal slivers, burrs, weld splatter, gouges or delaminations in the metal by filing or grinding prior to abrasive surface preparation.
 - 3) In cold weather or when moisture collects on the pipe and the temperature of the pipe is less than 45 degrees F, preheat pipe to a temperature between 45 and 90 degrees F and 5 degrees F above dew point.
 - Clean pipe by abrasive blasting with a mixture of steel grit and shot to produce the surface preparation cleanliness as required by coating manufacturer and as specified.
 - a) Recycled abrasive shall be cleaned of debris and spent abrasive in an air wash separator.
 - 5) Blast media mixture and gradation shall be adequate to achieve a sharp angular surface profile as required by coating manufacturer and to the minimum depth specified.

- 6) Protect prepared pipe from humidity, moisture and rain.
- 7) Keep pipe clean, dry and free of flash rust.
 - a) Remove all flash rust, imperfections or contamination on cleaned pipe surface by reblasting prior to primer application.
- 8) Complete priming and coating of pipe in a continuous operation the same day as surface preparation.
- Abrasive blast exterior surfaces in accordance with SSPC SP 10/NACE No.
 to a near-white blast cleaning with a minimum 3.0 mil angular profile in bare steel.
- c. Equipment
 - 1) 2-component, heated airless spray unit in accordance with coating manufacturer's recommendation
- d. Temperature
 - 1) Minimum 5 degrees F above dew point temperature
 - a) The temperature of the surface shall not be less than 60 degrees F during application.
- e. Humidity
 - 1) Heating of pipe surfaces may be required to meet requirements of this Section if relative humidity exceeds 80 percent.
- f. Resin
 - 1) Do not thin or mix resins; use as received.
 - 2) Store resins at a temperature recommended by the coating manufacturer.
- g. Application
 - 1) Applicator shall be certified by the coating manufacturer and conform to coating manufacturer's recommendations.
 - a) Thinning is not permitted.
 - Apply directly to pipe to achieve a total dry film thickness (DFT) of 35 mils as measured by SSPC PA 2.
 - 3) Multiple-pass, 1 coat application process is permitted provided maximum allowable recoat time specified by coating manufacturer is not exceeded.
 - Provide cutbacks in accordance with coating manufacturer's recommendations as appropriate for the type of joint and heat shrink sleeve to be used.
- h. Recoating
 - 1) Recoat only when coating has cured less than maximum time specified by coating manufacturer.
 - 2) When coating has cured for more than recoat time, brush-blast or thoroughly sand the surface.

- 3) Blow-off cleaning using clean, dry, high pressure compressed air.
- i. Curing
 - 1) Do not handle pipe until coating has been allowed to cure, per manufacturer's recommendations.

2.2 SOURCE QUALITY CONTROL

- A. Marking for Identification
 - 1. For each joint of pipe and each fitting, plainly mark on 1 end:
 - a. Class for which it is designated
 - b. Date of manufacturer
 - c. Identification number
 - d. Field top centerlines shall be marked on all specials

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General
 - 1. Install steel pipe, fittings, specials and appurtenances as specified herein, as specified in AWWA M11 and AWWA C604, in accordance with the pipe manufacturer's recommendations and as required for the proper functioning of the completed pipe line.
 - 2. Lay pipe to the lines and grades as indicated in the Drawings.
 - a. Do not lay pipe in submerged or partially submerged conditions.
 - b. Do not allow the pipe to be submerged within 24 hours after placement.
 - 3. Excavate, embed and backfill trenches in accordance with Section 31 23 33.
 - For installation of carrier pipe within casing or tunnel liner plate, see Section 33 05 24.
 - 5. Inspect and test each joint for holidays just prior to pipe being lowered into the ditch.
 - a. All damaged areas and holidays are to be repaired before the pipe is lowered into the trench.
 - 6. Place and consolidate embedment and backfill prior to removing pipe stulls.
 - a. Contractor shall verify all stulls have been removed from pipeline prior to hydrostatic testing and disinfection. Contractor shall submit a letter to the Owner confirming all stulls have been removed.
 - 7. At the close of each operating day:
 - a. Keep the pipe clean and free of debris, dirt, animals and trash during and after the laying operation.

- b. Effectively seal the open end of the pipe using a manufactured gasketed night cap. Night cap shall be Foreman Night Cap as manufactured by Pioneer Works or approved equal.
- 8. Maximum allowable pipe deflection is limited to:
 - a. 2 percent for mortar coated steel pipe
 - b. 3 percent for polyurethane coated steel pipe
 - c. 0.25 percent for pipe directly adjacent to direct buried butterfly
- 9. Install bonds at all pipe joints, except for welded joints or insulated joints.
- B. Pipe Handling
 - 1. Haul and distribute pipe and fittings at the project site.
 - 2. Handle pipe with care to avoid damage.
 - a. Pipe shall be handled at all times with sufficient non-abrasive slings, belts or other equipment designed to prevent damage to the coating or lining.
 - b. The spacing of pipe supports required to handle the pipe shall be adequate to prevent cracking or damage to the lining or coating.
 - c. Inspect each joint of pipe and reject or repair any damaged pipe prior to lowering into the trench.
 - d. The equipment shall be kept in such repair that its continued use is not injurious to the coating.
- C. Line Up at Bends
 - 1. Line up pipe and bends for joining so as to prevent damage thereto.
 - a. Thoroughly clean the bell and spigot ends of each joint of pipe of foreign matter, rust and scale before placing spigot into bell.
 - 2. Where abrupt changes in grade and direction occur, employ special shop fabricated fittings for the purpose.
 - a. Field cutting the ends of the steel pipe to accomplish angular changes in grade or direction of the line shall not be permitted.
- D. Pipe Laying
 - 1. Rubber Gasket Joint
 - a. Will not be allowed
 - 2. Welded Joints
 - a. Weld joints in accordance with AWWA C206.
 - 1) Contractor shall provide adequate ventilation for welders and for Owner's representative to observe welds.
 - 2) Welds shall be full circle fillet welds, unless otherwise specified.
 - 3) Welding shall be completed after application of field applied joint coating.

- b. Adequate provisions for reducing temperature stresses shall be the responsibility of the Contractor.
- c. After the pipe has been joined and properly aligned and prior to the start of the welding procedure:
 - 1) The spigot and bell shall be made essentially concentric by shimming or tacking to obtain clearance tolerance around the periphery of the joint.
 - 2) In no case shall the clearance tolerance be permitted to accumulate.
- d. Before welding:
 - 1) Thoroughly clean pipe ends.
 - 2) Weld pipe by machine or by the manual shielded electric arc process.
 - a) Welding shall be performed so as not to damage lining or coating.
 - 3) Cover the polyurethane coating as necessary to protect from weld splatter.
- e. Furnish labor, equipment, tools and supplies, including shielded type welding rod.
 - 1) Protect welding rod from any deterioration prior to its use.
 - 2) If any portion of a box or carton is damaged, reject the entire box or carton.
- f. Hand Welding
 - 1) The metal shall be deposited in successive layers.
 - 2) Not more than 1/8 inch of metal shall be deposited in each pass.
 - Each pass except the final, whether in butt or fillet welds, shall be thoroughly bobbed or peened to relieve shrinkage stresses and to remove dirt, slag or flux before the succeeding bead is applied.
 - Each pass shall be thoroughly fused into the plates at each side of the welding groove or fillet and shall not be permitted to pile up in the center of the weld.
 - 5) Undercutting along the side shall not be permitted.
- g. Welds shall be free from pin holes, non-metallic inclusions, air pockets, undercutting and/or any other defects.
- h. If the ends of the pipe are laminated, split or damaged to the extent that satisfactory welding contact cannot be obtained, remove the pipe from the line.
- i. Furnish each welder employed with a steel stencil for marking the welds, so that the work of each welder may be identified.
- j. Have each welder stencil the pipe adjacent to the weld with the stencil assigned to him.
 - 1) In the event any welder leaves the job, his stencil shall be voided and not duplicated if another welder is employed.
- k. Welders

- Use only competent, skilled and qualified workmen. Each welder employed by the Contractor shall be required to satisfactorily pass a welding test in accordance with AWWA C206 before being allowed to weld on the line. Field welding shall be provided by one of the following firms:
 - (1) Thompson Pipe Group
 - (2) Fuller's Service Company, Barry Fuller, 817-477-3841
 - (3) Scott's Welding, Scott Fowler, 972-978-7865
 - (4) Eddie's Welding Service, Eddie Pierce, 214-909-6089
 - (5) National Welding Corporation, Nash Williams, 801-225-5959
 - (6) No others will be accepted
- 2) After each welder has qualified in the preliminary tests referred to above, inspections shall be made of joints in the line.
 - a) The inspection will be done by a Certified Welding Inspector retained by the Contractor.
- Any welder making defective welds shall not be allowed to continue to weld.
- 3. Flanged Joints
 - a. Install in accordance with ASME PCC-1-2012.
 - b. During assembly, tighten nuts gradually and equally using a three-pass method in accordance with ASME PCC-1-2012.
 - 1) For the first pass, tighten the nuts to 50 percent at diametrically opposite sides to prevent misalignment and to ensure that all bolts carry equal loads.
 - 2) For the second pass, tighten the nuts to 100 percent again in a diametrically opposite pattern.
 - 3) Allow a minimum of 1 hour to pass to provide time for settlement between bolts and nuts and gasket relaxation.
 - 4) Complete the third pass by checking each bolt in a clockwise pattern. Each nut should be tightened until it will no longer turn at the target torque. This step compensates for elastic interaction and brings all bolts into parity.
 - c. The threads of the bolts should protrude a minimum of $\frac{1}{2}$ -inch from the nuts.
- E. Exterior Joint Protection
 - 1. Heat Shrink Sleeves
 - a. General
 - 1) Buried pipe joints shall be field coated after pipe assembly in accordance with AWWA C216, using Heat Shrink Sleeves.
 - 2) Width of heat shrink sleeve shall be sufficient to overlap the polyurethane coating by a minimum of 3 inches.

- 3) Overlapping of 2 or more heat shrink sleeves to achieve the necessary width will not be permitted.
- b. Installation
 - Clean pipe surface and adjacent coating of all mud, oil, grease, rust and other foreign contaminates with a wire brush in accordance with SSPC SP 2, or SSPC SP 3. Remove oil or grease contamination by solvent wiping the pipe and adjacent coating in accordance with SSPC SP 1.
 - a) Clean the full circumference of the pipe and a minimum of 6 inches onto the existing coating.
 - 2) Remove all loose or damaged pipe coating at joint and either repair the coating as specified herein or increase the length of the joint coating, where reasonable and practical.
 - 3) Complete joint bonding of non-welded pipe joints before application of joint coating.
 - a) Joint bonds shall be low profile bonds and all gaps and crevices around the bonds shall be filled with mastic sealant.
 - 4) Store sleeves in shipping box until use is required.
 - a) Keep dry and sheltered from exposure to direct sunlight.
 - b) Store off the ground or concrete floors and maintain at a temperature between 60 degrees F and 100 degrees F as recommended by the sleeve manufacturer.
 - 5) Metal surface shall be free of all dirt, dust and flash rusting prior to sleeve application.
 - 6) Preheat pipe uniformly to 140 degrees F to 160 degrees F or as recommended by the sleeve manufacturer.
 - a) Monitor pipe temperature using a surface temperature gauge, infrared thermometer or color changing crayons.
 - b) Protect preheated pipe from rain, snow, frost or moisture with tenting or shields and do not permit the joint to cool.
 - 7) Prime joint with specified primer and fill all cracks, crevices and gaps with mastic filler in accordance with the manufacturer's recommendations for the full circumference of the pipe.
 - Apply heat shrink sleeve when it is at a minimum temperature or 60 degrees F and while maintaining the pipe temperature above the preheat temperature specified.
 - a) Apply sleeve in accordance with the manufacturer's instructions and center the sleeve over the joint to provide a minimum of 3-inch overlay onto the existing pipe coating.
 - 9) Apply heat to the sleeve using either propane fire infrared heaters or wrap around heaters.

- a) Hold flame a minimum of 6 inches from the sleeve surface.
- b) Periodically roll the coating on the pipe surface.
- c) Heat from the center of the sleeve to the outer edge until properly seated, then begin in the opposite direction.
- d) Monitor sleeve for color change, where appropriate, or with appropriate temperature gauges.
- e) Take care not to excessively heat the parent coating.
- 10) Completed joint sleeve shall be fully bonded to the pipe and existing coating surface, without voids, mastic beading shall be visible along the full circumference of the sleeve, and there shall be no wrinkling or excessive burns on the sleeves.
 - a) Sleeves which do not meet these requirements shall be removed and the joint recoated as directed by the Engineer.
 - b) Minor repairs may be made using heat shrink sleeve repair kits.
- 11) Allow the sleeve to cool before moving, handling or backfilling. In hot climates, provide shading from direct sunlight.
 - a) Water quenching will be allowed only when permitted by the sleeve manufacturer.
- 12) Holiday testing shall be performed using a high voltage holiday tester (operating at 100 volts per mil) at each joint after field application of heat shrinkable joint sleeve per SP0188.
 - a) If any holidays or cuts are detected, the sleeve shall be repaired using the heat shrink sleeve manufacturer's recommendation.
 - b) The damaged area shall be covered with a minimum of 50-mm overlap around the damaged area.
- F. Protective Welded Joints Coating System Weld After Backfill
 - 1. General
 - a. The Contractor is responsible for his operations so that they do not damage the factory applied coating system.
 - b. When applying the 3 layer joint coating system for post welding the joints, the Contractor must show that his operation will not damage the joint coating system to the Engineer's satisfaction.
 - c. The Contractor will be required to fully uncover a maximum of 10 joints, selected at random by the Engineer or Owner to visually inspect and test the joint after welding. Any damage must be repaired.
 - If the Contractor's welding procedure damages the 3 layer joint coating system, the Contractor, at the direction of the Engineer, will be required to modify his welding procedure.
 - 2. Joint Coating (3 Layer)

- a. Apply 3 Layer Joint Coating System before welding the joint. Coating system shall consist of the following:
 - 1) A factory applied 35 mil thickness polyurethane coating shall be applied over entire length of pipe.
 - The Contractor shall field apply 60 mil thick by 6 inch wide strip of CANUSA HCO Wrapid Tape heat resistant tape to the exterior bell end of the pipe, centered on the location of the welding.
 - 3) A field applied 110 mil (full recovered thickness) by 18 inch wide CANUSA AquaWrap high shrink heat shrinkable joint sleeve.
 - a) Install heat shrink sleeve in accordance with 3.1.E.
 - 4) After the heat shrinkable joint sleeve is installed, backfill the trench and then weld the joint.
- G. Interior Joint Grouting
 - 1. Upon completion of backfilling of the pipe trench, clean out dirt or trash which has collected in the joint and moisten the concrete surfaces of the joint space by spraying or brushing with a wet brush.
 - 2. Fill the inside of the joint recess with a stiff cement mortar.
 - 3. Where the mortar joint opening is 1 inch or wider, such as where trimmed spigots are required, apply a bonding agent to mortar and steel surface prior to placing joint mortar.
 - 4. Ram or pack the stiff mortar into the joint space and take extreme care to ensure that no voids remain in the joint space.
 - 5. After the joint has been filled, level the surfaces of the joint mortar with the interior surfaces of the pipe with a steel trowel so that the surface is smooth.
 - 6. Interior joints of pipe 30-inch and smaller shall have the bell buttered with mortar prior to inserting the spigot such that when the spigot is pushed into position it will extrude surplus mortar from the joint.
 - a. The surplus mortar shall be struck off flush with the inside of the pipe by pulling a filled burlap bag or inflated ball through the pipe with a rope.
- H. Protection of Buried Metal
 - 1. Coat buried ferrous metal such as bolts and flanges, which cannot be protected with factory or field-applied polyurethane coatings or heat shrink sleeves, with petrolatum tape system. Petrolatum tape system shall consist of of Densyl Mastic, Densyl Paste, and Densyl Tape as manufactured by Denso.

3.2 REPAIR

- A. Repair and Field Touchup of Polyurethane Coating
 - 1. Holidays
 - a. Remove all traces of oil, grease, dust, dirt and other debris.
 - b. Roughen area to be patched by sanding with rough grade sandpaper (40 grit).
 - c. Apply a 35 mil coat of repair material described above.

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- d. Work repair material into scratched surface by brushing or rolling in accordance with manufacturer's recommendations.
- e. Retest for Holiday.
- 2. Field Cuts or Large Damage
 - a. If in the opinion of the Owner the polyurethane coating is excessively damaged, the pipe segment will be rejected until the coating system is removed and replaced so that the system is in a like-new condition.
 - b. Remove burrs from field cut ends or handling damage and smooth out edge of polyurethane coating.
 - c. Remove all traces of oil, grease, dust, dirt and other debris.
 - d. Roughen area to be patched with rough grade sandpaper (40 grit).
 - e. Feather edges and include overlap of 2 inches of roughened polyurethane in area to be patched.
 - f. Apply a 35 mil coat of repair material described above, in accordance with manufacturer's recommendations.
 - g. Work repair material into scratched surface by brushing.
 - h. Feather edges of repair material into prepared surface.
 - i. Cover at least 1 inch of roughed area surrounding damage or adjacent to field cut.
 - j. Test repairs for holidays.
- B. Patch of Cement Mortar Lining
 - 1. Repair cracks larger than 1/16 inch.
 - 2. Pipes with disbonded linings will be rejected.
 - 3. Excessive patching of lining shall not be permitted.
 - 4. Repair in accordance with AWWA C205 and as follows:
 - a. Apply bonding agent to patch area.
 - b. Patching of lining shall be allowed where area to be repaired does not exceed 100 square inches and has no dimension greater than 12 inches.
 - c. In general, there shall be not more than 1 patch in the lining of any joint of pipe.
 - 5. Wherever necessary to patch the pipe, make the patch with the mortar indicated.
 - 6. Do not install patched pipe until the patch has been properly and adequately cured, unless approved by the Owner.

3.3 FIELD QUALITY CONTROL

- A. Field Tests and Inspections
 - 1. Quality Control of Field Applied Polyurethane Coating
 - a. Surface Preparation

- 1) Visually inspect surface preparation to ensure cleanliness and dryness requirements have been met.
- 2) Use Testex tape on at least 1 joint per day to ensure that adequate profile is being achieved.
- b. Visual
 - 1) Visually inspect cured coating to ensure that the coating is completely cured with no blisters, cracks, pinholes, missed areas, excessive roughness, "sticky" or "gooey" areas.
 - 2) Check to ensure that the coating completely covers the steel and existing coating.
- c. Thickness
 - 1) Use a magnetic dry film thickness (DFT) gauge on cured coating to ensure adequate thickness has been achieved according to SSPC PA 2.
 - a) If the thickness of the coating is below the minimum specified millage anywhere along the length of the pipe, then adjustments must be made to the spray system to correct the problem.
 - 2) At a minimum, the thickness shall be measured for every 50 square feet of sprayed area.
- d. Adhesion
 - 1) Perform the following procedure on a minimum of 1 joint per day:
 - a) Select area to test that has cured for at least 1 hour for fast setting coatings.
 - b) Test and repair in accordance with AWWA C222 Dolly Pull-off Test.
- e. Holiday Testing
 - Holiday testing shall be performed using a high voltage holiday tester at each joint no sooner than 1 hour after field application of polyurethane coating.
- f. Inspection at Welding Joints
 - When applying the 3 layer joint coating system for post welding the joints, the Contractor must show that his operation will not damage the joint coating system to the Engineer's satisfaction.
 - The Contractor will be required to fully uncover a maximum of 10 joints, selected at random by the Engineer or Owner to visually inspect and test the joint after welding.
 - 3) Any damage must be repaired.
 - 4) If the Contractor's welding procedure damages the 3 layer joint coating system, the Contractor, at the direction of the Engineer, will be required to modify his welding procedure.
- 2. Weld Testing

- a. Magnetic particle test in accordance with AWWA C206 and set forth in AWS D.1.1 shall be performed by the Contractor under the supervision and inspection of the Owner's Representative or an independent testing laboratory, on all full welded joints.
 - 1) Welds that are defective will be replaced or repaired, whichever is deemed necessary by the Engineer, at the Contractor's expense.
 - 2) If the Contractor disagrees with the Engineer's interpretation of welding tests, test sections may be cut from the joint for physical testing. The Contractor shall bear the expense of repairing the joint, regardless of the results of physical testing.
 - a) The procedure for repairing the joint shall be approved by the Engineer before proceeding.
 - Cement mortar lining at joints shall be held back a sufficient distance from the weld location to allow for a full magnetic particle test to be performed on the weld.
- 3. Deflection Testing
 - a. Prior to hydrostatic testing, the Owner's inspector shall perform deflection testing at a minimum of 2 locations on site.
 - b. Owner may reject any areas not meeting the deflection requirements of this Specification.
- 4. Cleaning and Testing
 - a. Clean, flush/pig, disinfect, hydrostatic test and bacteriological test the water main as specified in Section 01 45 16.16.

END OF SECTION

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SECTION 33 12 18 AIR RELEASE/VACUUM VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnishing all labor, materials, equipment and incidentals required to completely install and put into operation, air release/ air vacuum valves as specified herein and shown on the drawings.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

- 1.3 REFERENCES [NOT USED]
- 1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]
- 1.5 SUBMITTALS [NOT USED]
- 1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS
 - A. Product Data

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE [NOT USED]

1.10 DELIVERY, STORAGE, AND HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
- C. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- D. Take special care to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, preventing any deformation.

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY

- A. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner.
- B. Warranty shall be for a period of two years after Final Acceptance.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Manufacturers

The valve shall be the product of a manufacturer regularly engaged in the manufacture of combination air release/air vacuum valves having similar service and size. The valves covered by the specifications are intended to be standard equipment that has proven ability. Only the following manufacturers and models are acceptable.

- a. Vent-O-Mat Series RBX
- b. Vent-Tech Model WTR, Series C
- c. No others will be allowed
- 2. The listing above does not imply that the manufacturer's standard product is acceptable. The successful manufacturer will be required to conform to all specifications.
- B. Description
 - 1. The air vacuum valve shall achieve the following functions:
 - a. High volume discharge during pipeline filling
 - b. High volume intake through the large orifice
 - c. Pressurized air discharge
 - d. Surge Dampening Controlled discharge rates
 - 2. The valve shall have an integral surge alleviation mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure due to high velocity air discharge or the subsequent rejoining of the separated water columns. The limitation of the pressure rise shall be achieved by decelerating the approaching water prior to valve closure.
 - 3. Intake/Discharge orifice area shall be equal to the nominal size of the valve.
 - 4. The valve shall perform as intended with no deformation, leaking or damage of any kind for the pressure ranges indicated.
- C. Performance / Design Criteria
 - The arrangement shown on the drawings is based upon the best information available to the Engineer at the time of design and is not intended to show exact dimensions to any specific equipment unless otherwise shown or specified. Therefore, it may be anticipated that the structural supports, foundations, and connected piping shown, in part or in whole, may have to be changed in order to accommodate the equipment furnished. No additional payment will be made for such changes. All necessary calculations and drawings for any related redesign shall be submitted to the Engineer for his approval prior to beginning the work.
 - 2. The valve shall be designed to operate with the following working conditions without damage to the valve.

| <u>48" WATER LINE – 8" ARV</u> | |
|----------------------------------|--------------------|
| Water Type | Potable Water |
| Working Pressure Range | 7.25 psi – 200 psi |
| Test Pressure | 300 psi |
| Total (Working + Surge) Pressure | 300 psi |
| Flow Range | 0 MGD – 65 MGD |

3. The equipment to be provided under this section shall be suitable for installation and operation at elevations of about 500 feet above sea level inside a vault structure.

- 4. Outside ambient temperatures range between 0 and 110 degrees F, and reported water temperatures vary between 50 and 105 degrees F.
- 5. Relative humidity is expected to range between 5 and 100 percent. The valve shall be capable of being submerged periodically.
- D. Materials
 - 1. All internal parts shall be a non-corroding material such as stainless steel or high density polyethylene.
 - 2. The valve body shall be constructed of stainless steel and equipped with intake and discharge flanges.
 - a. Flanges shall be composed of stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All air release valves shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.

END OF SECTION

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SECTION 33 12 20 RESILIENT SEATED GATE VALVE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Work in this section includes furnishing all labor, materials, equipment and incidentals required to completely install and put into operation resilient seated gate valves and actuator as specified herein and shown on the drawings.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Water Works Association (AWWA)
 - a. AWWA C509 Resilient seated gate valves
 - b. AWWA C515 Reduced wall resilient seated gate valves
 - 3. American Society for Testing and Materials (ASTM)
 - a. ASTM A48 Gray Iron Castings
 - b. ASTM A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - c. ASTM A436 Austenitic Gray Iron Castings
 - d. ASTM A536 Ductile Iron Castings.

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

A. Product Data

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts
 - 1. Furnish one set of special tools required for the proper servicing of all equipment supplied under these Specifications, packed in a suitable steel tool chest with a lock.

1.9 QUALITY ASSURANCE

- A. The Contractor shall cause all equipment specified under this section to be furnished by the valve manufacturer who shall be responsible for the adequacy and compatibility of all valve components including the actuator. Any component of each complete unit not provided by the valve manufacturer shall be designed, fabricated, tested, and installed by factory-authorized representatives experienced in the design and manufacture of the valve equipment. This requirement, however, shall not be construed as relieving the Contractor of the overall responsibility for this portion of the work.
- B. The equipment to be provided under this section shall be suitable for installation and operation either inside vault structure or directly buried.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements
 - 1. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
 - a. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
 - b. The finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.
 - c. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
 - 2. Take special care to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, preventing any deformation.

1.11 WARRANTY

- A. Manufacturer Warranty
 - The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner. Warranty shall be for a period of two (2) years and begin on the Date of Final Acceptance.

PART 2 - PRODUCTS

2.1 RESILIENT SEATED GATE VALVES

- A. Manufacturers
 - 1. Resilient seated gate valves for sizes 2" through 36" shall be:
 - a. Clow/Kennedy;
 - b. Mueller;
 - c. American Flow Control;
 - d. No others will be allowed
- B. Description
 - 1. Regulatory Requirements
 - a. Resilient seated gate valves through 36" shall meet or exceed the latest revisions of AWWA C509 or AWWA C515 and shall meet or exceed the requirements of this specification.
 - b. All valve components in contact with potable water shall conform to the requirements of ANSI/NSF Standard 61 and be resistant to chloramines.

- c. Flange end valves shall be Class 125 drilling pattern per ANSI B16.1 standard for cast iron flanges.
 - 1) Valves used in conjunction with tapping sleeves shall comply with MSS SP-60
- d. Mechanical Joints shall be furnished with outlets which conform to ANSI/AWWA C111/A21.11 mechanical joint requirements.
- C. Performance / Design Criteria
 - Resilient seated gate valves for buried service shall be furnished with a square 2" operating nut. The valve box shall be Tyler Pipe 6850 series or Engineer approved equal.
 - 2. In all non-buried service, handwheel operators shall be furnished, unless otherwise specified.
 - 3. Resilient seated gate valves shall be non-rising stem type unless otherwise specified.
 - 4. 24" and larger resilient seated gate valves shall be furnished with gear reduction.
- D. Materials
 - 1. Valve Body
 - a. Ductile iron per ASTM A536.
 - 2. Valve Disc
 - a. For valves 12" and smaller:
 - 1) Ductile iron or cast iron fully encapsulated in rubber.
 - b. For valves larger than 12"
 - 1) Ductile iron fully encapsulated in rubber
 - c. For all sizes, no iron shall be exposed on the disc.
 - 3. Bolts and Nuts
 - a. Hex head bolt, and hex nut shall be Steel ASTM A307 Gr. B, Zinc Plate per ASTM B633, SC3 for non-buried service (4" through 12" valves).
 - For buried applications (all sizes) and for valves 16-inch through 30-inch (nonburied service), provide ASTM A193 Grade B8M Bolts and ASTM A194 Grade 8M Nuts.
 - c. Bolts and nuts located within vaults shall be considered a buried application and shall be provided as stainless steel.
 - d. For non-buried service, T-Bolts shall be high strength low alloy Cor-Ten or approved equal. For buried service T-Bolts shall be 316 stainless steel.
- E. Finishes
 - 1. Finish Materials
 - a. Gate valves in buried service shall be provided with polyethylene encasement in accordance with AWWA C105.
 - b. For buried valves, the valve in its entirety (including valve body, nuts, and bolts) shall be wrapped in petrolatum tape system. Petrolatum tape system shall consist of Densyl Mastic, Densyl Paste, and Densyl Tape, as manufactured by Denso.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All resilient seated gate valves shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.

END OF SECTION

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SECTION 33 12 21 AWWA BUTTERFLY VALVE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - This work includes furnishing all labor, materials, equipment and incidentals required to completely install and put into operation, AWWA butterfly valves for buried and plant applications as specified herein and shown on the drawings. This work also includes replacing gearing on existing butterfly valves in a plant application.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Water Works Association (AWWA)
 - a. AWWA C504 Rubber Seated Butterfly Valves
 - 3. American Society for Testing and Materials (ASTM)
 - a. ASTM A48 Gray Iron Castings
 - b. ASTM A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - c. ASTM A436 Austenitic Gray Iron Casting
 - d. ASTM A536 Ductile Iron Casings

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
- B. Certificate of Compliance with specifications

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual

1.8 MAINTANENCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE

- A. The valve shall be the product of a manufacturer regularly engaged in the manufacture of butterfly valves having similar service and size. The valves covered by the specifications are intended to be standard equipment of that which has proven ability.
- B. The Contractor shall cause all equipment specified under this section to be furnished by the valve manufacturer who shall be responsible for the adequacy and compatibility of all unit components including but not limited to the valve, actuator and extension stems.
- C. Any component of each complete unit not provided by the valve manufacturer shall be designed, fabricated, tested, and installed by factory-authorized representatives experienced in the design and manufacture of the equipment. This requirement, however, shall not be construed as relieving the Contractor of the overall responsibility for this portion of the work

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements
 - 1. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
 - a. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
 - b. The finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.
 - c. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
 - 2. Take special care to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, preventing any deformation.

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY

- A. Manufacturer Warranty
 - The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner. Warranty shall be for a period of two (2) years and begin on the Date of Final Acceptance.

PART 2 - PRODUCTS

2.1 BUTTERFLY VALVES

- A. Manufacturers
 - 1. The following manufacturers are acceptable.
 - a. 30" and smaller valves
 - 1) Dezurik
 - 2) Crispin K-Flo
 - 3) Val-Matic
 - 4) Pratt
 - 5) No others will be allowed

- b. 36" and larger valves
 - 1) Crispin K-Flo
 - 2) Val-Matic
 - 3) GA Industries
 - 4) No others will be allowed
- 2. The listing above does not imply that the valve or the manufacturer's standard product is acceptable. The successful manufacturer will be required to conform to all specifications.

B. Description

- 1. Regulatory Requirements
 - a. Butterfly valves shall be in general conformance the latest revision of AWWA Standard C504 butterfly valves and shall meet or exceed the requirements of this specification.
 - b. All valve components in contact with potable water shall conform to the requirements of ANSI/NSF Standard 61.
 - c. Valve shall be of the short body design
 - d. Flange end shall have Class 125 Standard flanged ends faced and drilled per ANSI B16.1 standard for cast iron flanges.
 - e. Mechanical joint end valves shall meet the requirements of AWWA C111/ANSI 21.11.
 - f. Unless otherwise specified, exterior and interior metallic surfaces of each valve shall be shop painted per the latest revision of AWWA C504.
- C. Performance / Design Criteria
 - 1. System Description
 - a. The arrangement shown on the drawings is based upon the best information available to the Engineer at the time of design and is not intended to show exact dimensions to any specific equipment unless otherwise shown or specified. Therefore, it may be anticipated that the structural supports, foundations, and connected piping shown, in part or in whole, may have to be changed in order to accommodate the equipment furnished. No additional payment will be made for such changes. All necessary calculations and drawings for any related redesign shall be submitted to the Engineer for his approval prior to beginning the work.
 - b. Valves shall be designed to operate with the following working conditions without damage to the valve and without leakage across the street.

| Size | Min. Acceptable Valve Class | Working Pressure | Test Pressure | Max. Velocity (ft/s) | Service |
|--------------|-----------------------------------|---------------------|------------------|----------------------------|-----------|
| See Plans | 250 B | 200 psi | 250 psi | 16 | See Plans |

- c. The butterfly valves shall operate satisfactorily over the complete operating range shown. The equipment to be provided under this section shall be suitable for installation and operation at elevations about 500 feet above sea level, in weather-protected structures and in buried service. Outside ambient temperatures range between 0 and 110 degrees. F, and reported water temperatures vary between 50 and 105 degrees F. Relative humidity is expected to range between 5 and 100 percent.
- 2. Flanges:
 - a. Flanged ends shall be provided unless otherwise specified.
 - b. Flange Class
 - 1) Ductile Iron
 - a) Flanges shall be designed for the test pressure of the valve.

- 2) Steel
 - a) Flanges shall be Class D with 150 psi working pressure for valves where the maximum pressure (test or total) is less than or equal to 225 psi and working pressure is less than or equal to 150 psi.
 - b) Flanges shall be Class E with 275 psi working pressure for valves where the maximum pressure (test or total) is greater than 225 psi or working pressure is between 150 psi and 275 psi.
- 3. Seats:
 - a. Resilient seats shall be located on the disc or body and shall provide a 360 degree continuous, uninterrupted seating surface.
 - b. 30" and smaller valves:
 - 1) Seat shall be mechanically retained to the disc or body using either a stainless steel retaining ring and stainless steel cap screws which shall pass through both the resilient seat and the retaining ring, epoxy, or vulcanization.
 - c. 36" and larger valves:
 - 1) Seats shall be mechanically retained with a stainless steel retaining ring and stainless steel cap screws which shall pass through both the resilient seat and the retaining ring.
 - d. The resilient seat's mating surface shall be to a 360 degree continuous uninterrupted stainless steel body seat ring.
 - e. Resilient seats shall be field adjustable and replaceable. Valves 36 inches and larger shall have in-line replaceable seats.
- 4. Valve Position Indicator:
 - a. Valves located above ground or in cast in place vaults shall have an indicator which will indicate the valve position. The indicator shall be permanently match-marked at the factor to indicate full open and full closed position.
 - b. Valve position indicator is not required for buried valves or valves with actuators inside of manholes.

D. Materials

- 1. Valve Body
 - a. Valve bodies shall be of ductile iron per ASTM A536 Grade 65-45-12 or fabricated steel ASTM A36.
- 2. Valve Disc
 - a. Discs shall be ductile iron ASTM A536 Grade or fabricated steel ASTM A36.
 - b. Disc and shaft connection shall be made with tapered pins of either monel or stainless steel.
- 3. Valve Shaft
 - a. Valve shaft shall be type 304 stainless steel or equal.
 - b. Valve shaft seals shall be self-compensating V-type packing with a minimum of 4 sealing rings.
 - c. Valve shaft bearings shall be non-metallic and permanently lubricated.
- 4. Valve Seat
 - a. The seat shall be EPDM for water
- 5. Bolts
 - a. Hex head bolt, and hex nut shall be Steel ASTM A307 Gr. B, Zinc Plate per ASTM B633, SC3 for non-buried service (4" through 12" valves).
 - For buried applications (all sizes) and for non-buried service valves larger than 16-inches, provide ASTM A193 Grade B8M Bolts and ASTM A194 Grade 8M Nuts.
 - c. Bolts and nuts located within vaults shall be considered a buried application and shall be provided as stainless steel.

- d. For non-buried service, T-Bolts shall be high strength low alloy Cor-Ten or approved equal. For buried service T-Bolts shall be 316 stainless steel.
- E. Finishes
 - 1. Finish Materials
 - a. All surfaces of the valve shall be clean, dry and free from grease before applying paint or coating.
 - b. The valve interior and exterior surfaces, except for the seating surfaces, shall be provided with the manufacturer's standard coating or as specified by contract.
 - c. All internal exposed surfaces that are susceptible to corrosion shall be coated with a Polymide cured, rust inhibiting epoxy.
 - d. Surfaces to be coated shall be prepared per NAPF 500-03 or SSPC-SP 10.
 - e. Final coating thickness shall be 16 mils minimum.
 - f. For buried valves, the valve in its entirety (including valve body, nuts, and bolts) shall be wrapped in petrolatum tape system. Petrolatum tape system shall consist of Densyl Mastic, Densyl Paste, and Densyl Tape, as manufactured by Denso.
- F. Testing
 - 1. Factory testing shall be in accordance with AWWA C504.
 - 2. All surfaces shall be inspected for proper dry film thickness using a magnetic dry film thickness gauge. Tests for invisible holidays shall be conducted using a low voltage, wet sponge holiday or leak detector.

2.2 MANUAL ACTUATORS

- A. Manufacturer's
 - 1. The following manufacturers and models are acceptable.
 - a. AUMA Type GS
 - b. Limitorque Type HBC
 - c. No others will be allowed
- B. Description
 - 1. Regulatory Requirements
 - a. Worm gear manual operator shall comply fully with AWWA C-504, latest edition.
- C. Performance / Design Criteria
 - 1. Valves shall be provided with manual actuators unless otherwise specified or indicated on the plans.
 - 2. Valves shall be opened by turning the actuator counter clockwise and close clockwise.
 - 3. Manual actuators shall be fully greased, packed and have stops in the open and closed position. The actuator shall have a mechanical stop which will withstand an input torque of 300 ft. lbs. against the stop. The actuator shall have a built in packing leak bypass to eliminate possible packing leakage into the actuator housing.
 - 4. Butterfly valves for buried service shall be furnished with a 2" operating nut. The actuator shall be placed in a vault as indicated on the plans and have extension to the top of the vault.
 - 5. Actuator shall be worm-gear type, as follows:

- a. Worm gear drive sleeve and worm shaft shall be of solid, one-piece design; bolted segments or pinned worms will not be acceptable. Drive sleeve shall include an integral spline to accept a removable bottom-entry spline bushing for valve shaft connection.
- b. If required for torque purposes, spur gear reducers may be provided for increased torque outputs and to reduce handwheel diameter.
- c. Worm gear operator shall include handwheel with maximum 80 pound rim pull.
- 6. Manual gears shall be capable of being field retrofit with an electric motor operator in the future without major modifications. With spur gear removed, splined worm gear input shaft and motor adapter flange shall be easily added to accept a multi-turn "torque-only" electric valve actuator.
- 7. Supplier shall include the number of turns required to complete on Open-to-Close stroke in the Equipment Submittal.
- D. Materials
 - 1. Housing Ductile iron or Cast Iron
 - 2. Drive Sleeve Ductile iron
 - 3. Worm Wheel Bronze
 - 4. Worm Shaft Alloy steel
 - 5. Bearings Heavy duty ball bearings
 - 6. Fasteners Stainless Steel
- E. Finishes
 - 1. Finish Materials
 - a. Thermostatically applied polyester powdercoat

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All butterfly valves shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.
- B. Installation and adjustment shall be checked and approved by a manufacturer's factory representative in the field. Butterfly valve and actuator field inspection shall occur concurrently.
 - 1. Butterfly Valves
 - a. For valves 36" and larger, verification shall include entering the pipe prior to pipe filling to inspect that the seats have been installed correctly.
 - b. For valves smaller than 36", manufacturer shall visit the site within 48 hours prior to installation and visually inspect the valve at the surface. Manufacturer shall run the valve through open/close and ensure that the seats have been installed correctly.
 - 1) For valves to be installed during a shutdown, manufacturer shall visit the site no later than 24 hours before the shutdown is scheduled to begin.
 - 2. Actuators
 - a. Manufacturer shall set the actuator limits in the field within 48 hours prior to installation.
- C. After acceptance, the representative shall address a letter to the Engineer outlining all installation and start up procedures. The letter shall include a statement that the valves and actuators are installed per the manufacturer's recommendations. The manufacturer or his qualified representative shall conduct a training session for the Owner's personnel in the operation and maintenance of the valve and actuator if requested by the Owner.

END OF SECTION

SECTION 33 12 25 CONNECTION TO EXISTING WATER MAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Connection to existing water mains to include, but not limited to:
 - a. Cutting in a tee for a branch connection
 - b. Extending from an existing water main
 - c. Installing a tapping sleeve and valve
 - d. Replacing segments of an existing water main
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract
 - 2. Division 1 General Requirements
 - 3. Section 31 23 33 Trenching, Backfilling and Compaction
 - 4. Section 33 12 80 Expansion Joints, Couplings and Tapping Sleeves

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125 and 250)
 - 3. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

- c. A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
- d. A242, Standard Specification for High-Strength Low-Alloy Structural Steel.
- e. A283, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- f. A285, Standard Specification for Pressure Vessel Plates, Carbon Steel, Lowand Intermediate-Tensile Strength.
- g. B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
- h. D2000, Standard Classification System for Rubber Products in Automotive Applications.
- 4. American Water Works Association (AWWA):
 - a. C200, Steel Water Pipe 6 Inch and Larger.
 - b. C207, Steel Pipe Flanges for Waterworks Service Sizes 4 Inch through 144 Inch
 - c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - d. C223, Fabricated Steel and Stainless Steel Tapping Sleeves.
- 5. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C105/A21.5, Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - b. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - c. C115A21/15, Flanged Ductile-Iron Pipe with Ductile Iron or Gray-Iron Threaded Flanges.
- 6. NSF International (NSF):
 - a. 61, Drinking Water System Components Health Effects.
- 7. Manufacturers Standardization Society of the Valve and Fitting Industry Inc. (MSS):
 - a. SP-60, Connecting flange Joint Between Tapping Sleeves and Tapping Valves.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings
 - 1. Required for any connections to an existing, pressurized North Texas Municipal Water District (NTMWD) water distribution system main.
 - 2. Schedule a pre-installation meeting a minimum of 3 weeks prior to proposed time for the work to occur.

- 3. The meeting shall include the Contractor, Construction Manager, Owner's Operations Staff, and Owner's Project Engineer.
- 4. Review work procedures as submitted and any adjustments made for current field conditions.
- 5. Verify that all valves and plugs to be used have adequate thrust restraint.
- 6. Schedule the date for the connection to the existing system.
- B. Scheduling
 - 1. Schedule work to make all connections:
 - a. During the period from May 1 through November 1, no shut downs will be allowed unless otherwise approved by the Owner. The Owner also reserves the right to deny shut downs at any time based on system demands.
 - 2. Request shutdown a minimum of 14 days in advance.
 - a. In the event that other water system activities do not allow the existing main to be dewatered at the requested time, schedule work to allow the connection at an alternate time acceptable to the Owner.
 - 1) If water main cannot be taken out of service at the originally requested time, coordination will be required with the Owner to discuss rescheduling and compensation for mobilization.
 - 2) No additional payment will be provided if the schedule was altered at the Contractor's request.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Owner prior to delivery and/or fabrication for specials.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data, if applicable
 - 1. Tapping Sleeve noting the pressure rating and coating system supplied including:
 - a. Dimensions, weights, material list, and detailed drawings
 - b. Maximum torque recommended by the manufacturer for the valve by size
- B. Submittals
 - 1. Provide a detailed sequence of work for connections that includes:
 - a. Results of exploratory excavation

- b. Dewatering procedure
- c. Procedure for connecting to the existing water main
- d. Time period for completing work from when the water is shut down to when the main is back in service.
 - 1) Include duration estimates for each phase of construction.
- e. Testing and repressurization procedures
- f. Welders that are assigned to work on connection to concrete cylinder or steel pipe must be certified and provide Welding Certificates, upon request, in accordance with AWWA C200. Field welding shall be provided by one of the following firms:
 - a) US Pipe, A Forterra Company
 - b) Fuller's Service Company, Barry Fuller, 817-477-3841
 - c) Scott's Welding, Scott Fowler, 972-978-7865
 - d) Eddie's Welding Service, Eddie Pierce, 817-909-6089
 - e) National Welding Corporation, Nash Williams, 801-225-5959
 - f) No others will be accepted

1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE [NOT USED]

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements
 - 1. Protect parts so that no damage or deterioration occurs during a prolonged delay from the time of shipment until installation is completed.
 - 2. Protect all equipment and parts against any damage during a prolonged period at the site.
 - 3. Protect the finished surfaces of all exposed flanges using wooden flanges, strongly built and securely bolted thereto.
 - 4. Protect finished iron or steel surfaces not painted to prevent rust and corrosion.
 - 5. Prevent plastic and similar brittle items from being exposed to direct sunlight and extremes in temperature.
 - 6. Secure and maintain a location to store the material

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY

- A. Manufacturer Warranty
 - 1. Manufacturer's warranty shall be in accordance with Division 1.

PART 2 - PRODUCTS

2.1 EQUIPMENT, PRODUCT TYPES AND MATERIALS

- A. Description
 - 1. Regulatory Requirements
 - a. Tapping Sleeves shall meet or exceed AWWA C223 and the requirements of Section 33 12 80.
 - b. All valve components in contact with potable water shall conform to the requirements of NSF 61.
- B. Tapping Sleeve Materials
 - 1. As specified in Section 33 12 80.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions
 - 1. Verify by exploratory excavation that existing water main is as depicted in the Drawings and that the location is suitable for a connection to the existing water main.
 - a. Excavate and backfill trench for the exploratory excavation
 - 2. Verify that all equipment and materials are available on-site prior to the shutdown of the existing main.
 - 3. Pipe lines shall be completed, tested and authorized for connection to the existing system in accordance with Section 01 45 16.16.

3.2 INSTALLATION

- A. General
 - 1. Upon disruption of the existing water main, continue work until the connection is complete and the existing water main is back in service.

B. Procedure

- 1. Establish thrust restraint on the existing pipeline if required per the manufacturer's thrust calculations.
- 2. Expose the proposed connection point in accordance with Section 31 23 33. Submit shop drawing of exploratory excavation to Engineer for approval.
- 3. Dewater the existing water line in accordance with the Drawings. Contractor shall be responsible for dewatering line and dechlorination. This shall include notifying the NTMWD a minimum of five days prior to any water discharge.
- 4. Maintain the water that may bleed by existing valves or plugs during installation within the work area to a reasonable level.
 - a. Control the water in such a way that it does not interfere with the proper installation of the connection or create a discharge of chlorinated water.
- 5. If a fish kill occurs associated with the construction activities:
 - a. Immediately alter activities to prevent further fish kills.
 - b. Immediately notify Owner.
 - c. Collect and classify fish in accordance with TCEQ requirements.
 - d. Coordinate with Owner to properly notify TCEQ.
 - e. Be responsible for fines assessed.
- 6. Cut and remove existing water main in order to make the connection.
- 7. Verify that the existing pipe line is suitable for the proposed connection.
- 8. Clean and sterilize the existing pipe or facilities for a minimum distance of three pipe diameters back from the ends of the pipe. Plug the ends of the line when work is not being performed on the pipe to prevent embedment, backfill, soil, water or other debris from entering the pipeline.
- 9. Perform sterilization by swabbing each item with a concentrated chlorine solution.
 - a. Disinfect each piece just prior to installation in the existing pipe to help prevent re-contamination.
 - b. Plug the ends of the assembly until a new item is to be added to the assembly.
 - c. Store disinfected materials on blocks to prevent contact with the ground.
- 10. Place trench foundation and bedding in accordance with 31 23 33.
- 11. In the event that a tapping sleeve and valve is used, the coupon from the existing water main shall be submitted to the Owner.
- 12. Establish thrust restraint at the proposed connection location as provided for in the Drawings.

- 13. Clean and disinfect the pipeline associated with the connection in accordance with Section 01 45 16.16.
- 14. Place embedment as shown in the Drawings.
- 15. Request that the Owner Valve Crew re-pressurize the pipeline.
- 16. Directionally flush the connection.
- 17. Request that Owner Valve Crew open all remaining valves.

END OF SECTION

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SECTION 33 12 80 EXPANSION JOINTS, COUPLINGS AND TAPPING SLEEVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Furnish all labor, materials, equipment and incidentals required to completely install and put into service expansion joints, couplings, and tapping sleeves as specified herein and shown on the drawings.
- B. Related Specification Sections include but are not necessarily limited to
 - 1. Division 0 Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 General Requirements.

1.2 PRICE AND PAYMENT PROCEDURES [NOT USED]

1.3 REFERENCES

- A. Reference Standards
 - 1. Reference standards cited in this specification refer to the current reference standard published at the time of the latest revision date logged at the end of this specification, unless a date is specifically cited.
 - 2. American Society for Testing and Materials (ASTM):
 - a. ASTM A283 Standard Specification for Low and Intermediate Tensile Strength Carbon Steel
 - b. ASTM A285 Standard Specification for Pressure Vessel Plates, Carbon Steel Low and Intermediate Tensile Strength
 - 3. American Water Works Association (AWWA):
 - a. AWWA C219 Bolted, Sleeve-Type Couplings for Plain End Pipe
 - b. AWWA C223 Fabricated Steel and Stainless Steel Tapping Sleeves
 - American National Standards Institute (ANSI):
 a. ANSI/NSF Standard 61 Drinking Water System Components

1.4 ADMINISTRATIVE REQUIREMENTS [NOT USED]

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer or the Owner prior to delivery.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Product Data
- 1.7 CLOSEOUT SUBMITTALS [NOT USED]

1.8 MAINTENANCE MATERIAL SUBMITTALS [NOT USED]

1.9 QUALITY ASSURANCE [NOT USED]

1.10 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements

- 1. Take special care to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, preventing any deformation.
- 2. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- 3. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.

1.11 FIELD [SITE] CONDITIONS [NOT USED]

1.12 WARRANTY

- A. Manufacturer Warranty
 - The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner. Warranty shall be for a period of two (2) years and begin on the Date of Final Acceptance.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

- A. Manufacturers
 - 1. Expansion joints shall be single end Smith-Blair Series 611 or approved equal. Joint diameter shall be the same as adjoining pipe shown on plans.
- B. Description
 - 1. The expansion joint shall be tied to the line and supported as shown on the plans.
 - 2. Provide slip pipe, limit rods, gland bolts, washers and nuts and install according to the manufacturer's recommendations.
- C. Performance / Design Criteria
 - 1. Pressure Requirements
 - a. Working pressure = 200 psi
 - b. Total pressure = 250 psi
 - c. Test pressure = As specified in Section 01 45 16.16
 - 2. Expansion length shall range from 5 to 10-inches
 - 3. Slip pipe shall be stainless steel
- D. Finishes
 - 1. Finish Materials
 - a. Coating shall be fusion bonded epoxy powder coating, or equal. Final top coating shall be field applied.

2.2 STEEL COUPLINGS

- A. Manufacturers
 - 1. Steel couplings shall be Series 411 as manufactured by Smith-Blair or approved equal.
- B. Description

- 1. Provide control rods, control rod plates, washers and bolts and install according to the plans and manufacturer's recommendations. Anchor studs are not allowed for restraint.
- 2. Apply paint to steel couplings as required for adjoining pipe.
- C. Performance / Design Criteria
 - 1. Pressure Requirements
 - a. Working pressure = 200 psi
 - b. Total pressure = 250 psi
 - c. Test pressure = As specified in Section 01 45 16.16
 - 2. Sleeve length = 7-inches (unless otherwise specified)
- D. Materials
 - 1. Bolts and Nuts
 - a. 316 stainless steel
- E. Finishes
 - 1. Finish Materials
 - a. Coating shall be fusion bonded epoxy powder coating, or equal. Final top coating shall be field applied.
 - 2. For buried couplings, the coupling in its entirety (including coupling, nuts, bolts, and thrust restraint) shall be wrapped in petrolatum tape system. Petrolatum tape system shall consist of Densyl Mastic, Densyl Paste, and Densyl Tape, as manufactured by Denso.

2.3 TAPPING SLEEVES

- A. Manufacturers
 - 1. Tapping sleeves shall be Smith–Blair Series 622 or approved equal.
- B. Performance / Design Criteria
 - 1. Pressure Requirements
 - a. Working pressure = 200 psi
 - b. Total pressure = 250 psi
 - c. Test pressure = As specified in Section 01 45 16.16
- C. Materials
 - 1. Bolts and nuts
 - a. ASTM A193 Grade B8M bolts and ASTM A194 Grade 8M Nuts
 - 2. Gaskets shall be Grade 60 (Nitrile ASTM D2000)
 - 3. Body shall be Carbon Steel per ASTM A283 Grade C, ASTM A285 Grade C, ASTM A36 Steel or equal.
 - 4. Flanges
 - a. Flanged ends shall meet requirements of AWWA C115 or AWWA C207 depending on pipe material.
 - b. Shall be ANSI B16.1 class 125 drilling
 - c. For steel flanges
 - 1) Class D with 150 psi working pressure for valves where the maximum pressure (test or total) is less than or equal to 225 psi and working pressure is less than or equal to 150 psi.
 - Class E with 275 psi working pressure for valves where the maximum pressure (test or total) is greater than 225 psi or working pressure is between 150 psi and 275 psi.
 - d. Recessed to accept standard tapping valves per MSS SP-60
 - 5. Test Plug

- a. ³/₄-inch NPT carbon steel with square head and fusion bonded epoxy coating
- D. Finishes
 - 1. Finish Materials
 - a. Coating shall be fusion bonded epoxy powder coating, or equal. Final top coating shall be field applied.
 - b. For buried tapping sleeves, the sleeve in its entirety (including nuts and bolts) shall be wrapped in petrolatum tape system. Petrolatum tape system shall consist of Densyl Mastic, Densyl Paste, and Densyl Tape, as manufactured by Denso.

2.4 FLANGE COUPLING ADAPTERS

- A. Manufacturers
 - 1. Flange coupling adapters shall be Smith–Blair Series 913 or approved equal for steel pipe and Smith-Blair Series 912 or approved equal for ductile iron pipe.
- B. Performance / Design Criteria
 - 1. Pressure Requirements
 - a. Working pressure = 200 psi
 - b. Total pressure = 250 psi
 - c. Test pressure = As specified in Section 01 45 16.16
- C. Materials
 - 1. ASTM A193 Grade B8M bolts and ASTM A194 Grade 8M Nuts
 - 2. Gaskets shall be Grade 30 standard
 - 3. Body shall be ductile iron ASTM A536 or carbon steel per ASTM A53, A512, or carbon steel having a minimum yield of 30,000 psi.
 - 4. Flanges
 - a. Flanged ends shall meet requirements of AWWA C115 or AWWA C207 depending on pipe material.
 - b. Shall be ANSI B16.1 class 125 drilling
 - c. For steel flanges:
 - Class D with 150 psi working pressure for valves where the maximum pressure (test or total) is less than or equal to 225 psi and working pressure is less than or equal to 150 psi.
 - Class E with 275 psi working pressure for valves where the maximum pressure (test or total) is greater than 225 psi or working pressure is between 150 psi and 275 psi.

D. Finishes

- 1. Finish Materials
 - a. Coating shall be fusion bonded epoxy powder coating, or equal. Final top coatings shall be field applied.
- 2. For buried couplings, the coupling in its entirety (including coupling, nuts, bolts, and thrust restraint) shall be wrapped in petrolatum tape system. Petrolatum tape system shall consist of Densyl Mastic, Densyl Paste, and Densyl Tape, as manufactured by Denso.

PART 3 - EXECUTION

3.1 ERECTION / INSTALLATION / APPLICATION

A. All tapping sleeves, expansion joints, and couplings shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.

3.2 SYSTEM STARTUP

A. When field pressure testing is required, all tapping sleeves, expansion joints, and couplings shall be pressure tested as a part of the pipe.

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APPENDIX A

GEOTECHNICAL ENGINEERING STUDY & ADDENDUM 1 CMJ REPORT 103-18-286

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GEOTECHNICAL ENGINEERING STUDY 48-INCH PIPELINE IMPROVEMENTS WRF PHASE 2 NORTH TEXAS MUNICIPAL WATER DISTRICT WYLIE, TEXAS

Presented To:

Kimley-Horn and Associates, Inc.

October 2019

PROJECT NO. 103-18-286



October 7, 2019 Report No. 103-18-286

Kimley-Horn and Associates, Inc. 13455 Noel Road Two Galleria Office Tower, Suite 700 Dallas, Texas 75240

Attn: Mr. Kyle Sanderson, P.E.

GEOTECHNICAL ENGINEERING STUDY 48-INCH PIPELINE IMPROVEMENTS WRF PHASE 2 NORTH TEXAS MUNICIPAL WATER DISTRICT WYLIE, TEXAS

Dear Mr. Sanderson:

Submitted here are the results of a geotechnical engineering study for the referenced project. This study was performed in general accordance with CMJ Proposal 17-6651 dated October 30, 2017. The geotechnical services were authorized via Standard Agreement for Professional Services with Kimley-Horn and Associates, Inc., executed on March 5, 2018 by Mr. Eric Z. Smith, Assistant Secretary.

Engineering analyses and recommendations are contained in the text section of the report. Results of our field and laboratory services are included in the appendix of the report. We would appreciate the opportunity to be considered for providing the materials engineering and geotechnical observation services during the construction phase of this project.

We appreciate the opportunity to be of service to Kimley-Horn and Associates, Inc. Please contact us if you have any questions or if we may be of further service at this time.

Respectfully submitted, CMJ ENGINEERING, INC. **TEXAS FIRM REGISTRATION NO. F-9177** JAMES P. SAPPINGTO James P. Sappington IV, P.E. President Texas No. 97402

copies submitted: (2) Mr. Kyle Sanderson, P.E.; Kimley-Horn and Associates, Inc. (mail and email)

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1.0 INTRODUCTION

1.1 General

The project, as currently planned, will consist of approximately 20,000 linear feet of 48-inch water line in Wylie, Texas. The proposed line extends from near E. Brown Street at Kreymer Lane traversing southeast to SH 205 approximately 1,000 feet north of CR 485, then continuing east to CR 484. Tunnel crossings of existing facilities are planned at approximately six to seven locations along the alignment, plus one vault structure is planned at the eastern project end. Pipe bottom depths are anticipated to be on the order of 10 feet, typically. The project vicinity and approximate locations of exploration borings are illustrated on Plates A.1a and A.1b, Plan of Borings.

1.2 Purpose and Scope

The purpose of this geotechnical engineering study has been to determine the general subsurface conditions, evaluate the engineering characteristics of the subsurface materials encountered, provide comments on general excavation, develop recommendations for the type or types of foundations suitable for the project, and provide earthwork recommendations.

To accomplish its intended purposes, the study has been conducted in the following phases: (1) drilling sample borings to determine the general subsurface conditions and to obtain samples for testing; (2) performing laboratory tests on appropriate samples to determine pertinent engineering properties of the subsurface materials; and (3) performing engineering analyses, using the field and laboratory data to develop geotechnical recommendations for the proposed construction.

The design is currently in progress and the locations and/or elevations of the structures could change. The recommendations contained in this report are based on data supplied by Kimley-Horn and Associates, Inc. Once the final design is near completion (80-percent to 90-percent stage), it is recommended that CMJ Engineering, Inc. be retained to review those portions of the construction documents pertaining to the geotechnical recommendations, as a means to determine that our recommendations have been interpreted as intended.

1.3 Report Format

The text of the report is contained in Sections 1 through 9. All plates and large tables are contained in Appendix A. The alpha-numeric plate and table numbers identify the appendix in

which they appear. Small tables of less than one page in length may appear in the body of the text and are numbered according to the section in which they occur.

Units used in the report are based on the English system and may include tons per square foot (tsf), kips (1 kip = 1,000 pounds), kips per square foot (ksf), pounds per square foot (psf), pounds per cubic foot (pcf), and pounds per square inch (psi).

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Subsurface materials along the proposed pipeline were explored by thirteen (13) vertical soil borings drilled to depths of 15 to 50 feet below existing grades. The boring depths and associated structures/purposes are tabulated below in Table 2.1-1. Boring B-4 was not accessible for drilling equipment at the time of this investigation. The borings were drilled using continuous flight augers at the approximate locations shown on the Plan of Borings, Plates A.1a and A.1b. Borings B-3 and B-7 were converted to monitor wells after drilling completion in order to observe ground-water levels at 30 days following drilling completion. The boring logs are included on Plates A.4 through A.16 and keys to classifications and symbols used on the logs are provided on Plates A.2 and A.3.

| TABLE 2.1-1: Field Exploration Program | | | | |
|--|--------------------------|-----------|------------------------|--|
| Boring No. | Boring Depth (ft.) | Structure | Approximate Station | |
| B-1 | 25 | Tunnel | 24+00 | |
| B-2 | 20 | Tunnel | 48+00 | |
| B-3 | 50 | Tunnel | 85+00 | |
| B-5 | 25 | Pipeline | 99+00 | |
| B-6 | 25 | Pipeline | 120+00 | |
| B-7 | 20 | Tunnel | 132+00 | |
| B-8 | 20 | Tunnel | 136+00 | |
| B-9 | 25 | Tunnel | 164+00 | |
| B-10 | 25 | Tunnel | 167+00 | |
| B-11 | 50 | Tunnel | 171+00 | |
| B-12 | 35 | Tunnel | 174+00 | |
| B-13 | 20 | Vault | 202+00 | |
| B-14 | 15 | Alignment | 72+00 | |

Undisturbed samples of cohesive soils were obtained with nominal 3-inch diameter thin-walled (Shelby) tube samplers at the locations shown on the logs of borings. The Shelby tube sampler consists of a thin-walled steel tube with a sharp cutting edge connected to a head equipped with a ball valve threaded for rod connection. The tube is pushed into the soil by the hydraulic pulldown of the drilling rig. The soil specimens were extruded from the tube in the field, logged, tested for consistency with a hand penetrometer, sealed, and packaged to limit loss of moisture.

The consistency of cohesive soil samples was evaluated in the field using a calibrated hand penetrometer. In this test a 0.25-inch diameter piston is pushed into the relatively undisturbed sample at a constant rate to a depth of 0.25 inch. The results of these tests, in tsf, are tabulated at respective sample depths on the logs. When the capacity of the penetrometer is exceeded, the value is tabulated as 4.5+.

2.2 Laboratory Testing

Laboratory soil tests were performed on selected representative samples recovered from the borings. In addition to the classification tests (liquid limits, plastic limits, percent passing the No. 200 sieve, and particle size analyses), moisture content, unconfined compressive strength, and unit weight tests were performed. Results of the laboratory classification tests, moisture content, unconfined compressive strength, and unit weight tests conducted for this project are included on the boring logs. The sieve analyses are presented on Plates A.17 through A.25, Particle Size Distribution Reports.

Free swell testing was performed on a selected sample of the cohesive soils. The swell test was used in determining the expansive soil response of the clay soils. The results of the swell test are provided on Plate A.26.

The above laboratory tests were performed in general accordance with applicable ASTM procedures, or generally accepted practice.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

According to the <u>Sherman Sheet of the Geologic Atlas of Texas</u>, the project site traverses through the Ozan Formation in the western quarter of the project while the remaining portion of the alignment is geologically located in the Alluvial and Fluviatile Terrace Deposits. The alluvial and terrace deposits are generally a mixture of fine-grained and coarse materials, which are typically layered with grain sizes increasing with depth. At the surface the clay portions of these deposits can be moderately to highly active. Ground-water is typically present in these deposits, especially in the proximity of a river or creek. The Ozan Formation of Upper Cretaceous Age is over 425 feet thick and is composed of montmorillonitic, blocky, and calcareous clays. The residual clays of the formation are typically deep and generally highly active. Silt and sand content can occur in the upper portion of the formation.

3.2 Soil Conditions

Specific types and depths of subsurface strata encountered at the boring locations are shown on the boring logs in Appendix A. The generalized subsurface stratigraphy encountered in the borings is discussed below. Note that depths on the borings refer to the depth from the existing grade or ground surface present at the time of the investigation, and the boundaries between the various soil types are approximate.

Gravel base and gray gravel and sand surfacing are present at the surface in Borings B-2 and B-11, with thicknesses of 4 and 12 inches, respectively. Fill and possible fill are present at the surface in Borings B-10, B-11, and B-13 consisting of dark brown, brown, light brown, gray, and light gray silty clays and clays containing clayey sand, gravel, calcareous nodules, calcareous deposits, and iron stains. The fill and possible fill extend to depths of 1 to 5 feet.

Natural soils encountered consist of various dark brown, brown, light brown, olive-brown, tan, dark gray, gray and light gray sandy silty clays, silty clays, shaly clays, and clays. Calcareous nodules, calcareous deposits, ironstone nodules, and iron stains are frequently present within the natural soils. Occasional fine sand is present within the various clay soils at varying depths in Borings B-1, B-3, B-5, B-9, and B-11 through B-13. Gravel and clayey sand are present within the clays and silty clays from 7 to 13 feet in Boring B-7 and from 2 to 3 feet in Boring B-9. Olive-brown, dark gray and gray shaly clays/clayey shale are next present in Boring B-3 below a depth of 46 feet and in Boring B-11 below 44 feet. The shaly clay in Boring B-11 contains limestone lenses.

The various soils encountered had tested Liquid Limits (LL) of 39 to 94 with Plasticity Indices (PI) of 26 to 71 and are classified as CL, and CH according to the USCS. Tested soil dry unit weight and unconfined compressive strength values range from 92 to 110 pcf and 1,150 to 7,840 psf,

respectively. Select strength tests reflect slickensided characteristics, indicating higher in-situ strengths than the test value. No hard rock strata were encountered through the various boring termination depths of 15 to 50 feet.

3.3 Ground-water Observations

The borings were drilled using continuous flight augers in order to observe ground-water seepage during drilling. Ground-water seepage was encountered during drilling in Borings B-1, B-3, B-5 and B-9 through B-12 at depths of 13 to 23 feet below existing grade. Ground-water levels of 8 to 32 feet were measured at drilling completion in these borings. Borings B-2, B-6 through B-8, B-13, and B-14 were dry during drilling and at completion. Following drilling operations, monitor wells were installed in Borings B-3 and B-7 for short-term ground-water observations. Water levels of 7 to $7\frac{1}{2}$ feet were observed in these borings 30 days after drilling completion. Table 3.3-1 summarizes the observed water levels.

| | TABLE 3.3-1: Ground-Water Observations | | | | |
|---------------|--|------------------------------|--|--|--|
| Boring No. | Seepage During Drilling (ft.) | Water at Completion (ft.) | Water at 30 days After Completion (ft.) | | |
| B-1 | 20 | 23 | - | | |
| B-2 | Dry | Dry | - | | |
| B-3 | 18 | 8 | 71/2 | | |
| B-5 | 23 | 24 | - | | |
| B-6 | Dry | Dry | - | | |
| B-7 | Dry | Dry | 7 | | |
| B-8 | Dry | Dry | - | | |
| B-9 | 16 | 10 | - | | |
| B-10 | 15 | 10 | - | | |
| B-11 | 23 | 28 | - | | |
| B-12 | 13 | 32 | - | | |
| B-13 | Dry | Dry | - | | |
| B-14 | Dry | Dry | - | | |

While it is not possible to accurately predict the magnitude of subsurface water fluctuation that might occur based upon these short-term observations, it should be recognized that ground-water conditions will vary with fluctuations in rainfall.

Fluctuations of the ground-water level can occur due to seasonal variations in the amount of rainfall; site topography and runoff; hydraulic conductivity of soil strata; and other factors not evident at the time the borings were performed. Ground-water can flow through more permeable, sandy and gravel zones and should be considered when developing the design and construction plans for the project.

Water traveling through the soil (subsurface water) is often unpredictable. This could be due to seasonal changes in ground water and due to the unpredictable nature of ground-water paths. Therefore, it is necessary during construction for the contractor to be observant for ground-water seepage in excavations in order to assess the situation and take appropriate action.

4.0 VAULT FOUNDATION

4.1 General Foundation Considerations

Two independent design criteria must be satisfied in the selection of the type of foundation to support the proposed vault structure near B-13. First, the ultimate bearing capacity, reduced by a sufficient factor of safety, must not be exceeded by the bearing pressure transferred to the foundation soils. Second, due to consolidation or expansion of the underlying soils during the operating life of the structure, total and differential vertical movements must be within tolerable limits.

4.2 Mat Foundation – Vault

4.2.1 Foundation Design Criteria

A reinforced concrete mat/slab foundation may be used to support structural loads for the belowgrade vault structure. A mat type foundation should be a minimum of 2 feet in least dimension, but must be widened as required, based on allowable bearing capacity given below. Mat/slab foundations placed on the order of 10 to 15 feet below existing grade within the very stiff (soil basis) clays and silty clays may be designed for an allowable bearing capacity of 3,500 psf.

The allowable foundation pressure given above is for the maximum pressure induced by the foundation loads, and not the average pressure under the foundation base. During construction, close observation of soils strength should be conducted by a geotechnical engineer to allow designation and removal of very soft or loose soils not meeting the bearing capacities stated

above. The mat design should incorporate the potential for hydrostatic uplift effects of a shallow water table. For purposes of hydrostatic uplift design we recommend a ground-water level at the surface.

Excavation during construction for the vault foundation base could require dewatering to keep the excavation free of excess water. In addition, the water table should be lowered to a depth of 2 feet below the proposed excavation.

Depending on the time of year and the general weather conditions, the excavation and placement of the mat/slab foundation may be in a saturated soil condition. If the construction occurs in a wet condition, issues of dewatering of excavations, strength/stability of side slopes, and disturbance of bearing materials become important. Due to the great variability of moisture condition, the presence of excess moisture in soils cannot be predicted.

The above value contain a safety factor of three (3). Mat foundations proportioned for this value should experience a total settlement of 1 inch or less, and a differential settlement of ³/₄ inch or less, after construction.

4.2.2 Spread/Mat Foundation Construction

Spread foundation construction should be monitored by a representative of the geotechnical engineer to observe, among other things, the following items:

- Identification of bearing material
- Adequate penetration of the foundation excavation into the bearing layer
- The base and sides of the excavation are clean of loose cuttings
- If seepage is encountered, whether it is of sufficient amount to require the use of excavation dewatering methods

Precautions should be taken during the placement of reinforcing steel and concrete to prevent loose, excavated soil from falling into the excavation. Concrete should be placed as soon as practical after completion of the excavating, cleaning, reinforcing steel placement and observation. Excavation for a spread foundation should be filled with concrete before the end of the workday, or sooner if required, to prevent deterioration of the bearing material. Prolonged exposure or inundation of the bearing surface with water will result in changes in strength and compressibility characteristics. If delays occur, the excavation should be deepened as necessary and cleaned, in

order to provide a fresh bearing surface. If more than 24 hours of exposure of the bearing surface is anticipated in the excavation, a mud slab should be used to protect the bearing surfaces. If a mud slab is used, the foundation excavations should initially be over-excavated by approximately 4 inches and a lean concrete mud slab of approximately 4 inches in thickness should be placed in the bottom of the excavations immediately following exposure of the bearing surface by excavation. The mud slab will protect the bearing surface, maintain more uniform moisture in the subgrade, facilitate dewatering of excavations if required, and provide a working surface for placement of formwork and reinforcing steel.

The concrete should be placed in a manner that will prevent the concrete from striking the reinforcing steel or the sides of the excavation in a manner that would cause segregation of the concrete.

5.0 BELOW GRADE WALL RECOMMENDATIONS

5.1 Lateral Earth Pressure

5.1.1 General

The below-grade walls must be designed for lateral pressures including, but not necessarily limited to, earth, water, surcharge, swelling, and vibration. In addition, the lateral pressures will be influenced by whether the backfill is drained or undrained, and above or below the ground-water table.

5.1.2 Equivalent Fluid Pressures

Lateral earth pressures on retaining walls will depend on a variety of factors, including the type of soils behind the wall, the condition of the soils, and the drainage conditions behind the wall. Recommended lateral earth pressures expressed as equivalent fluid pressures, per foot of wall height, are presented in Table 5.1.2-1 for a wall with a level backfill behind the top of the wall. The equivalent fluid pressure for an undrained condition should be used if a drainage system is not present to remove water trapped in the backfill and behind the wall. Pressures are provided for at-rest and active earth pressure conditions. In order to allow for an active condition the top of the wall(s) must deflect on the order of 0.4 percent. <u>Rigid walls are not anticipated to develop enough movement to mobilize active earth pressures</u>.

| TABLE 5.1.2-1 – E | Equivalen | t Fluid Pres | sures | |
|---|-----------|---------------------------|---------|----------------------------|
| Backfill Material | | Equivalent ssure (pcf) | | Equivalent essure (pcf) |
| | Drained | Undrained | Drained | Undrained |
| Excavated on-site clay or clay fill material | 100 | 110 | 85 | 100 |
| Select fill, flowable fill, flexible base, or on-site soils meeting material specifications | 65 | 90 | 50 | 85 |
| Free draining granular backfill material or clean crushed stone | 50 | 90 | 35 | 80 |

For the select fill or free draining granular backfill, these values assume that a "full" wedge of the material is present behind the wall. The wedge is defined where the wall backfill limits extend outward at least 2 feet from the base of the wall and then upward on a 1H:2V slope. For narrower backfill widths of granular or select fill soils, the equivalent fluid pressures for the on-site soils should be used.

Flowable fill could be utilized as backfill. Upon initial placement, flowable fill is most comparable to a select fill in terms of at-rest earth pressures only. Thus the equivalent fluid pressures provided in Table 5.1.2-1 for select fill backfill for the at-rest condition should be utilized. After the flowable fill has set and hardened, lateral earth pressures are greatly reduced, to on the order of (or less than) the parameters given for free draining granular backfill for either active or at-rest conditions.

5.1.3 Additional Lateral Pressures

The location and magnitude of permanent surcharge loads (if present) should be determined, and the additional pressure generated by these loads such as the weight of construction equipment and vehicular loads that are used at the time the structures are being built must also be considered in the design. The effect of this or any other surcharge loading may be accounted for by adding an additional uniform load to the full depth of the side walls equivalent to one-half of the expected vertical surcharge intensity for select backfill materials, or equal to the full vertical surcharge intensity for clay backfill. The equivalent fluid pressures, given here, do not include a safety factor. Analysis of surcharge loads (if any) should be performed on a case-by-case basis. This is not included in the scope of this study. These services can be provided as additional services upon request.

5.2 Wall Backfill Material Requirements

<u>Free Draining Granular Backfill</u>: All free draining granular wall backfill material should be a crushed stone, sand/gravel mixture, or sand/crushed stone mixture. The material should have less than 3 percent passing the No. 200 sieve and less than 30 percent passing the No. 40 sieve. The minus No. 40 sieve material should be non-plastic. Granular wall backfill should not be water jetted during installation.

<u>Select Fill</u>: All wall select backfill should consist of clayey sand and/or sandy clay material with a plasticity index of 16 or less, with a liquid limit not exceeding 35. The select fill should be placed in maximum 8-inch lifts and compacted to between 95 and 100 percent of Standard Proctor density (ASTM D 698) within a moisture range of plus to minus 3 percentage points of the optimum moisture. Compaction within five feet of the walls should be accomplished using hand compaction equipment and should be compacted between 90 and 95 percent of the Standard Proctor Density.

<u>Flowable Backfill</u>: Item 401, Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, 2014 Edition.

<u>On-Site Soil Backfill</u>: For wall backfill areas with site-excavated materials or similar imported materials, all oversized fragments larger than four inches in maximum dimension should be removed from the backfill materials prior to placement. The backfill should be free of all organic and deleterious materials, and should be placed in maximum 8-inch compacted lifts at a minimum of 95 percent of Standard Proctor density (ASTM D 698) within a moisture range of plus to minus 3 percentage points of optimum moisture. Compaction within five feet of the walls should be accomplished using hand compaction equipment, and should be between 90 and 95 percent of the Standard Proctor Density.

<u>Crushed Stone Backfill</u>: Meeting quality and gradation requirements of ASTM D 448: No. 467, 57, 67, or similar gradation.

<u>Flexible Base Backfill</u>: Crushed Stone Flexible Base – Item 247, Type A, Grades 1 or 2, Texas Department of Transportation Standard Specifications for Construction of Maintenance of Highways, Streets, and Bridges, 2014 Edition.

5.3 Below-Grade Drainage Requirements

In order to achieve the "drained" condition for lateral earth pressure for low-permeability walls and below-grade structures, (concrete, masonry, etc.), a vertical drainage blanket or geocomposite drainage member must be installed adjacent to the wall/structure on the backfill side. The drainage must be connected to an outlet drain at the base of the wall, or to a sump/pump system. Drains should be properly filtered to minimize the potential for erosion through these drains, and/or the plugging of drain lines. Design or specific recommendations for drainage members is beyond the scope for this study. These services can be provided as an additional service upon request.

5.3.1 Buoyancy Effects

Buoyant effects must be considered. Unless a permanent drainage system is provided, the belowgrade structure should be designed to withstand full hydrostatic pressure below the ground-water table. We recommend a water table at the surface be assumed for these calculations. For buoyancy calculations, the unit weight of submerged soils can be assumed as 65 pcf.

6.0 TRENCH / BORE EXCAVATIONS

6.1 Expected Subsurface Conditions

The various soil materials encountered in the borings can be excavated using conventional earthwork equipment. Where saturated clays or clayey sand and gravel seams are present within the clays, caving will likely occur due to decreased strength with high moisture content, or more granular nature of select material zones and with the presence of ground-water encountered in the borings with depth. Appreciable ground-water should be anticipated in all excavations below depths where encountered in the borings as discussed below. In addition, the shaly clays and clayey shales present below 44 to 46 feet in Borings B-3 and B-11 can be moderately hard (rock basis). Heavy-duty equipment could be required to excavate/tunnel through the harder zones of these shale-like materials.

6.2 Open Cut

The trench excavations should be performed in accordance with OSHA Safety and Health Standards (29 CFR 1926/1919), Subpart P. It is expected that near vertical excavation walls will be possible within the surficial clays to 5-foot depths in most locations along the alignment. Where excavations occur through granular soils, loose sands, or submerged clay or sand soils (or non-

compacted fill, if encountered) it will be necessary to either slope the excavation sidewalls or provide temporary bracing to control excavation wall instability. In addition, for excavations deeper than 5 feet, the excavation sidewalls must be sloped or temporary bracing must be provided, regardless of the soil conditions encountered.

Surcharge loads, such as those resulting from excavation spoils and/or equipment, should be placed no closer than two feet from the crest of the slope, in accordance with OSHA regulations. All vehicle traffic should be prohibited from at least five feet of the crest of the excavation. Excavations should take into account any existing utilities to avoid undermining these features. Trench shoring should be used for excavation to support open cuts located where existing utilities are within a zone extending from the base of the excavation upward at a 1.5H:1V slope.

The following guidelines are presented to aid in the development of the excavation plans:

- 1. Surface areas behind the crest of the excavations should be graded so that surface water does not pond within 15 feet of the crest, nor drain into the excavation.
- 2. Heavy material stockpiles should not be placed near the crest of slopes. Similarly, heavy construction equipment should not pass over or be parked within 10 feet of the crest.
- 3. The crest of slopes should be continually monitored for evidence of movement or potential problems. Freestanding slopes will become less stable than influenced by ground water or saturation by rain.

6.3 Trench / Bore Pit Dewatering

As discussed in Section 3.3, <u>Ground-water Observations</u>, ground-water conditions can vary with seasonal fluctuations in rainfall. Controlling the ground-water is essential to construction of the proposed water line and the associated vault. Failure to control any encountered ground-water could result in excavation collapse, excavation bottom heave, an unstable bottom and detrimental pipeline settlement and pipe deflections after backfilling. Ground-water levels should be maintained at least <u>two feet below the base of the excavation for the full term of construction</u>. Protection of the open excavations should be provided during periods of moderate to heavy rainfall, as surface water will most likely channel and collect in the excavations. <u>The water level should be lowered prior to excavating and should be maintained at this lowered level until the pipe trench is backfilled</u>. In the event that water infiltration rates are high, it may become necessary to

install a more elaborate dewatering system. The design of any dewatering system required is the contractor's responsibility.

6.4 Soft/Loose Trench Bottom Conditions

Soft and/or loose conditions may occur in select reaches in the vicinity of Borings B-3, B-9 and B-11 with depth and the presence of ground-water. Control of ground-water as discussed above is the key to avoiding an unstable trench bottom in soils which are more granular, as well as cohesive soils. Unstable trench bottoms are considered to be unsuitable for support of the proposed water line. Soft clays or saturated sands could occur where ground-water is present, as documented in Section 3.3. In any areas where unsuitable clay bearing materials are encountered at the planned invert elevation, the trench bottom can be prepared using the following method:

Under-cut to a suitable bearing subgrade and replace with a structural compacted fill. The over-excavation should extend laterally a distance of at least 1 foot beyond the edges of the pipe, and then at least 1 foot laterally for every 1.5 feet of fill required beneath the pipe. The over-excavation backfill should be completely surrounded with a geotextile consisting of Mirafi 140N or equivalent. The backfill should consist of a free draining aggregate (i.e., sands, gravels, crushed limestone, or crushed concrete) approved by the geotechnical engineer. The backfill should be placed in maximum 9-inch loose lifts and uniformly compacted to a minimum relative density of 65 percent as determined by test methods ASTM D 4253 and D 4254.

6.5 Excavation Considerations

If open trench cuts are performed within 1.25 times the trench depth of any surface structure, trench shoring (not trench boxes) should be used within open trench cuts performed within this distance. Hydraulic shoring struts should be used and installed during excavation as needed to provide full lateral support to vertical trench sidewalls and thereby help reduce lateral ground movements near existing structures. A pre-construction condition survey should be performed prior to beginning excavation near any structure that could be affected by the trench excavation to verify existing conditions (existing distress) prior to construction. Construction monitoring should be performed to verify that existing structures are not impacted or damaged by construction operations.

6.6 Trench Backfill

To assure adequate base support for the pipe, it is recommended that bedding/embedment material be placed around the pipe, 6 inches below the pipe, and 12 inches above the pipe. If

concern exists of native backfill above the embedment migrating into the more coarse embedment (and causing backfill settlement), a filter cloth is recommended at the embedment/native soil interface. The filter cloth should cover the entire interface and up through the sidewall a minimum of 1 foot.

Bedding material may consist of gravel/stone from 1" to No. 10 sieve size. Gravel should be consolidated upon placement by rodding or pneumatic vibration methods. Such methods should not cause harm or distress to the pipe. The filter cloth should be TenCate Geosynthetics Marifi 140N or equivalent.

Site excavated materials are generally considered suitable for use as backfill above the pipe bedding materials. All trench backfill should be free of deleterious materials. Use of rock fragments greater than 4 inches in any dimension should be prohibited, since attaining a uniform moisture and density without voids would be difficult. Backfill should be compacted in maximum 8-inch loose lifts at a minimum of 95 percent of the Standard Proctor density (ASTM D 698). The uncompacted lift thickness should be reduced to 4 inches for structure backfill zones requiring hand-operated power compactors or small self-propelled compactors. For trench backfill in excess of 15 feet deep, any backfill placed below 15-foot depths should be compacted at a minimum of 98 percent of the Standard Proctor density described at a minimum of 98 percent of the Standard Proctor densited at a minimum of 98 percent of the Standard Proctor density at a minimum of 98 percent of the Standard Proctor density backfill placed below 15-foot depths should be compacted at a minimum of 98 percent of the Standard Proctor density (ASTM D 698).

Clay soils having a Plasticity Index greater than 20 should be compacted at a moisture content ranging from 0 to plus 4 percentage points above the optimum moisture content. Granular soils having a PI less than 20 should be compacted at a moisture content ranging from minus 3 to plus 3 percentage points of the optimum moisture content. Jetting to compact the pipe backfill should not be allowed. In areas where settlement of the backfill must be closely controlled, the trench excavation should be backfilled with either cement stabilized sand or flowable concrete having a 28-day compressive strength ranging between 50 and 200 psi.

6.7 Trench Backfill Settlement

Settlement of the backfill soils should be anticipated. It is anticipated that properly compacted onsite clay fill soils will settle between about 1 and 2 percent of the fill thickness. For example, 10 feet of fill would be expected to settle on the order of 1.2 to 2.4 inches. The trench backfill could be over-built in order to reduce the potential for a surface depression along the trench centerline. We recommend the backfill be crowned. The centerline of the excavation should be over-built by one foot and sloped down to match grade at the edge of the excavation.

6.8 Provisions to Reduce Backfill Settlement

Field testing will be a critical element in controlling the compaction of the backfill to limit settlement. All trench backfilling in these critical areas shall include full-time observation of soil compaction by an experienced geotechnician under the supervision of the geotechnical engineer. The contractor should provide protection for the testing/inspection personnel while working in the trenches, and shall move the protective shield/shoring such that areas to be tested are readily accessible. The compacted moisture/density of all backfill soils should be tested at a rate of one test per 100 linear feet of trench, for each lift of fill placed, during compaction. Digging through existing lifts of backfill to access and test underlying lifts should not be allowed.

In addition, to limit settlement, where crushed stone materials are used as pipe bedding materials, they should be wrapped with a suitable geotextile to limit the intrusion of fines into the crushed stone material.

6.9 Bore/Tunnel Considerations

Bore/tunnel excavations are generally anticipated to encounter various firm to hard clays, silty clays, and shaly clays with occasional gravel or sand seams/zones. Ground-water will likely seep into bore/tunnel excavations, and should be anticipated in areas a documented in Section 3.3. The more granular strata serve as conduits to direct water towards the bore excavation. Water seepage can decrease the stability of the bore/tunnel excavation and result in ground subsidence. Proper de-watering, as discussed above, is imperative for excavation stability. The underlying clayey shale and shaly clay materials are (B-3 and B-11) are anticipated to consist of relatively good materials for boring and tunneling.

It is recommended that the bore/ tunnel contractor be made aware of these potential variabilities. A contractor experienced in tunneling in alluvial/terrace deposit materials should understand the ramifications of the above discussion.

7.0 EARTHWORK

7.1 Site Preparation & Field Testing

The subgrade should be firm and able to support the construction equipment without displacement. Soft or yielding subgrade should be corrected and made stable before construction proceeds. The subgrade should be proof rolled to detect soft spots, which if exist, should be excavated to provide a firm and otherwise suitable subgrade. Proof rolling should be performed using a heavy pneumatic tired roller, loaded dump truck, or similar piece of equipment. The proof rolling operations should be observed by the project geotechnical engineer or his/her representative. Prior to fill placement, the subgrade should be scarified to a minimum depth of 6 inches, its moisture content adjusted, and recompacted to the moisture and density recommended for fill.

Fill materials should be uniform with respect to material type and moisture content. Clods and chunks of material should be broken down and the fill material mixed by disking, blading, or plowing, as necessary, so that a material of uniform moisture and density is obtained for each lift. Water required for sprinkling to bring the fill material to the proper moisture content should be applied evenly through each layer.

Soil fill material should be compacted to a minimum density of 95 percent of maximum dry density as determined by ASTM D 698, Standard Proctor. Crushed stone materials should be compacted via three passes of a vibratory roller over a 6-inch lift. In conjunction with the compacting operation, the fill material should be brought to the proper moisture content. The moisture content for general earth fill should range from 2 percentage points below optimum to 5 percentage points above optimum (-2 to +5). These ranges of moisture contents are given as maximum recommended ranges. For some soils and under some conditions, the contractor may have to maintain a more narrow range of moisture content (within the recommended range) in order to consistently achieve the recommended density.

Field density tests should be taken as each lift of fill material is placed. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of 2 tests per lift should be required. The earthwork operations should be observed and tested on a continuing basis by an experienced geotechnician working in conjunction with the project geotechnical engineer.

Each lift should be compacted, tested, and approved before another lift is added. The purpose of the field density tests is to provide some indication that uniform and adequate compaction is being obtained. The actual quality of the fill, as compacted, should be the responsibility of the contractor and satisfactory results from the tests should not be considered as a guarantee of the quality of the contractor's filling operations.

7.2 Excavation

The side slopes of excavations through the overburden soils should be made in such a manner to provide for their stability during construction. Existing structures, pipelines or other facilities, which are constructed prior to or during the currently proposed construction and which require excavation, should be protected from loss of end bearing or lateral support.

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes.

Trench safety recommendations are beyond the scope of this report. The contractor must comply with all applicable safety regulations concerning trench safety and excavations including, but not limited to, OSHA regulations.

7.3 Soil Corrosion Potential

Specific testing for soil corrosion potential was not included in the scope of this study. However, based upon past experience on other projects in the vicinity, the soils at this site may be corrosive. Standard construction practices for protecting metal or concrete pipe and similar facilities in contact with these soils should be used.

7.4 Erosion and Sediment Control

All disturbed areas should be protected from erosion and sedimentation during construction, and all permanent slopes and other areas subject to erosion or sedimentation should be provided with permanent erosion and sediment control facilities. All applicable ordinances and codes regarding erosion and sediment control should be followed.

8.0 CONSTRUCTION OBSERVATIONS

In any geotechnical investigation, the design recommendations are based on a limited amount of information about the subsurface conditions. In the analysis, the geotechnical engineer must assume the subsurface conditions are similar to the conditions encountered in the borings. However, quite often during construction anomalies in the subsurface conditions are revealed. Therefore, it is recommended that CMJ Engineering, Inc. be retained to observe earthwork and foundation installation and perform materials evaluation during the construction phase of the project. This enables the geotechnical engineer to stay abreast of the project and to be readily available to evaluate unanticipated conditions, to conduct additional tests if required and, when necessary, to recommend alternative solutions to unanticipated conditions. Until these construction phase services are performed by the project geotechnical engineer, the recommendations contained in this report on such items as final foundation bearing elevations, proper soil moisture condition, and other such subsurface related recommendations should be considered as preliminary.

It is proposed that construction phase observation and materials testing commence by the project geotechnical engineer at the outset of the project. Experience has shown that the most suitable method for procuring these services is for the owner or the owner's design engineers to contract directly with the project geotechnical engineer. This results in a clear, direct line of communication between the owner and the owner's design engineers and the geotechnical engineer.

9.0 REPORT CLOSURE

The borings for this study were selected by Kimley-Horn and Associates, Inc. and staked by CMJ Engineering, Inc. in the field using handheld GPS equipment. The locations and elevations of the borings should be considered accurate only to the degree implied by the methods used in their determination. The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretive information. Laboratory soil classification tests were also performed on samples from selected depths in the borings. The results of these tests, along with visual-manual procedures were used to generally classify each stratum. Therefore, it should be understood that the classification data on the logs of borings represent visual estimates

of classifications for those portions of each stratum on which the full range of laboratory soil classification tests were not performed. It is not implied that these logs are representative of subsurface conditions at other locations and times.

With regard to ground-water conditions, this report presents data on ground-water levels as they were observed during the course of the field work. In particular, water level readings have been made in the borings and temporary observation wells at the times and under conditions stated in the text of the report and on the boring logs. It should be noted that fluctuations in the level of the ground-water table can occur with passage of time due to variations in rainfall, temperature and other factors. Also, this report does not include long-term quantitative information on rates of flow of ground water into excavations, on pumping capacities necessary to dewater the excavations, or on methods of dewatering excavations. Flow-rate estimates provided in this report should be considered preliminary. Unanticipated soil conditions at a construction site are commonly encountered and cannot be fully predicted by mere soil samples, test borings or test pits. Such unexpected conditions frequently require that additional expenditures be made by the owner to attain a properly designed and constructed project. Therefore, provision for some contingency fund is recommended to accommodate such potential extra cost.

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the borings at the time they were completed. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present in excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between submission of this report and the start of the work at the site, if conditions have changed due either to natural causes or to construction operations at or adjacent to the site, or if structure locations, structural loads or finish grades are changed, we urge that we be promptly informed and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse.

Further, it is urged that CMJ Engineering, Inc. be retained to review those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to

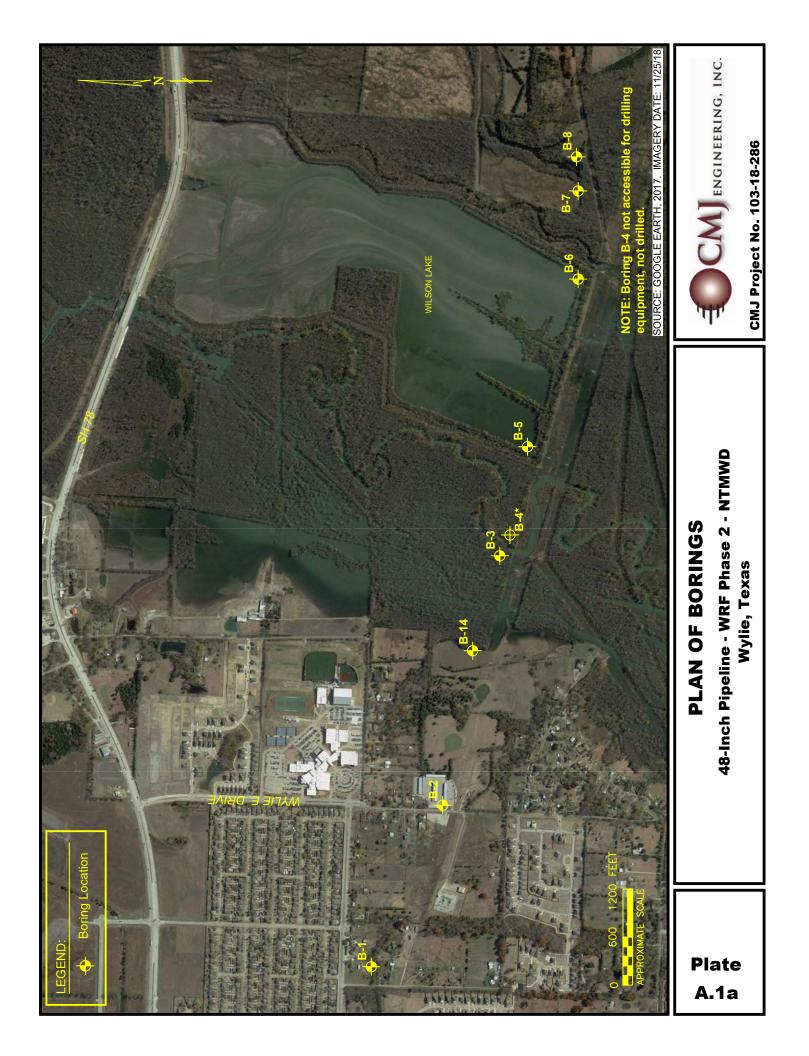
determine whether the plans and specifications are consistent with the recommendations contained in this report. In addition, we are available to observe construction, particularly the compaction of structural fill, or backfill and the construction of foundations as recommended in the report, and such other field observations as might be necessary.

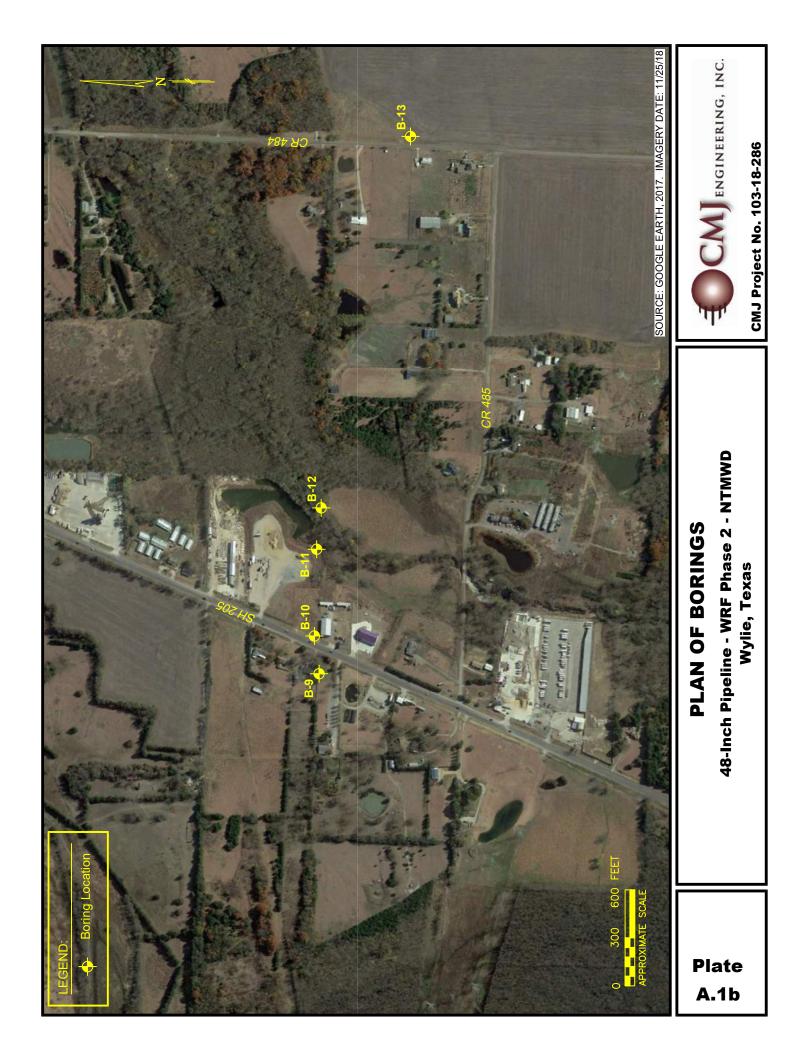
The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, ground water or air, on or below or around the site.

This report has been prepared for use in developing an overall design concept. Paragraphs, statements, test results, boring logs, diagrams, etc. should not be taken out of context, nor utilized without a knowledge and awareness of their intent within the overall concept of this report. The reproduction of this report, or any part thereof, supplied to persons other than the owner, should indicate that this study was made for design purposes only and that verification of the subsurface conditions for purposes of determining difficulty of excavation, trafficability, etc. are responsibilities of the contractor.

This report has been prepared for the exclusive use of Kimley-Horn and Associates, Inc. for specific application to design of this project. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.

* * * *





| | Major D | ivisions | Grp. Sym. | Typical Names | Laboratory Classification Criteria | |
|--|---|--|--------------|--|--|-----|
| | n is larger | Clean gravels (Little or no fines) | GW | Well-graded gravels, gravel- sand mixtures, little or no fines | $C_{u} = \frac{D_{60}}{D_{10}}$ greater than 4: $C_{c} = \frac{(D_{30})^{2}}{D_{10} \times D_{60}}$ between 1 and 3 | |
| eve size) | Gravels f coarse fractio o. 4 sieve size) | Clean (Little or | GP | Poorly graded gravels, grave sand mixtures, little or no fines | A C C S S A C | |
| No. 200 sie | Gravels (More than half of coarse fraction is larger than No. 4 sieve size) | Gravels with fines (Appreciable amount of fines) | GM | Silty gravels, gravel-sand-silt mixtures | Control contro | ne |
| ained soils larger than | (More tha | Gravels (Apprecial of fi | GC | Clayey gravels, gravel-sand- clay mixtures | Liquid and Plastic limits below "A" line or P.I. greater than 4 Liquid and plastic limits below "A" line or P.I. greater than 4 Liquid and plastic limits between 4 and 7 are borderline cases requiring use of dual symbols | I |
| Coarse-grained soils (more than half of the material is larger than No. 200 sieve size) | is smaller | Clean sands (Little or no fines) | SW | Well-graded sands, gravelly sands, little or no fines | $C_u = \frac{D_{60}}{D_{10}}$ greater than 6: $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 | |
| an half of the | nds Irse fraction sieve size) | | SP | Poorly graded sands; gravelly sands, little or no fines | of sand and sand and times (fract date being all gradation requirements for SW | |
| (more the | Sands (More than half of coarse fraction is smaller than No. 4 sieve size) | Sands with fines (Appreciable amount of fines) | SM | Silty sands, sand-silt mixtures | $\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \\ \\ \\ \end{array} \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \end{array} \\ \begin{array}{c} \begin{array}{c} \\ \\ \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \end{array} \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$ | d 7 |
| | (More tha | Sands v (Appreciabl fin | SC | Clayey sands, sand-clay mixtures | Liquid and Plastic limits Liquid and Plastic limits above "A" line with P.I. greater than 7 | |
| | δ | lan 50) | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity | | |
| . 200 sieve) | Silts and clavs | (Liquid limit less than | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays | | |
| soils Iller than No | | (Liquid | OL | Organic silts and organic silty clays of low plasticity | | |
| Fine-grained soils naterial is smaller t | s | than 50) | ΜН | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | 20 OH and MH | |
| Fine-grained soils (More than half of material is smaller than No. 200 sieve) | Silts and clavs | (Liquid limit greater than 50) | СН | Inorganic clays of high plasticity, fat clays | 10 7 CL-ML ML and OL | |
| (More the | | (Liquid | ОН | Organic clays of medium to high plasticity, organic silts | | 100 |
| | Highly | Organic soils | Pt | Peat and other highly organic soils | | |
| UNIFI | ED SOI | L CLAS | SIFIC | CATION SYSTEM | PLATE A.2 | |

| GRAVEL | | | | | | |
|---|--|------------------------|--------------------|--------------|-------------|--------------|
| SAND | SANDY SANDY | | | | | |
| SILT | | | | | | |
| CLAYEY | HIGHLY PLASTIC CLAY | Shelby Aug Tube Aug | ger Split Spoon | Rock Core | Cone Pen | No Recove |
| FERMS DESCRIBING | CONSISTENCY, CONDITION, AN | D STRUCTU | RE OF SOIL | | | |
| Fine Grained Soils (More | than 50% Passing No. 200 Sieve) | | | | | |
| Descriptive Item | Penetrometer Reading, (tsf) | | | | | |
| Soft | 0.0 to 1.0 | | | | | |
| Firm | 1.0 to 1.5 1.5 to 3.0 | | | | | |
| Stiff Very Stiff | 3.0 to 4.5 | | | | | |
| Hard | 4.5+ | | | | | |
| Tara | | | | | | |
| Coarse Grained Soils (N Penetration Resistance | lore than 50% Retained on No. 200 Sieve) | Deletive | Donoitre | | | |
| (blows/foot) | Descriptive Item | Relative | Density | | | |
| 0 to 4 | Very Loose | 0 to 2 | 20% | | | |
| 4 to 10 | Loose | 20 to | | | | |
| 10 to 30 | Medium Dense | 40 to | 70% | | | |
| 30 to 50 | Dense | 70 to | 90% | | | |
| Over 50 | Very Dense | 90 to 1 | 100% | | | |
| Soil Structure | | | | | | |
| Calcareous | Contains appreciable deposits of calciun | n carbonate; ger | erally nodular | | | |
| Slickensided | Having inclined planes of weakness that | - | - | ince | | |
| _aminated | Composed of thin layers of varying color | • | | | | |
| Fissured | Containing cracks, sometimes filled with | | | | | |
| nterbedded | Composed of alternate layers of differen | | lly in approxim | ately equa | l proporti | ons |
| | | | | | | |
| | PHYSICAL PROPERTIES OF RO | СК | | | | |
| Hardness and Degree of | | •••••• | | 1. | | |
| /ery Soft or Plastic | Can be remolded in hand; corresponds | in consistency up | to very stiff in | SOIIS | | |
| Soft | Can be scratched with fingernail | | | | | |
| Moderately Hard | Can be scratched easily with knife; can | not be scratched | with fingernail | | | |
| Hard | Difficult to scratch with knife | | | | | |
| /ery Hard | Cannot be scratched with knife | | | | | |
| Poorly Cemented or Friable | Easily crumbled | | | | | |
| Cemented | Bound together by chemically precipitate | ed material; Qua | rtz, calcite, dol | omite, side | erite, | |
| | and iron oxide are common cementing n | naterials. and iror | n oxide are con | nmon cem | enting m | aterials. |
| Degree of Weathering | | | | | | |
| Jnweathered | Rock in its natural state before being exp | osed to atmosph | eric agente | | | |
| Slightly Weathered | Noted predominantly by color change wi | - | - | | | |
| | | - | | | | |
| | Complete color change with zones of slig | | | | obine ' | 1 |
| Extremely Weathered | Complete color change with consistency | , lexlure, and gei | ierai appearar | ice approa | ching sol | I |
| | ION AND SYMBOLS | | | | PLATE | Δ3 |

KEY TO CLASSIFICATION AND SYMBOLS

PLATE A.3

| | 3-18 | | 6 | Boring No. B-1 | Project | 48-inch Pipeline Im Wylie, Texas | prove | nent | s - WRF | Pha | se 2 | | - CN | 1 ENG | GINEER | ING INC. |
|------------------------|--------|---------|-------|--|--|---|---------|--------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|--|
| Locat Comp Depth | oletio | | | ate A.1 Completion ^{Date} 8-19-19 | Water Ob | servations Seepage at 20' duri | ing dri | lling; | water a | t 23' | at co | mple | etion | | | |
| | | : | Surfa | ace Elevation | Туре | B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | Strat | tum De | scription | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sor Et |
| | | | | CLAY / SILT to hard | Y CLAY , dar | k brown to brown, very stiff | | | 4.5+ | | | | | 11 | | |
| | | | | -w/ occasion | al fine sand, | 1' to 5' | | | 4.5+ 4.5+ | | | | | 12 12 | | |
| | | | | -w/ calcareo | us nodules b | elow 1' | | | 4.5+ 4.5+ | 96 | 64 | 18 | 46 | 11 16 | | |
| - 5 | | | | | | | | | 4.01 | 50 | 04 | | | | | |
| - | | | | -w/ ironstone | e nodules and | d iron stains below 7' | | | 4.25 | | | | | 20 | | |
| - -10 | | | | calcareous | DY SILTY CL s nodules, ca f to very stiff | <u>AY</u> , tan and gray, w/ lcareous deposits, and iron | | | 3.75 | | | | | 20 | 108 | 598 |
| - | | | | | | | | | 2.5 | | | | | 21 | | |
| -15 - | | | | | | | | | | | | | | | | |
| - - 20 | | | | -slightly fissi | le, very stiff t | o hard below 19' | | | 4.5+ | 82 | 56 | 12 | 44 | 18 | | |
| - | | | | | | | | | | | | | | | | |
| -25 | | | | + | | | | | 4.25 | | | | | 21 | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| LC | G C | F E | BOR | ING NO. | 8-1 | | | | | | | | | PLA | TE | A.4 |

| | 3-18 | -286 | Boring No. B-2 | Project 48-inch Pipeline Im Wylie, Texas | prover | nents | s - WRF | Pha | se 2 | | - CN | ∕∐ ENG | GINEER | ING INC |
|------------------------|---------|-------------------|----------------------------------|---|--------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| Locat Comp Depth | oletio | า | Plate A.1 Completion | Water Observations Seepage not encou | ntered | duri | ng drill | ing; c | dry at | com | npleti | on | | |
| Depti | ' 2 | 0.0' S | Date 8-19-19 urface Elevation | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | Strat | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| | Ī | | GRAVEL BA | <u>SE</u> , 4 inches thick Y CLAY, dark brown to brown, w/ iron | | | 2.5 | | | | | 29 | | |
| | | | stains, stif | Y CLAY, dark brown to brown, w/ iron f to very stiff us deposits above 2' | | | 3.25 | 86 | 73 | 18 | 55 | 27 | | |
| 5 | | | | | | | 2.5 | | | | | 27 | 97 | 4820 |
| | | | | | | | | | | | | | | |
| | | | | | | | 3.0 | | | | | 30 | | |
| -10 | | | CLAY / SILT calcareous | Y CLAY, tan and light gray, w/ nodules, calcareous deposits, and iron f to very stiff | | | 3.0 | | | | | 32 | | |
| | | | -w/ ironstone | e nodules above 10' | | | | | | | | | | |
| | | | -slightly fissi | le below 14' | | | 2.75 | 98 | 77 | 19 | 58 | 25 | | |
| -15 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 20 | | | + | | | | 4.0 | | | | | 22 | | |
| | | | | | | | | | | | | | | |
| LO | GC | F B(| | -2 | | | | | | | | PLA | | A.5 |

| | 8-18- | 286 | Boring No. B-3 | Project 48-inch Pipeline Ir Wylie, Texas | nprover | nent | s - WRF | Pha | se 2 | | | IJ ENG | JINEER | ING INC. |
|----------------|--------|------------|-----------------------------------|--|-----------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---------------------------|
| Locatio | : | | Plate A.1 | Water Observations Seepage at 18' du | ring dril | ling; | water a | it 8' a | t con | nplet | ion; \ | watei | • at 7. | 5' 30 |
| Compl Depth | |).0' | Completion Date 8-21-19 | days after drilling | | | - | | | | | | | |
| | | Su | rface Elevation | Туре ATV / B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression |
| | | | CLAY / SILT nodules ar | Y CLAY, dark brown, w/ calcareous ad deposits, hard | | | 4.5+ 4.5+ | | | | | 20 16 | | |
| | | | CLAY / SILT | Y CLAY, brown, w/ calcareous nodules | | | 4.5+ | | | | | 17 | | |
| | | | -w/ light brow | one nodules, hard vn, 1' to 4' | | | 4.5+ 3.75 | | | | | 18 25 | | |
| - 5 | | | -w/ dark brov -stiff to very s | vn, 4' to 5' | | | 0.70 | | | | | 20 | | |
| | | | -w/ occasion | al fine sand above 4' | | | 2.75 | 98 | 77 | 18 | 59 | 29 | | |
| | | | | | | | 2.75 | 90 | | 10 | 59 | 29 | | |
| -10 | | | | | | | 3.0 | | | | | 28 | 95 | 28 |
| | | | | | | | | | | | | | | |
| -15 | | | -w/ dark brov | vn, 14' to 15' | | | 3.25 | | | | | 27 | | |
| | | | -slickensided | l, 16' to 27' | | | | | | | | | | |
| _ | | | | | | | 3.0 | | | | | 28 | | |
| -20 | | | | | | | 0.0 | | | | | 20 | | |
| · _ | | | | | | | | | | | | | | |
| -25 | | | | | | | 2.75 | 97 | 75 | 20 | 55 | 29 | 96 | 26 |
| · _ | | | | DY SILTY CLAY, light brown, brown, | | | | | | | | | | |
| | | | and light g | ray, w/ calcareous nodules, ironstone | | | | | | | | | | |
| -30 | | | nodules, a | nd iron stains, stiff | | | 2.0 | | | | | 26 | 105 | 28 |
| · _ | | | | | | | | | | | | | | |
| -35 | | | -w/ fine sand | below 34' | | | 2.25 | 82 | 52 | 15 | 37 | 26 | | |
| · _ | | | | | | | | | | | | | | |
| -40 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | SHALY CLA | Y / CLAYEY SHALE, gray and | | | | | | | | | | |
| | | | olive-brown | 1 | | | | | | | | 28 | | |
| -50 | | 4 | + | | | | | | | | | 20 | | |
| | 20 | LL F BO | RING NO. B | -3 | <u> </u> | 1 | | 1 | I | 1 | | | | A.6 |

| Project No. 103-18-286 | Boring No. B-5 | Project 48-inch Pipeline Im Wylie, Texas | proven | nents | s - WRF | Phas | se 2 | | - CN | IJ ENG | GINEER | ING INC. |
|--|---|---|---------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| Location See F Completion Depth 25.0' | Plate A.1 Completion Date 8-19-19 | Water Observations Seepage at 23' duri | ng dril | ing; | water a | t 24' | at co | mple | tion | | | |
| | face Elevation | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. Symbol Samples | Strat | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| /// | and iron st | Y CLAY, brown, w/ ironstone nodules ains, stiff to very stiff | | | 3.0 2.5 | | | | | 26 32 | | |
| /// | -w/ dark brov -w/ light brow | n and fine sand. 1' to 5' | | | 2.5 2.0 | | | | | 29 24 | | |
| 5 | | us nodules, 3' to 5' | | | 1.75 | | | | | 24 | | |
| | -w/ dark brov | VN DEIOW 5 | | | | | | | | | | |
| | | | | | 2.0 | | | | | 34 | | |
| -10 | -w/ calcareou | us nodules below 9' | | | 2.5 | 99 | 84 | 21 | 63 | 34 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 15- | | | | | 2.5 | | | | | 29 | | |
| | | | | | | | | | | | | |
| | | Y CLAY, brown, tan, and gray, w/ | | | 3.25 | | | | | 26 | 95 | 346 |
| 20- | calcareous | nodules and ironstone nodules, slightly | | | 3.20 | | | | | 20 | 95 | 340 |
| | | | | | | | | | | | | |
| | -w/ iron stain | s below 24' | | | 2.75 | 90 | 72 | 17 | 55 | 25 | | |
| -23 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| LOG OF BO | RING NO. B | -5 | | 1 | 1 | 1 | I | I | | PLA | | A.7 |

| Project No. 103-18-286 | Boring No. | Project 48-inch Pipeline Im Wylie, Texas | proven | nents | s - WRF | Pha | se 2 | | - CM | 1J eno | GINEER | ING INC. |
|--|---|---|---------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| Location See Completion Depth 25.0' | Plate A.1 Completion Date 8-19-19 | Water Observations Seepage not encou | Intered | duri | ng drilli | ing; c | dry at | com | pleti | on | | |
| S | urface Elevation | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. Symbol Samples | Strat | tum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sa. Ft. |
| | slickenside | Y CLAY, dark brown to brown, slightly ed, hard | | | 4.5+ 4.5+ | | | | | 24 25 | | |
| | | us nodules below 1' e nodules, 3' to 4' | | | 4.25 2.25 | | | | | 27 32 | | |
| - 5 | -stiff to very | | | | 3.5 | | | | | 26 | | |
| | -w/ ironstone | e nodules below 7' | | | 2.5 | | | | | 26 | | |
| | | | | | | | | | | | | |
| 10-10- | -w/ crystal de | eposits, 9' to 10' | | | 2.5 | | | | | 30 | 93 | 230 |
| | | | | | | | | | | | | |
| 15 | | | | | 2.25 | 98 | 83 | 21 | 62 | 31 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 20- | <u>CLAY / SILT</u> nodules ar | <u>Y CLAY</u> , light brown, w/ calcareous nd ironstone nodules, stiff to very stiff | | | 3.25 | | | | | 27 | | |
| | | | | | | | | | | | | |
| 25 | | | | | 2.75 | | | | | 26 | | |
| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| | DRING NO. B | 3-6 | [| I | 1 | I | 1 | | I | | TE | A.8 |

| | 3-18 | -286 | Boring No. B-7 | Project 48-inch Pipeline II Wylie, Texas | mprover | nent | s - WRF | Pha | se 2 | | - CN | IJ ENG | GINEER | ING INC. |
|----------------|--------|--------------------|-------------------------|--|----------|-------|--|----------------------------|--------------------|---------------------|---------------------|----------|------------------------------|---|
| Locati Comp | letior | ı | Plate A.1 Completion | Water Observations Seepage not enco 30 days after drill | ountered | duri | ing drill | ing; c | dry at | com | pleti | on; v | vater | at 7' |
| Depth | 2 | 0.0' Su | Date 8-20-19 | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| | | | | <u>Y CLAY</u> , dark brown to brown, hard us nodules below 1' | | | 4.5+ 4.5+ | | | | | 23 23 | | |
| | | | | | | | 4.5+ 4.5+ | 97 | 94 | 23 | 71 | 22 23 | | |
| - 5 | | | | | | | 4.5+ | | | | | 26 | | |
| | | | -w/ gravel ar | d clayey sand, 7' to 13' | | | 2.5 | | | | | 30 | | |
| | | | | | | | 2.75 | | | | | 29 | | |
| -10 | | | | | | | | | | | | | | |
| _ | | | <u>CLAY / SILT</u> | Y CLAY, light brown, w/ calcareous | | | | | | | | | | |
| -15 | | | nodules ar | id ironstone nodules, slickensided, stiff | | | 2.75 | 94 | 83 | 20 | 63 | 28 | | |
| _ | | | | | | | | | | | | | | |
| | | | | | | | 2.5 | | | | | 29 | 94 | 310 |
| | | | | | | | | | | | | | | |
| LO | G O | F BC | | -7 | | | | | | | | PLA | TE | A.9 |

| | 3-18 | -286 | Boring No. B-8 | Project 48-inch Pipeline In Wylie, Texas | proven | nents | s - WRF | Pha | se 2 | | - CN | IJ ENG | GINEER | ING INC |
|---------------|--------|---------|----------------------------|---|---------|-------|--|----------------------------|--------------------|---------------------|---------------------|----------|------------------------------|---|
| Locati | | | Plate A.1 | Water Observations Seepage not enco | untered | duri | ng drilli | ing; c | dry at | com | pleti | on | | |
| Comp Depth | | 0.0' | Completion Date 8-21-19 | | | | | | | | | | | |
| | | Su | Irface Elevation | Type ATV-47; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | tum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| | | | CLAY / SILT nodules ar | Y CLAY, dark brown, w/ calcareous nd deposits, hard | | | 4.5+ 4.5+ | | | | | 21 22 | | |
| | | | | | | | 4.5+ 4.5+ | | | | | 22 22 | | |
| 5 | | | | V CLAV light brown w/ colooroous | | | 4.5+ | | | | | 22 | | |
| | | | deposits a | <u>Y CLAY</u> , light brown, w/ calcareous nd ironstone nodules, stiff to very stiff | | | | | | | | | | |
| | | | | | | | 3.25 | | | | | 24 | | |
| 10 | | | | | | | 3.75 | 97 | 66 | 17 | 49 | 23 | | |
| | | | | | | | | | | | | | | |
| | | | | | | | 3.25 | | | | | 25 | | |
| | | | | | | | 0.20 | | | | | 20 | | |
| | | | | | | | | | | | | | | |
| | | | | | | | 3.0 | | | | | 25 | 102 | 5500 |
| | | | | | | | | | | | | | | |
| LO | GC | F BC | DRING NO. B | 8-8 | | | <u> </u> | | | | P | LAT | E / | A.10 |

| | -18- | | Boring No. B-9 | Project | 48-inch Pipeline Ir Wylie, Texas | nprove | ment | s - WRF | Pha | se 2 | | - CN | 1J ENG | GINEER | ING INC. |
|---------------------------|--------|---------|---|---|-------------------------------------|----------|--------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| Locatio Compl Depth | etion | | Plate A.1 Completion Date 8-21-19 | Water Obser | vations Seepage at 16' du | ring dri | lling; | water a | it 10' | at co | mple | etion | | | |
| | | | face Elevation | Туре | B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | Strat | um Desc | | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sa. Ft. |
| | | | CLAY / SILT calcareous | <u>Y CLAY</u> , dark b s nodules, hard | rown to brown, w/ | | | 4.5+ | | | | | 20 18 | | |
| | | | | nodules below | 1' | | | 4.5+ | 92 | 73 | 15 | 58 | 18 | | |
| _ | | | _ | <u>′ / CLAY</u> , tan an | d light gray, w/ | | | 4.5+ 4.5+ | | | | | 16 14 | | |
| 5 | X | | calcareous stains, har | s deposits, calca | areous nodules, and iron | | | | | | | | | | |
| | X | | | | | | | 4.5+ | | | | | 18 | | |
| | | | -w/ ironstone | e nodules above | e 8' | | | 4.5+ | | | | | 19 | | |
| 10— — | | | | | | | | | | | | | | | |
| _ | X | | | | | | | | | | | | | | |
| | X | | | | | | | 4.5+ | | | | | 19 | | |
| 15 | X | | | | | | | | | | | | | | |
| _ | | | | | | | | | | | | | | | |
| | | | -w/ fine sand | l, firm to stiff be | low 19' | | | 1.5 | 87 | 49 | 14 | 35 | 27 | 95 | 115 |
| 20 | X | | | ., | | | | | | | | | | | |
| _ | X | | | | | | | | | | | | | | |
| | XX | | SHALY CLA | Y . light grav and | l light brown, w/ iron | | | 1.75 | | | | | 24 | | |
| -25 | ŦŢŢ | | stains, fiss | | | _/] | | | | | | | | | |
| | 17 | | | | | | | | | | | | | | |
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| LO | 0 ن | - RO | RING NO. B | -9 | | | | | | | | <u>Р</u> | LA | | 4.11 |

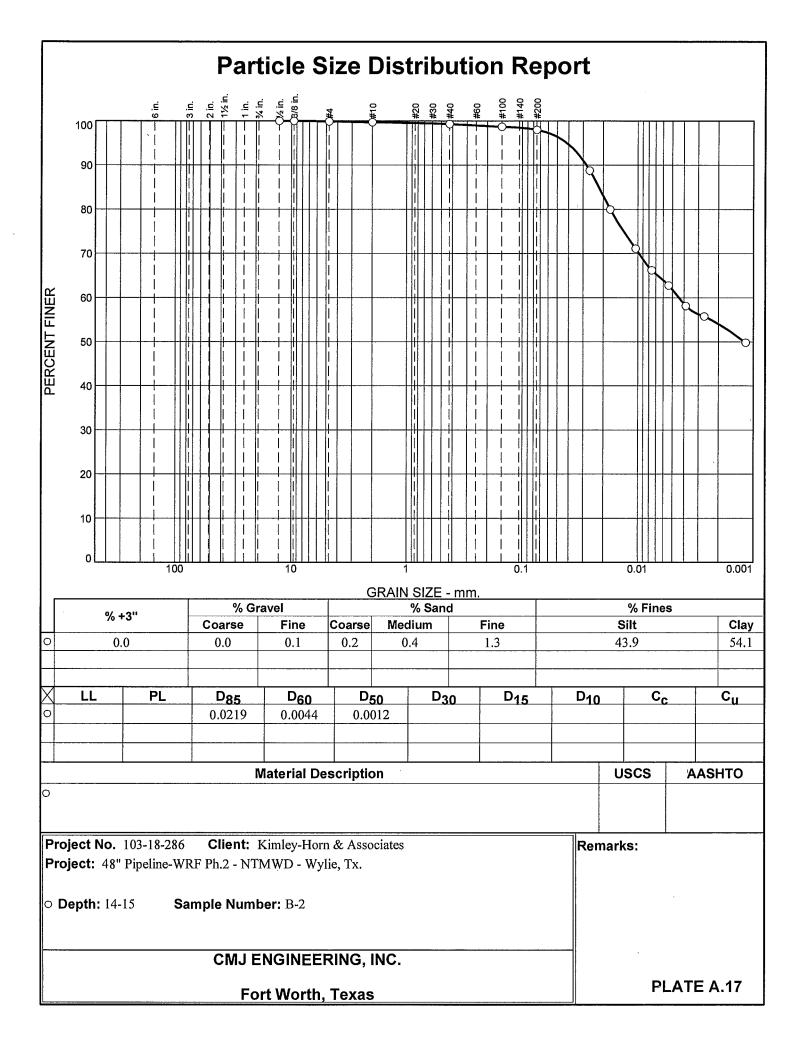
| Projec 103 | t No. -18-2 | | Boring No. B-10 | Project | 48-inch Pipeline Im Wylie, Texas | prove | ment | s - WRF | Phas | se 2 | | - CN | [] end | GINEER | ING INC. – |
|--|-----------------------|-----------|-----------------------------------|----------------|--|--------|--------|--|----------------------------|--------------------|---------------------|---------------------|----------------------|------------------------------|---|
| Locatio | on | | | Water Obs | ervations | | | | | | | | | | |
| | | e Plat | | _ | Seepage at 15' duri | ng dri | lling; | water a | t 10' | at co | mple | etion | | | |
| Compl Depth | | ן ביים | Completion Date 8-21-19 | | | | | | | | | | | | |
| | 25. | | e Elevation | Туре | | | | | | | | | | | |
| | | Currao | | 1,100 | B-53; w/ CFA | | | | | | | | | | |
| i i i | - s | | | | , | | | | 0 | | | | | | |
| Depth, Ft. | Symbol Samples | | | | | | | or ing, | 0 20 | | | | % | i, i, | ion FT |
| Dep | Sal | | Strat | um Des | scription | % | 8 | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | % | % | sity | nt, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| | | | | | - | REC | RQD % | en R S.F. | assir eve, | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, | nit D s./C | omp ounc |
| | | | | Barba barana | | R | Ř | <u> </u> | u, u | | <u> </u> | ĒĒ | | 53 | <u> </u> |
| | | | \uparrow sand and c | occasional gra | and brown, w/ clayey avel, hard (FILL) | | | 4.5+ 4.5+ | | | | | 10 17 | | |
| | | | CLAY / SILT | Y CLAY, dark | brown to brown, w/ iron stains,very stiff to hard | | | 4.5+ | | | | | 17 | | |
| | | | -possible fill a | above 2' | | | | 4.5+ | 00 | 75 | 40 | 00 | 17 | | |
| - 5 - | $///_{}$ | | | | | | | 4.5+ | 92 | 75 | 13 | 62 | 18 | | |
| | | | | | | | | | | | | | | | |
| | | | -very stiff bel | ow 7' | | | | 3.25 | | | | | 23 | | |
| | | | CLAY / SILT | Y CLAY, tan a | and gray, w/ occasional | _ | | 2.75 | 96 | 69 | 18 | 51 | 23 | | |
| | | | calcareous | deposits, sti | ff to very stiff | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| ⊢ − | | | | | | | | | | | | | | | |
| | | | | | | | | 3.0 | | | | | 24 | 101 | 4110 |
| | | | | | | | | | | | | | | | |
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| -20 | ////- | | | | | | | 3.5 | | | | | 24 | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | -w/ iron stain | s below 24' | | | | 4.0 | | | | | 24 | | |
| 25 | | | + | | | • – | | | | | | | | | |
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| 10/7/ | | | | | | | | | | | | | | | |
| GDT | | | | | | | | | | | | | | | |
| CMJ. | | | | | | | | | | | | | | | |
| GPJ | | | | | | | | | | | | | | | |
| -286. | | | | | | | | | | | | | | | |
| 03-18 | | | | | | | | | | | | | | | |
| 2 7 | | | | | | | | | | | | | | | |
| BORIN | | | | | | | | | | | | | | | |
| LOG OF BORING 103-18-286.GPJ CMJ.GDT 10/7/19 | | I | | 40 | | | _ | | 1 | | <u> </u> | | | | |
| မ္ခို LOC | G OF | BORIN | NG NO. B | -10 | | | | | | | | <u> </u> | LAI | E / | A.12 |

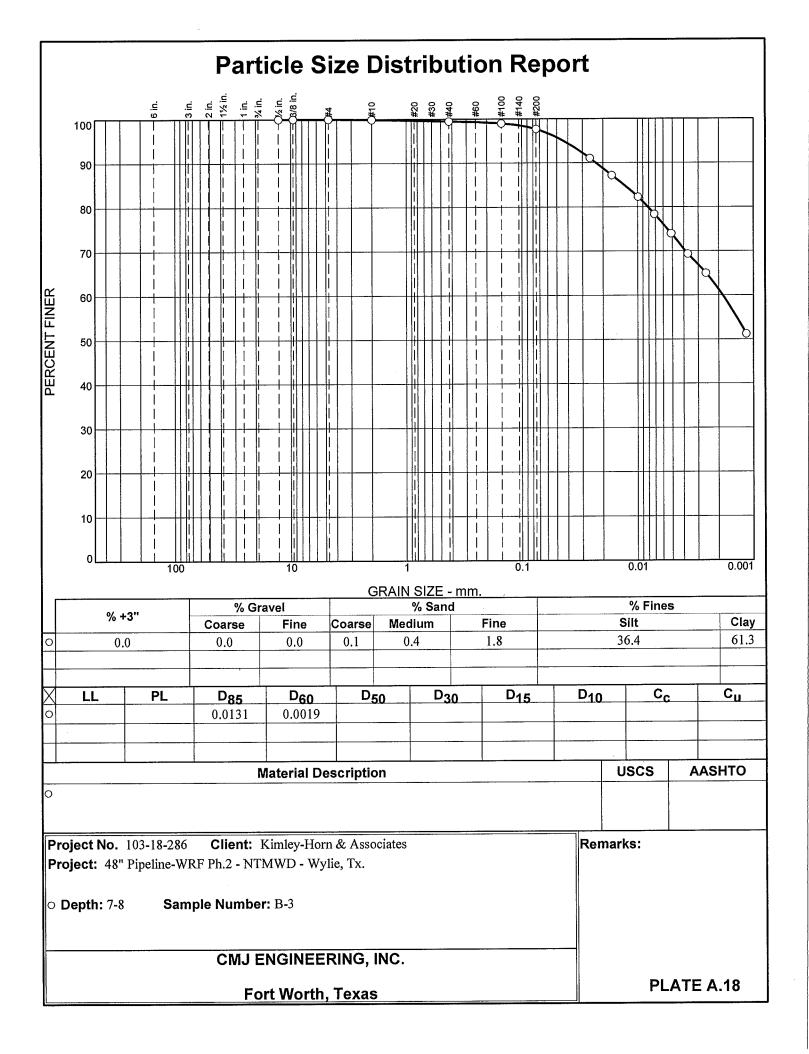
| Proje | | o. 8-28 | | oring No. B-11 | Project 48-inch Pipeline Im Wylie, Texas | oroven | nents | s - WRF | Phas | se 2 | | - CN | 1 ENG | GINEER | ING INC. — |
|------------|---|-------------------|--|---------------------------|---|---------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| Locat | | | e Plate | | Water Observations Seepage at 23' duri | ng dril | ling; | water a | t 28' | at co | mple | tion | | | |
| | Completion Depth 50.0' Completion Date 8-20-19 Surface Elevation | | ompletion ^{ate} 8-20-19 | | | | | | | | | | | | |
| | | | Surface | e Elevation | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| | 1 | | - | | RAVEL, gray (FILL) CLAY, dark brown, brown, light | | | | 5 | | | | 2 | | |
| | | | | brown, and | light gray, w/ calcareous nodules, deposits, iron stains, and gravel, stiff | | | | | | | | 23 | | |
| - 5 - | Ų | | - | (FILL) | (CLA) / light business alive business and | _ | | 2.5 | 88 | 64 | 15 | 49 | 25 | | |
| | | | | gray, w/ iro | <u>CLAY</u> , light brown, olive-brown, and n stains, calcareous nodules and | | | | | | | | | | |
| | | | | deposits, si | ightly slickensided, firm to stiff | | | 2.75 | | | | | 27 | | |
| -10- | | | | | | | | 1.5 | | | | | 29 | 92 | 2680 |
| | | | | | | | | | | | | | | | |
| | | | | -w/ fine sand, | 14' to 20' | | | 1.5 | 89 | 67 | 19 | 48 | 24 | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | 1.25 | | | | | 27 | 94 | 1720 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 25 | | | | | | | | 2.5 | | | | | 24 | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | 2.25 | | | | | 24 | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| -35- | | | | -very stiff to h | ard below 34' | | | 4.5+ | 98 | 58 | 16 | 42 | 23 | | |
| F - | | | | | | | | | | | | | | | |
| | | | | | | | | 3.5 | | | | | 24 | | |
| -40 | | | | | | | | | | | | | | | |
| e – | | | | | | | | | | | | | | | |
| -45- | | | - | SHALY CLAY and limesto | , dark gray, w/ calcareous deposits one lenses, hard | | | 4.5+ | | | | | 25 | 103 | 7840 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | 4.5+ | | | | | 20 | 108 | |
| 6 | | <i>[]</i> | - | + | | | | +.01 | | | | | 20 | | |
| | | | | | | | | | | | | | | | |
| LO | G | DF I | BORIN | IG NO. B | -11 | | | | | | | Ρ | LA1 | Έ/ | A.13 |

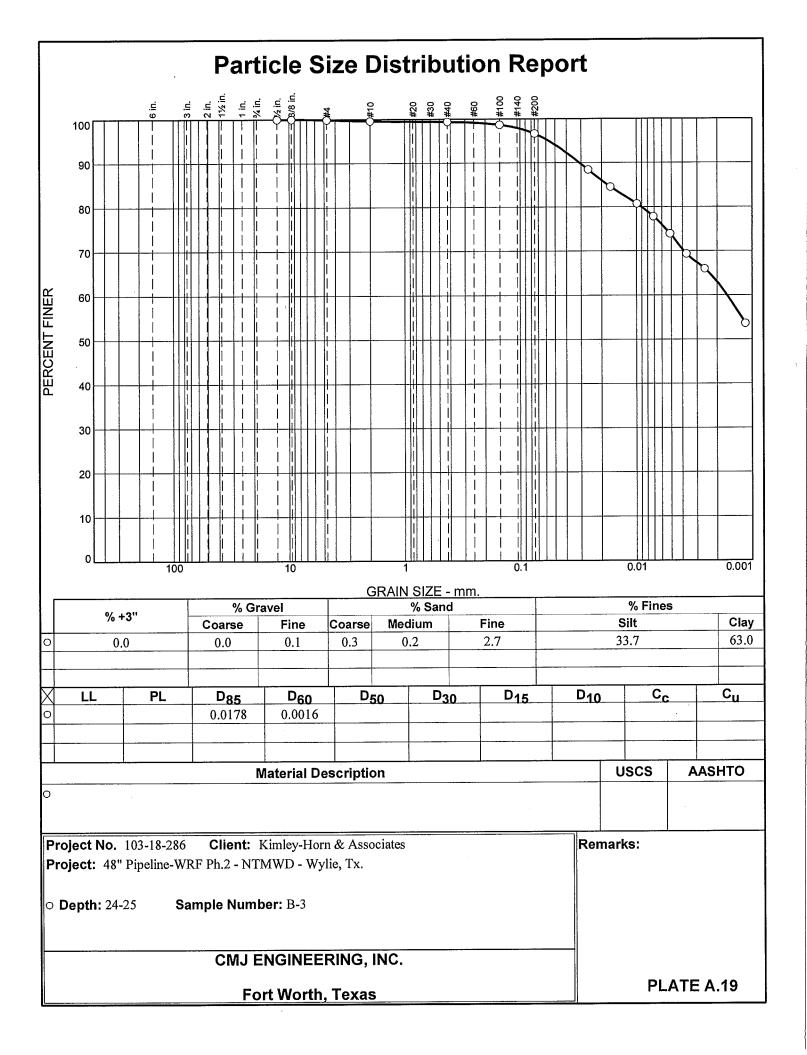
| Projec 103 Locati | 3-18 | -286 | Boring No. B-12 | Project 48-inch Pipeline Imp Wylie, Texas | rover | nent | s - WRF | Pha | se 2 | | - CM | IJ ENG | GINEER | ING INC. | |
|--|--------|---------|----------------------------|--|-------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|--|--|
| See Plate A.1CompletionCompletionDepth35.0'Date8-21-19 | | | | Seepage at 13' during drilling; water at 32' at completion | | | | | | | | | | | |
| | | Sı | Inface Elevation | Туре B-53; w/ CFA | | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | Strat | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Dounde/Con Et | |
| | | | CLAY / SILT deposits ar | <u>Y CLAY</u> , dark brown, w/ calcareous ad occasional fine sand, very stiff to hard | | | 4.5+ 4.5+ | | | | | 18 17 | | | |
| | | | | | | | 4.5+ 4.5+ | | | | | 18 21 | | | |
| - 5 | | | SILTY CLAY | / SANDY SILTY CLAY, brown and | - | | 3.5 | | | | | 21 | | | |
| | | | light brown calcareous | , w/ calcareous nodules and occasional deposits, stiff to very stiff | | | 3.25 | | | | | 21 | | | |
| | | | | | | | 2.5 | | | | | 23 | | | |
| -10 | | | | | | | | | | | | | | | |
| -15 | | | | | | | 2.0 | | | | | 24 | 101 | 234 | |
| · _ | | | | | | | | | | | | | | | |
| -20 | | | | | | | 1.5 | 82 | 47 | 16 | 31 | 24 | | | |
| | | | -w/ iron stain | s and ironstone nodules, below 24' | | | 3.75 | | | | | 20 | | | |
| | | | | | | | | | | | | | | | |
| -30 | | | | | | | 2.75 | | | | | 21 | 108 | 464 | |
| · _ | | | | | | | | | | | | | | | |
| -35 | | | w/ light gray | below 34' | | | 2.25 | 80 | 39 | 13 | 26 | 21 | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| LO | GO | F BC | | -12 | | • | | • | · | | Ρ | LA1 | E/ | 4.14 | |

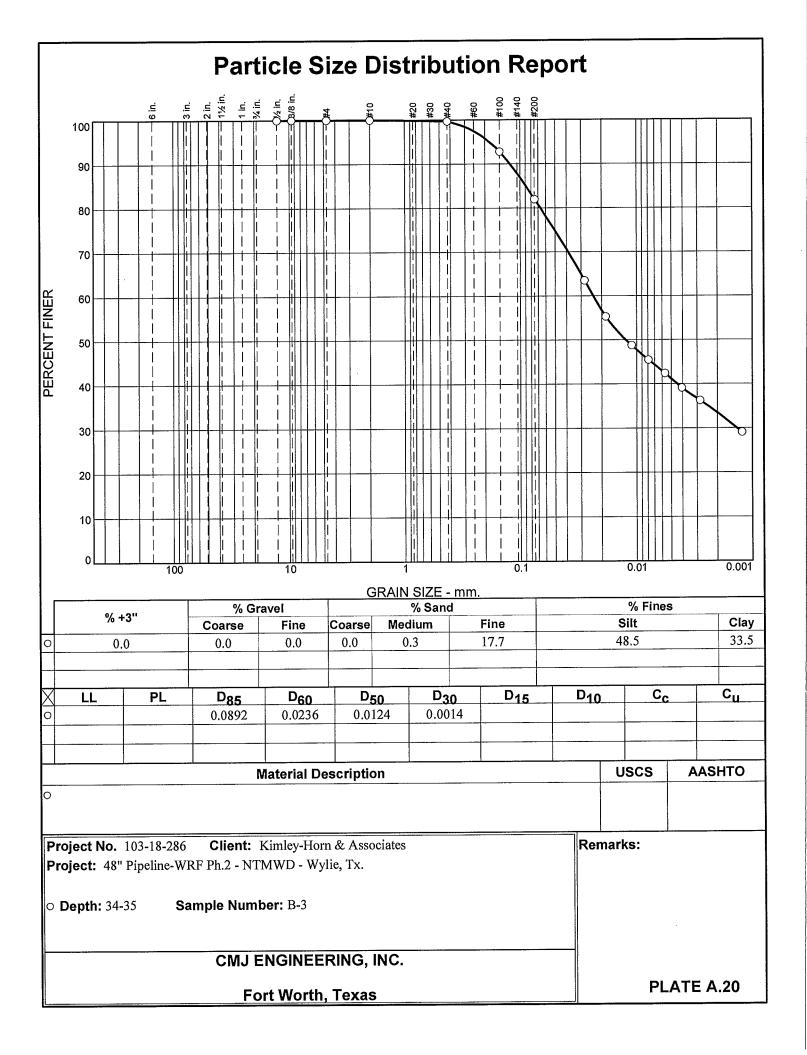
| Project No. 103-18-286 | Boring No. B-13 | Project 48-inch Pipeline Im Wylie, Texas | proven | nents | s - WRF | Pha | se 2 | | - CN | IJ ENG | GINEER | ING INC. |
|----------------------------------|----------------------------|---|--------|-------|--|----------------------------|--------------------|---------------------|---------------------|------------------------|------------------------------|---|
| | Plate A.1 | Water Observations Seepage not encountered during drilling; dry at completion | | | | | | | | | | |
| Completion Depth 20.0' | Completion Date 8-21-19 | | | | | | 1 | i | | i | | |
| Su | rface Elevation | Туре B-53; w/ CFA | | | | | | | | | | |
| Depth, Ft. Symbol Samples | Strat | um Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
| /// | nodules ar | Y CLAY, dark brown, w/ calcareous ind ironstone nodules, hard | | | 4.5+ 4.5+ | | | | | 15 20 | | |
| | - | id ironstains, possible fill above 1' | | | 4.5+ | | | | | 24 | | |
| <u>-</u> 5 | -stiff to very | stiff below 3 | | | 4.0 2.5 | 96 | 84 | 20 | 64 | 25 27 | | |
| | | | | | 3.25 | | | | | 23 | | |
| | deposits, c | Y CLAY, tan and gray, w/ calcareous alcareous nodules, and iron stains, very | | | 3.5 | | | | | 22 | 103 | 3490 |
| -10- | stiff | | | | | | | | | | | |
| | | | | | | | | | | | | |
| -15- | -w/ occasion | al fine sand below 14' | | | 4.0 | | 61 | 15 | 46 | 20 | 110 | |
| | | | | | | | | | | | | |
| | + | | | | 3.5 | | | | | 22 | 106 | 6550 |
| | | | | | | | | | | | | |
| LOG OF BO | RING NO. B | -13 | | | | | | | P | LA1 | E / | A.15 |

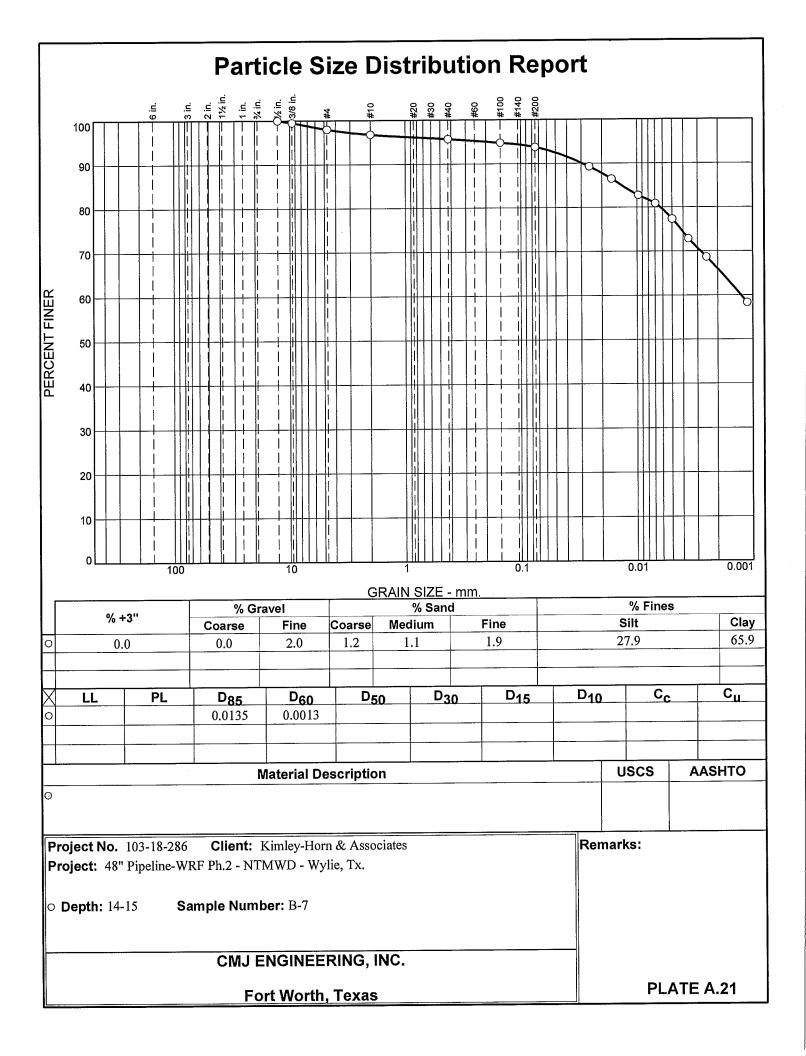
| | 3-18 | -286 | Boring No. B-14 | Project 48-inch Pipeline In Wylie, Texas | nprover | nent | s - WRF | Pha | se 2 | | - CN | IJ ENG | GINEER | ING INC. | |
|-------------------------------------|--------|----------|---------------------------|---|---------|-------|--|----------------------------|--------------------|---------------------|---------------------|----------|------------------------------|---|--|
| See Plate A.1 Completion Completion | | | Completion | Water Observations Seepage not encountered during drilling; dry at completion | | | | | | | | | | | |
| Depth | | 5.0' | Date 8-19-19 | | | | | | | | | | | | |
| | | | Irface Elevation | Туре B-53; w/ CFA | | | | | | | | | | | |
| Depth, Ft. | Symbol | Samples | | tum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. | |
| | | | CLAY / SILT nodules ar | Y CLAY, dark brown, w/ calcareous nd occasional ironstone nodules, hard | | | 4.5+ 4.5+ | | | | | 12 14 | | | |
| | | | | | | | 4.5+ | | | | | 18 | | | |
| | | | -w/ iron stair | ns, stiff to very stiff below 4' | | | 4.5+ 2.75 | 97 | 64 | 13 | 51 | 19 22 | | | |
| - 5 | | | | | | | | | | | | | | | |
| _ | | | | | | | 3.25 | | | | | 22 | 103 | 440 | |
| _ | | | | | | | | | | | | | | | |
| 10 | | | | | | | 3.25 | | | | | 20 | | | |
| | | | | | | | | | | | | | | | |
| _ | | | | | | | | | | | | | | | |
| -15 | | | CLAY / SILT | Y CLAY, tan and gray, w/ calcareous nd iron stains, very stiff | | | 3.25 | 93 | 58 | 14 | 44 | 19 | | | |
| | | | | | | | | | | | | | | | |
| LO | G O | F BC | | 3-14 | | | | | | | P | LAT | | A.16 | |

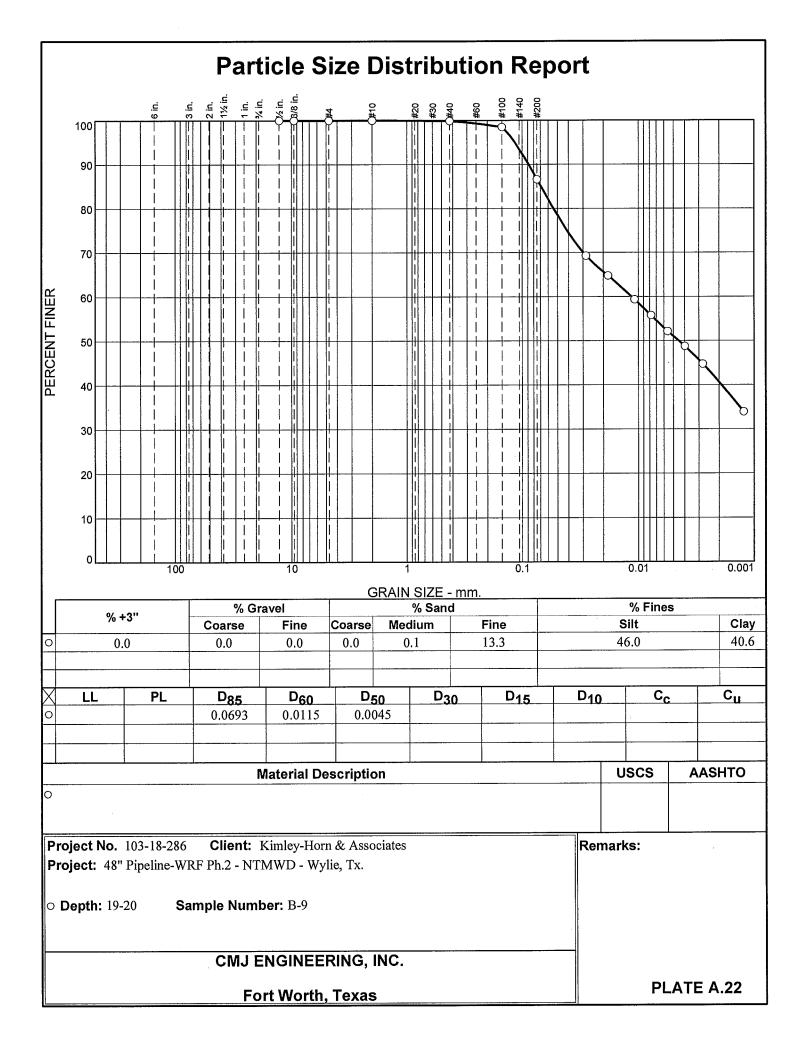


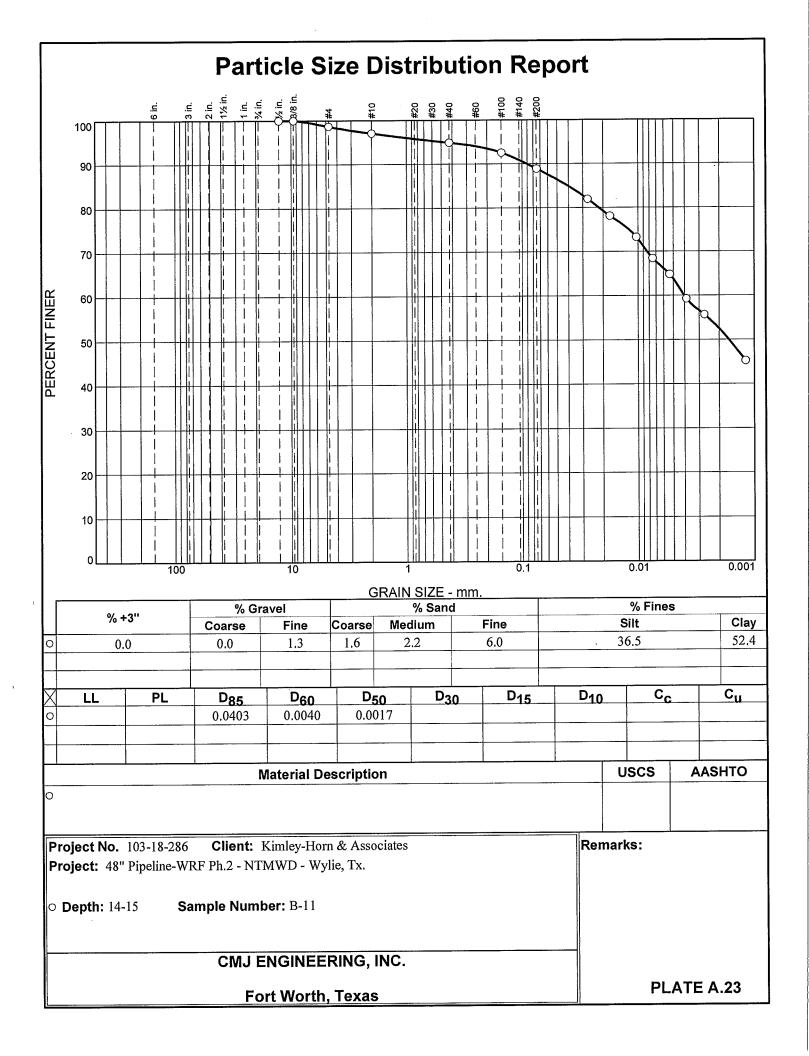


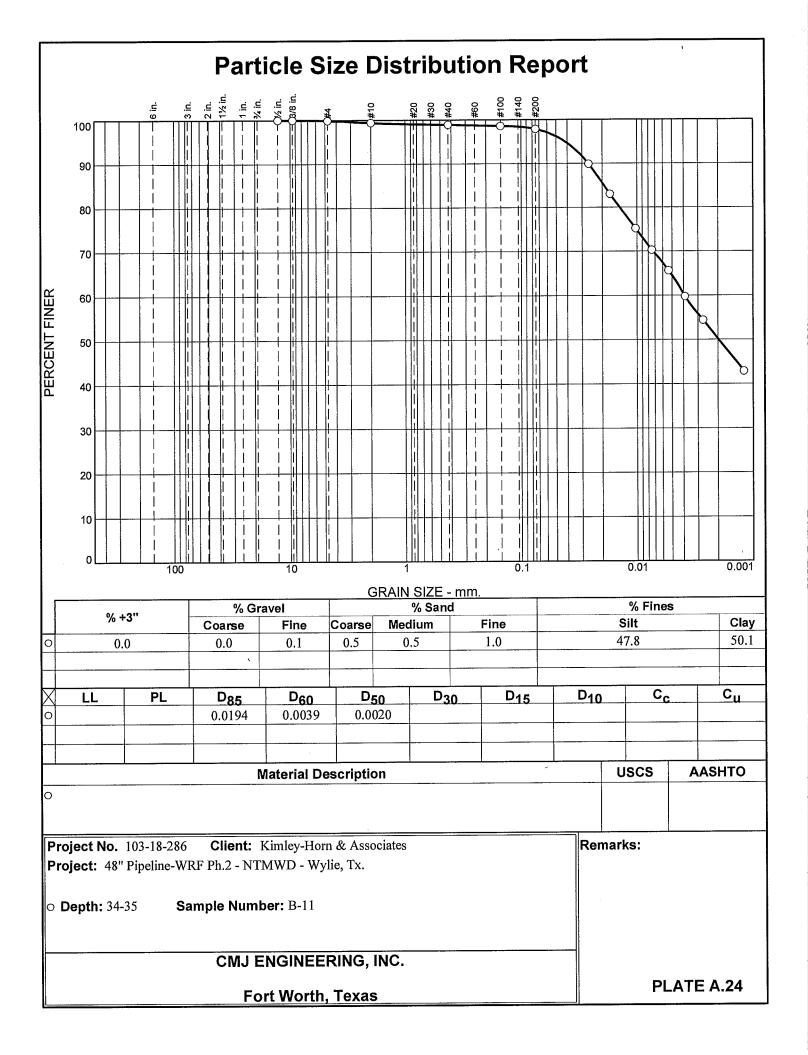


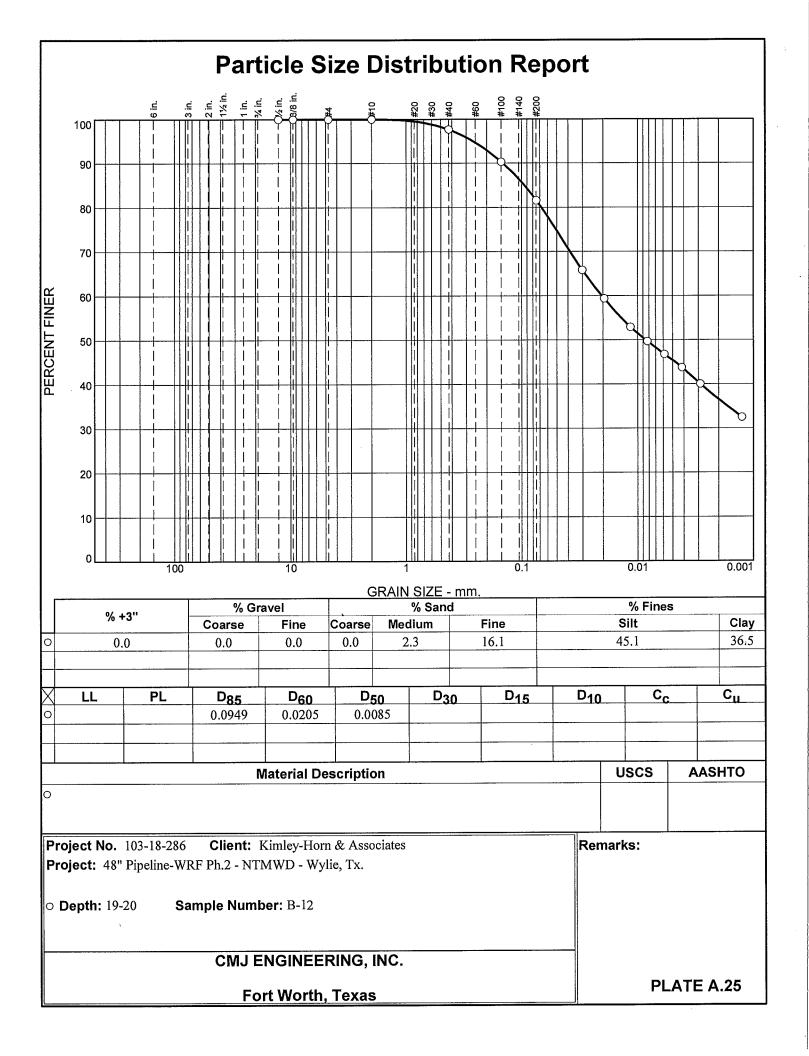












FREE SWELL TEST RESULTS

Project: 48-inch Pipeline Improvements - WRF Phase 2 Wylie, Texas

Project No.: 103-18-286

| Boring No. | Depth Interval | Sample Description | Liquid Limit | Plastic Limit | Plasticity Index | Mois Conte | | Percent Swell |
|---------------|-------------------|-----------------------|-----------------|------------------|---------------------|---------------|----------|------------------|
| NO. | (ft.) | Description | LL | PL | PI | Initial | al Final | (%) |
| B-13 | 14 – 15 | Clay/Silty Clay | 61 | 15 | 46 | 19.7 | 21.5 | 0.4 |

Free swell tests performed at approximate overburden pressure



November 7, 2019

Kimley-Horn and Associates, Inc. 13455 Noel Road Two Galleria Office Tower, Suite 700 Dallas, Texas 75240

Attn: Mr. Kyle Sanderson, P.E.

RE: ADDENDUM 1 TO REPORT 103-18-286 48-INCH PIPELINE IMPROVEMENTS WRF PHASE 2 NORTH TEXAS MUNICIPAL WATER DISTRICT WYLIE, TEXAS

Dear Mr. Sanderson:

The following presents an addendum to the above referenced report to present the field results of groundwater pump-out measurements conducted at the monitor wells installed for this project at Borings B-3 and B-7. CMJ Engineering, Inc. performed the original geotechnical investigation for this site with results contained in Report 103-18-286 dated October 7, 2019 with details of the monitor well installation provided therein.

Following drilling operations, temporary observation wells with metal stick-ups were installed in Borings B-3 and B-7 for short-term ground-water recharge and pump-out observations. Ground-water was observed at a depths of 8 feet following well completion Boring B-3 while Boring B-7 was dry at completion. The temporary wells were installed on August 21, 2019, consisting of 2-inch diameter PVC. Subsequent thirty-day water level observations were conducted on September 20, 2019, with measured ground-water at depths of 7 to 7½ feet at these locations. Ground-water pump-out observations were performed on November 2, 2019 Following the ground-water recharge and pump-out observations, the temporary wells were removed and backfilled with bentonite on November 4, 2019. Results of pump-out and recharge observations are provided below.

CMJ ENGINEERING INC.

Kimley-Horn and Associates, Inc. Addendum 1 to Report 103-18-286 November 7, 2019 Page 2 of 3

| | We | ell B-3 Data, 11/2/201 | 9 |
|--|---------------------|----------------------------|---|
| 45-foot well, 2- 6-inch diamete Pump: 3 gpm | er pea gravel pa | diameter, screened ack. | below 4.5 feet inside approximate |
| Time Interval (minutes) | Pump Depth (ft.) | Well Production (gpm) | Ground-Water Level Below Existing Ground (ft.) |
| 0 (Prior to Test) | N/A | N/A | 6.1 |
| 5 | 33 | 1 | 7.9 (static level during pumping) |
| 9 | 23 | 1.25 | 8.2 (static level during pumping) |
| 14 | 18 | 1.25 | 7.9 (static level during pumping) |
| 17 | 13 | 2 | 7.9 (static level during pumping) |
| 20 | 10 | 2 | 8.3 (static level during pumping) |
| 32 (After Test) | N/A | N/A | 6.1 (stabilized) |

| Well B-7 Data, 11/2/2019 | | | | | |
|--|---------------------|--------------------------|---|--|--|
| 20-foot well, 2-inch PVC pipe diameter, screened below 5 feet inside approximate 6 inch diameter pea gravel pack. Pump: 3 gpm capacity. | | | | | |
| Time Interval (minutes) | Pump Depth (ft.) | Well Production (gpm) | Ground-Water Level Below Existing Ground (ft.) | | |
| 0 (Prior to Test) | N/A | N/A | 5.8 | | |
| 7 | 16 | 1 | Dry at 7 minutes | | |
| 12 | N/A, pulled | N/A | 19.9 | | |
| 67 | N/A | N/A | 19 | | |
| 127 | N/A | N/A | 18.2 | | |

The Alluvial and Fluviatile Terrace Deposits are known to carry significant quantities of groundwater in select locations, as encountered in select borings along the project alignment and particularly in the vicinity of the river. The design of any dewatering system required is the contractor's responsibility.

CMJ ENGINEERING INC.

Kimley-Horn and Associates, Inc. Addendum 1 to Report 103-18-286 November 7, 2019 Page 3 of 3

We appreciate the opportunity to provide these field test results. Please contact us should questions arise on information contained herein.

Respectfully, CMJ ENGINEERING, INC. **TEXAS FIRM REGISTRATION NO. F-9177**

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James P. Sappington IV, P.E. President Texas No. 97402



copies submitted:

(1) Mr. Kyle Sanderson, P.E.; Kimley-Horn & Associates, Inc. (email)

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APPENDIX B

U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT 12 PCN

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DEPARTMENT OF THE ARMY U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT P. O. BOX 17300 FORT WORTH, TEXAS 76102-0300

March 30, 2020

Regulatory Division

SUBJECT: Project Number SWF-2018-00201, Wylie-Rockwall-Farmersville 48-inch Pipeline

Ms. Kara Byrnes North Texas Municipal Water District 501 E. Brown Street Wylie, Texas 75098 <u>kbyrnes@ntmwd.com</u>

Dear Ms. Byrnes:

This letter is in regard to information received January 25, 2019, and subsequent submittals received October 9, 2019, October 23, 2019, January 29, 2020, February 19, 2020, and March 26, 2020, concerning a proposal by North Texas Municipal Water District to construct approximately 22,000 linear feet of 48-inch diameter pipeline located in Wylie, Collin County, Texas. This project has been assigned Project Number SWF-2018-00201. Please include this number in all future correspondence concerning this project.

Under Section 404 of the Clean Water Act the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the United States, including wetlands. USACE responsibility under Section 10 of the Rivers and Harbors Act of 1899 is to regulate any work in, or affecting, navigable waters of the United States. Based on the description of the proposed work, and other information available to us, we have determined this project will involve activities subject to the requirements of Section 404.

We have reviewed this project under the pre-construction notification procedures of Nationwide Permit General Condition 32 (Federal Register, Vol. 82, No. 4, Friday, January 6, 2017). We have determined the discharge of dredged or fill materials into waters of the United States associated with this project is authorized by Nationwide Permit 12 For Utility Line Activities. To use this permit, the permittee must ensure the work is in compliance with the specifications and conditions for the permit listed above, found at https://www.swf.usace.army.mil/Missions/Regulatory/Permitting/Nationwide-General-Permits/, and the special conditions listed below. Additionally, all activities must comply with the water quality certification conditions of the Texas Commission on Environmental Quality (TCEQ) located at

http://www.swf.usace.army.mil/Portals/47/Users/053/21/821/NWP%202017%20Texas%20401c ert.pdf. The special conditions are as follows:

1. The permittee shall implement and abide by the mitigation plan included in the "PCN additional information for North Texas Municipal Water District's Wylie-Rockwall-Farmersville 48-Inch Pipeline project, Collin County, TX (SWF-2018-00201)," prepared by Kimley-Horn and Associates, Inc, dated October 21, 2019, and revisions received

March 26, 2020. The permittee shall implement the mitigation plan prior to commencing any ground-disturbing activity within waters of the United States. Completion of all elements of this mitigation plan is a requirement of this permit.

2. The permittee shall debit 1.2 Forested Wetland Credits from the Red Oak Umbrella Mitigation Bank Palmer Tract in compliance with the provisions of the "Mitigation Banking Instrument and Site Development Plan for the Palmer Tract portion of the Red Oak Umbrella Mitigation Bank" dated June 7, 2013. This debit shall compensate off-site for unavoidable adverse project impacts that would not be compensated for by on-site mitigation. The permittee shall complete the mitigation bank transaction and provide documentation to the USACE that the transaction has occurred prior to commencing any ground-disturbing activity within waters of the United States.

Failure to comply with these specifications and conditions invalidates the authorization and may result in a violation of the Clean Water Act.

Our verification for the construction of this activity under this nationwide permit is valid until March 18, 2022, unless prior to that date the nationwide permit is suspended, revoked, or modified such that the activity would no longer comply with the terms and conditions of the nationwide permit on a regional or national basis. The USACE will issue a public notice announcing the changes when they occur. Furthermore, activities that have commenced, or are under contract to commence, in reliance on a nationwide permit will remain authorized provided the activity is completed within 12 months of the date of the nationwide permit's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 330.4(e) and 33 CFR 330.5(c) or (d). Continued confirmation that an activity complies with the specifications and conditions, and any changes to the nationwide permit, is the responsibility of the permittee.

The USACE based this decision on a preliminary jurisdictional determination (PJD) that there are waters of the United States on the project site. A PJD is not appealable. At any time you have the right to request and obtain an Approved Jurisdictional Determination (AJD), which can be appealed. If it is your intent to request an AJD, do not begin work until one is obtained.

Our review of this project also addressed its effects on threatened and endangered species. Based on the information provided, we have determined this project will not affect any species listed as threatened or endangered by the U.S. Fish and Wildlife Service within our permit area. However, please note you are responsible for meeting the requirements of General Condition 18 on endangered species.

The permittee must sign and submit to us the enclosed certification that the work, including any proposed mitigation, was completed in compliance with the nationwide permit. The permittee should submit the certification within 30 days of the completion of work.

This permit should not be considered as an approval of the design features of any activity authorized or an implication that such construction is considered adequate for any purpose intended. It does not authorize any damages to private property, invasion of private rights, or any infringement of federal, state, or local laws or regulations.

Thank you for your interest in our nation's water resources. If you have any questions concerning our regulatory program, please refer to our website at http://www.swf.usace.army.mil/Missions/Regulatory or contact Mr. Joseph L. Shelnutt at the address above, by telephone (817) 886-1738, or by email Joseph.L.Shelnutt@usace.army.mil, and refer to your assigned project number.

Please help the regulatory program improve its service by completing the survey on the following website: <u>http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey</u>

Sincerely,

For: Brandon W. Mobley Chief, Regulatory Division

Enclosure

Copy Furnished by Electronic Transfer:

Mr. Carland Holstead <u>carland.holstead@kimley-horn.com</u>

PERMIT COMPLIANCE CERTIFICATION

U.S. Army Corps of Engineers Project Number: SWF-2018-00201

Name of Permittee: North Texas Municipal Water District 501 E. Brown Street Wylie, Texas, 75098

Date of Issuance: March 30, 2020

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Regulatory Division CESWF-DE-R U.S. Army Corps of Engineers P.O. Box 17300 Fort Worth, Texas 76102-0300

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit was completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Signature of Permittee

Date

January 25, 2019

Stephen L Brooks Branch Chief Regulatory Branch (CESWF-EV-R) U.S. Army Corps of Engineers Fort Worth District P.O. Box 17300 Fort Worth, Texas 76102-0300

RE: Nationwide Permit 12 Pre-Construction Notification Wylie-Rockwall-Farmersville 48-Inch Pipeline SWF-2018-00201 From Kreymer Lane in Wylie to County Road 484 in Lavon Collin County, Texas

Dear Mr. Brooks:

On behalf of the North Texas Municipal Water District (NTMWD) (the Applicant), Kimley-Horn and Associates, Inc. (Kimley-Horn; the Authorized Agent) is submitting a Nationwide Permit (NWP) 12 Pre-Construction Notification (PCN) for the construction of approximately 20,000 linear feet of 48-inch diameter water line between Kreymer Lane in Wylie and County Road 484 in Lavon, Collin County, Texas (site or study area). Kimley-Horn attended a pre-application meeting on June 15, 2018. Ms. Jamie Larkin was assigned as project manager to this pre-application meeting; therefore, we would appreciate keeping Ms. Larkin as the project manager to process this request.

Appendix 1 for Regulatory Guidance Letter 16-01 and a completed Preliminary Jurisdictional Determination (PJD) form are attached (Attachment A) for your reference. The NWP 12 PCN Form is attached (Attachment B) for your reference and use. The purpose of the project is to replace an aging 36-inch diameter water line that is undersized and not adequately pressure rated for future planned use. The proposed 48-inch diameter water line will be owned and maintained by the NTMWD and will serve as a transmission line for Wylie, Rockwall, Farmersville, and other communities located in the eastern portion of the Dallas-Fort Worth Metroplex. Additional aspects of the project will include installing necessary valves, appurtenances and connections to existing water infrastructure.

Kimley-Horn conducted a site visit as part of an aquatic resources delineation on May 14, May 16, November 16, and December 12, 2018. As a result of the delineation, two ephemeral streams, two intermittent streams, five perennial streams, nine open water features, eleven forested wetlands, and seven emergent wetlands. The streams are likely Waters of the U.S. because they have ordinary high water marks (OHWM) and eventually flow to the Trinity River, a traditional navigable water (TNW). Four open water features are likely Waters of the U.S. because they are located on-channel or adjacent to other Waters of the U.S. and are located within the Federal Emergency Management Agency (FEMA) designated 100-year floodplain. Five open water features are likely not Waters of the U.S. because they are located within the FEMA designated 100-year floodplain. The wetlands are likely waters of the U.S. because they are located within the FEMA designated 100-year floodplain. Aquatic

resource details can be found in the attached Aquatic Resources Delineation Report (Attachment C). The table below quantifies the aquatic resources observed within the study area.

| Feature | Feeture Ture | Approx | cimate Amount o Resources | of Aquatic | Likely Waters of the U.S. |
|----------|---------------------------------|----------------|------------------------------|------------|------------------------------|
| ID | Feature Type | Linear Feet | онwм | Acres | |
| | Likely | Jurisdictiona | I Features | | |
| | | STREAMS | 3 | | |
| S1 | Ephemeral Stream | ~480 lf | ~2 ft | ~0.02 ac | Yes |
| S2 | Intermittent Stream | ~4,260 lf | ~4 ft | ~0.42 ac | Yes |
| S3 | Intermittent Stream | ~180 lf | ~ 1 ft | ~0.01 ac | Yes |
| S4 | Perennial Stream | ~1,270 lf | ~7 to 30 ft | ~0.49 ac | Yes |
| S5 | Perennial Stream | ~845 lf | ~14 to 25 ft | ~0.31 ac | Yes |
| S6 | Perennial Stream | ~3,380 lf | ~65 to 75 ft | ~5.15 ac | Yes |
| S7 | Perennial Stream | ~1,880 lf | ~28 to 30 ft | ~1.06 ac | Yes |
| S8 | Perennial Stream | ~415 lf | ~20 to 25 ft | ~0.16 ac | Yes |
| S9 | Ephemeral Stream | ~80 lf | ~ 1 ft | ~0.002 ac | Yes |
| Ju | urisdictional Stream Total: | ~12,790 lf | n/a | ~7.62 ac | n/a |
| | | OPEN WATE | RS | | |
| OW4 | Open Water | n/a | n/a | ~0.10 ac | Yes |
| OW5 | Open Water | n/a | n/a | ~7.06 ac | Yes |
| OW6 | Open Water | n/a | n/a | ~2.05 ac | Yes |
| OW7 | Open Water | n/a | n/a | ~0.60 ac | Yes |
| Juris | sdictional Open Water Total: | n/a | n/a | ~9.81 ac | n/a |
| | FO | RESTED WET | LANDS | | |
| FW1 | Forested Wetland | n/a | n/a | ~5.54 ac | Yes |
| FW2 | Forested Wetland | n/a | n/a | ~3.14 ac | Yes |
| FW3 | Forested Wetland | n/a | n/a | ~5.46 ac | Yes |
| FW4 | Forested Wetland | n/a | n/a | ~14.38 ac | Yes |
| FW5 | Forested Wetland | n/a | n/a | ~1.29 ac | Yes |
| FW6 | Forested Wetland | n/a | n/a | ~4.08 ac | Yes |
| FW7 | Forested Wetland | n/a | n/a | ~3.21 ac | Yes |
| FW8 | Forested Wetland | n/a | n/a | ~13.23 ac | Yes |
| FW9 | Forested Wetland | n/a | n/a | ~15.41 ac | Yes |
| FW10 | Forested Wetland | n/a | n/a | ~0.07 ac | Yes |
| FW11 | Forested Wetland | n/a | n/a | ~1.27 ac | Yes |
| Jurisdic | tional Forested Wetlands Total: | n/a | n/a | ~67.08 ac | n/a |
| | EM | ERGENT WET | | | • |
| EW1 | Emergent Wetland | n/a | n/a | ~1.45 ac | Yes |
| EW2 | Emergent Wetland | n/a | n/a | ~1.63 ac | Yes |
| EW3 | Emergent Wetland | n/a | n/a | ~3.96 ac | Yes |
| EW4 | Emergent Wetland | n/a | n/a | ~16.94 ac | Yes |
| EW5 | Emergent Wetland | n/a | n/a | ~20.13 ac | Yes |
| EW6 | Emergent Wetland | n/a | n/a | ~4.86 ac | Yes |

Table 1: Aquatic Resources Observed Within the Study Area

| Feature | Feature Type | Approx | imate Amount o Resources | Likely Waters | | | |
|----------|---|----------------|-----------------------------|---------------|-------------|--|--|
| ID | reature Type | Linear Feet | онwм | Acres | of the U.S. | | |
| EW7 | Emergent Wetland | n/a | n/a | ~0.62 ac | Yes | | |
| Jurisdic | Jurisdictional Emergent Wetlands Total: | | n/a | ~49.59 ac | n/a | | |
| | Likely Non-Jurisdictional Features | | | | | | |
| | OPEN WATER | | | | | | |
| OW1 | Open Water | n/a | n/a | ~0.23 ac | No | | |
| OW2 | Open Water | n/a | n/a | ~0.54 ac | No | | |
| OW3 | Open Water | n/a | n/a | ~0.59 ac | No | | |
| OW8 | Open Water | n/a | n/a | ~0.09 ac | No | | |
| OW9 | Open Water | n/a | n/a | ~0.13 ac | No | | |
| Non-Ju | urisdictional Open Water Total: | n/a | n/a | ~1.58 ac | n/a | | |

To facilitate the installation of the 48-inch diameter water line, impacts to Waters of the U.S. are proposed. The table provided below details the proposed impacts to Waters of the U.S. as a result of the project.

Table 2: Impacts to Aquatic Resources

| Feature | Feature Type | | y Impacts |
|----------------|---------------------|---------------|-----------|
| ID | reature rype | Linear Feet | Acres |
| | ſ | STREAMS | T |
| S1 | Ephemeral Stream | 15.96 ft | 0.001 ac |
| S2 | Intermittent Stream | 379.02 ft | 0.04 ac |
| S3 | Intermittent Stream | 43.61 ft | 0.001 ac |
| S4 | Perennial Stream | 82.27 ft | 0.02 ac |
| S5 | Perennial Stream | 81.32 ft | 0.04 ac |
| S6 | Perennial Stream | 0 lf | 0 ac |
| S7 | Perennial Stream | 84.62 lf | 0.05 ac |
| S8 | Perennial Stream | 45.54 lf | 0.02 ac |
| S9 | Ephemeral Stream | 0 lf | 0 ac |
| Streams Total: | | 732.34 lf | 0.17 ac |
| | O | PEN WATERS | |
| OW1 | Open Water | - | 0 ac |
| OW2 | Open Water | - | 0 ac |
| OW3 | Open Water | - | 0 ac |
| OW4 | Open Water | - | 0 ac |
| OW5 | Open Water | - | 0.13 ac |
| OW6 | Open Water | - | 0.05 ac |
| OW7 | Open Water | - | 0.06 ac |
| OW8 | Open Water | - | 0 ac |
| OW9 | Open Water | - | 0 ac |
| Ope | n Waters Total: | - | 0.24 ac |
| | FORE | STED WETLANDS | • |
| FW1 | Forested Wetland | - | 0.85 ac |
| FW2 | Forested Wetland | - | 0.54 ac |
| | 1 | | 1 |

| Feature | Feature Type | Temporar | y Impacts |
|--------------------------|---------------------|---------------|-----------|
| ID | reature rype | Linear Feet | Acres |
| FW3 | Forested Wetland | - | 0.83 ac |
| FW4 | Forested Wetland | - | 2.37 ac |
| FW5 | Forested Wetland | - | 0 ac |
| FW6 | Forested Wetland | - | 0.68 ac |
| FW7 | Forested Wetland | - | 0.47 ac |
| FW8 | Forested Wetland | - | 1.01 ac |
| FW9 | Forested Wetland | - | 0 ac |
| FW10 | Forested Wetland | - | 0.05 ac |
| FW11 | Forested Wetland | - | 0.51 ac |
| Forested Wetlands Total: | | - | 7.31 ac |
| | EMER | GENT WETLANDS | |
| EW1 | Emergent Wetland | - | 0 ac |
| EW2 | Emergent Wetland | - | 0 ac |
| EW3 | Emergent Wetland | - | 0 ac |
| EW4 | Emergent Wetland | - | 0 ac |
| EW5 | Emergent Wetland | - | 0.71 ac |
| EW6 | Emergent Wetland | - | 0.6 ac |
| EW7 | Emergent Wetland | - | 0.23 ac |
| Emerge | ent Wetlands Total: | - | 1.54 ac |

The project has been designed in a way to avoid impacts to the remaining likely jurisdictional aquatic resources. Impacts maps and plan and profile views of the impact area are attached (Attachment D) for your review. Portions of the 48-inch diameter water line will be constructed utilizing the open-cut trench method. Some aquatic resources will be avoided by boring. The impacts maps provide details regarding boring locations. It is anticipated that compensatory mitigation for the impacts to the jurisdictional aquatic resources will be accomplished by purchasing the appropriate number of credits from an approved mitigation bank. Following completion of construction activities, impacted wetlands will be restored to preconstruction contours and conditions. Emergent wetlands that will be impacted by the project will continue to function as emergent wetlands following completion of construction activities. Forested wetlands that will be impacted by the project will function as emergent wetlands following completion of construction activities; however, they will no longer be considered forested wetlands based on tree clearing being required for construction activities. Based on this, the Applicant is proposing to mitigate for the loss of function from a conversion from forested wetlands to emergent wetlands. For construction activities in wetlands, the top 6 to 12 inches of the trench will be sidecast and replaced upon completion of the installation of the water line. The trench will not be backfilled in a manner as to drain Waters of the U.S. Heavy equipment working in wetlands will be placed on mats, or other measures will be taken to minimize soil disturbance. The proposed mitigation methods are detailed in the attached mitigation plan (Attachment E). Kimley-Horn performed the TXRAM functional assessment for the impacted stream and has attached the data forms for your reference (Attachment E).

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Applicant:

Ms. Kara Byrnes, P.E. Project Manager North Texas Municipal Water District 501 E. Brown Street Wylie, Texas 75098 469-626-4732 kbyrnes@ntmwd.com

Threatened and Endangered Species:

Kimley-Horn personnel performed an evaluation of the potential for the proposed project to impact federally listed threatened and/or endangered species listed by the U.S. Fish and Wildlife Service (USFWS). According to the USFWS' Information for Planning and Conservation (IPaC) online system (<u>https://ecos.fws.gov/ipac/</u> (December 2018), four species are listed as potentially occurring within Collin County, Texas. These species include the Least Tern (*Sterna antillarum*), the Piping Plover (*Charadrius melodus*), the Red Knot (*Calidris canutus rufa*), and the Whooping Crane (*Grus americana*). According to the USFWS, the Piping Plover and Red Knot should only be considered in the effects analysis for wind energy projects. Given that the proposed project is not a wind energy project, these two species are dismissed from evaluation. The species list provided by the USFWS IPaC online system is attached for your reference (Attachment F).

The Least Tern requires habitat consisting of sparsely-vegetated sand and gravel bars within braided streams and rivers. The species has been known to nest on man-made structures. There is no designated critical habitat for the Least Tern in the vicinity of the site. This species or suitable habitat were not observed at the site; therefore, the project would have no effect on the Least Tern.

The Whooping Crane breeds, migrates, winters, and forages in a variety of wetland or other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows, rivers, and agricultural fields. There is no designated critical habitat for the Whooping Crane in the vicinity of the site. This species or suitable habitat were not observed at the site; therefore, the project would have no effect on the Whooping Crane.

This proposed project would have no effect on federally listed threatened and/or endangered species.

Cultural Resources:

A review of the Texas Historic Commission (THC) Atlas Map (<u>http://atlas.thc.state.tx.us/shell-couty.htm</u>) revealed no markers or historic sites within the vicinity of the study area. A reproduction of the THC Historic Sites Atlas Map is attached (Attachment G) for your reference. Kimley-Horn attended a pre-application meeting with the USACE on June 15, 2018. At this meeting, Mr. Jimmy Barrera, USACE archeologist informed Kimley-Horn that the USACE would be requiring a cultural resources survey to include pedestrian survey, shovel testing, and backhoe trenching. In accordance with the Antiquities Code of Texas, the Applicant consulted with the THC and requested a project review. The THC responded stating that a cultural resources survey would be required. Kimley-Horn retained Stone Point Services, LLC to prepare a cultural resources survey scope and obtain an Antiquities Permit. An

Antiquities Permit was obtained, and the scope was approved; however, the cultural resources survey has not been initiated. Once the survey is performed, Kimley-Horn will provide the cultural resources survey report to the USACE archeologist for review and approval.

If a discovery of cultural resources is made during construction, work will stop in the immediate area and the appropriate contact at the Fort Worth District of the U.S. Army Corps of Engineers (USACE) will be contacted. Construction documents will include directions for the construction contractor to stop work in the area and contact the Fort Worth District USACE if cultural resources are discovered during construction activities.

An executed Agent Authorization Form is attached authorizing Kimley-Horn as the agent for the Applicant (Attachment H). Please contact Carland Holstead by telephone at 469-914-8717 or by email to <u>carland.holstead@kimley-horn.com</u> if you have questions or need additional information.

Sincerely,

Carland J. Halstead

Project Manager Carland G. Holstead, PWS

| Attachments: | Attachment A: | Appendix 1 for Regulatory Guidance Letter 16-01 and a PJD Form |
|--------------|---------------|--|
| | Attachment B: | NWP 12 PCN Form |
| | Attachment C: | Aquatic Resources Delineation Report |
| | Attachment D: | Impacts Maps and Plans |
| | Attachment E: | Mitigation Plan |
| | Attachment F: | USFWS IPaC Species List |
| | Attachment G: | THC Historic Sites Atlas Map |
| | Attachment H: | Agent Authorization |

Attachment A

REGULATORY GUIDENCE LETTER 16-01 AND PJD FORM

Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD) USACE FORT WORTH DISTRICT REGULATORY DIVISION

| • | I am requesting a JD on property located at: From Kreymer Lane in Wylie to County Road 484 in Lavon |
|---|---|
| | (Street Address) |
| | City/Township/Parish: Wylie and Lavon County: Collin State: Texas |
| | Acreage of Parcel/Review Area for JD: <u>~40 acres</u> |
| | Section: <u>n/a</u> Township: <u>n/a</u> Range: <u>n/a</u> |
| | Latitude (decimal degrees): <u>33.008759° N</u> Longitude (decimal degrees): <u>-96.478824° W</u> |
| | (For linear projects, please include the center point of the proposed alignment.) |
| • | Please attach a survey/plat map and vicinity map identifying location and review area for the JD. |
| • | I currently own this property. I plan to purchase this property. |
| | I am an agent/consultant acting on behalf of the requestor. |
| | Other (please explain): |
| • | Reason for request: (check as many as applicable) |
| | I intend to construct/develop a project or perform activities on this parcel which would be designed to |
| | avoid all aquatic resources. |
| | I intend to construct/develop a project or perform activities on this parcel which would be designed to |
| | avoid all jurisdictional aquatic resources under Corps authority. |
| | I intend to construct/develop a project or perform activities on this parcel which may require |
| | authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional |
| | aquatic resources and as an initial step in a future permitting process. |
| | ✓ I intend to construct/develop a project or perform activities on this parcel which may require authorization from |
| | the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process. |
| | I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is |
| | included on the district Section 10 list and/or is subject to the ebb and flow of the tide. |
| | A Corps JD is required in order to obtain my local/state authorization. |
| | I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that |
| | jurisdiction does/does not exist over the aquatic resource on the parcel. |
| | I believe that the site may be comprised entirely of dry land. |
| | Other: |
| • | Type of determination being requested: |
| | I am requesting an approved JD. |
| | ✓ I am requesting a preliminary JD. |
| | I am requesting a "no permit required" letter as I believe my proposed activity is not regulated. |
| | I am unclear as to which JD I would like to request and require additional information to inform my decision. |
| | |

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature: ____

To:

Carland J. Halsteac

Date: 01/17/2019

Typed or printed name: Carland G. Holstead, PWS

Company name: Kimley-Horn and Associates LLC

Address: 13455 Noel Road, Two Galleria Office Tower, Suite 700

Dallas, TX 75240

Daytime phone no.: 469-914-8717

Email address: carland.holstead@kimley-horn.com

*Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.

| Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project |
|---|
| area subject to federal jurisdiction under the regulatory authorities referenced above. |

| Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be |
|--|
| made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in |
| the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website. |
| Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be |
| issued. |

ATTACHMENT

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Ms. Kara Byrnes, P.E. Project Manager North Texas Municipal Water District 501 E. Brown Street Wylie, Texas 75098 469-626-4732 kbyrnes@ntmwd.com

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

Fort Worth District, Wylie-Rockwall-Farmersville 48-Inch Pipeline, SWF-2018-00201

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:

The proposed project includes the construction of approximately 20,000 linear feet of 48-inch diameter ware line between Kreymer Lane in Wylie and County Road 484 in Lavon, Collin County, Texas. The purpose of the project is to replace an aging 36-inch diameter water line that is undersized and not adequately pressure rated for future planned use. The proposed 48-inch diameter water line will be owned and maintained by the NTMWD and will serve as a transmission line for Wylie, Rockwall, Farmersville, and other communities located in the eastern portion of the Dallas-Fort Worth Metroplex. Additional aspects of the project will include installing necessary valves, appurtenances and connections to existing water infrastructure.

To facilitate the development of the site, impacts to Waters of the U.S. are proposed. The project has been designed in a way to avoid impacts to some likely jurisdictional aquatic resources.

(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: TX County/parish/borough: Collin County City: Wylie and Lavon

Center coordinates of site (lat/long in degree decimal format): Lat. 33.008759° N, Long. -96.478824° W.

Universal Transverse Mercator: NAD83

Name of nearest waterbody: East Fork Trinity River and Pilot Grove Creek

Identify (estimate) amount of waters in the review area: Non-wetland waters:

| ID | Feature Type | Linear Feet | OHWM | Acres | | | |
|-----|---------------------|-------------|--------------|-----------|--|--|--|
| | STREAMS | | | | | | |
| S1 | S1 Ephemeral Stream | | ~2 ft | ~0.02 ac | | | |
| S2 | Intermittent Stream | ~4,260 lf | ~4 ft | ~0.42 ac | | | |
| S3 | Intermittent Stream | ~180 lf | ~ 1 ft | ~0.01 ac | | | |
| S4 | Perennial Stream | ~1,270 lf | ~7 to 30 ft | ~0.49 ac | | | |
| S5 | Perennial Stream | ~845 lf | ~14 to 25 ft | ~0.31 ac | | | |
| S6 | Perennial Stream | ~3,380 lf | ~65 to 75 ft | ~5.15 ac | | | |
| S7 | Perennial Stream | ~1,880 lf | ~28 to 30 ft | ~1.06 ac | | | |
| S8 | Perennial Stream | ~415 lf | ~20 to 25 ft | ~0.16 ac | | | |
| S9 | Ephemeral Stream | ~80 lf | ~ 1 ft | ~0.002 ac | | | |
| | Stream Total | ~12,790 lf | n/a | ~7.62 ac | | | |
| | OPEN V | VATERS | | | | | |
| OW1 | Open Water | n/a | n/a | ~0.23 ac | | | |
| OW2 | Open Water | n/a | n/a | ~0.54 ac | | | |
| OW3 | Open Water | n/a | n/a | ~0.59 ac | | | |
| OW4 | Open Water | n/a | n/a | ~0.10 ac | | | |
| OW5 | Open Water | n/a | n/a | ~7.06 ac | | | |
| OW6 | Open Water | n/a | n/a | ~2.05 ac | | | |
| OW7 | Open Water | n/a | n/a | ~0.60 ac | | | |
| OW8 | Open Water | n/a | n/a | ~0.09 ac | | | |
| OW9 | Open Water | n/a | n/a | ~0.13 ac | | | |
| | Open Waters Total | n/a | n/a | ~11.39 ac | | | |

Wetland waters:

| ID | Feature Type | Linear Feet | OHWM | Acres | | |
|-------------------|------------------------|-------------|------|-----------|--|--|
| FORESTED WETLANDS | | | | | | |
| FW1 | Forested Wetland | n/a | n/a | ~5.54 ac | | |
| FW2 | Forested Wetland | n/a | n/a | ~3.14 ac | | |
| FW3 | Forested Wetland | n/a | n/a | ~5.46 ac | | |
| FW4 | Forested Wetland | n/a | n/a | ~14.38 ac | | |
| FW5 | Forested Wetland | n/a | n/a | ~1.29 ac | | |
| FW6 | FW6 Forested Wetland | | n/a | ~4.08 ac | | |
| FW7 | Forested Wetland | n/a | n/a | ~3.21 ac | | |
| FW8 | W8 Forested Wetland | | n/a | ~13.23 ac | | |
| FW9 | V9 Forested Wetland | | n/a | ~15.41 ac | | |
| FW10 | Forested Wetland | n/a | n/a | ~0.07 ac | | |
| FW11 | Forested Wetland | n/a | n/a | ~1.27 ac | | |
| Fo | prested Wetlands Total | n/a | n/a | ~67.08 ac | | |
| EMERGENT WETLANDS | | | | | | |
| EW1 | Emergent Wetland | n/a | n/a | ~1.45 ac | | |
| EW2 | W2 Emergent Wetland | | n/a | ~1.63 ac | | |
| EW3 | /3 Emergent Wetland | | n/a | ~3.96 ac | | |
| EW4 | V4 Emergent Wetland | | n/a | ~16.94 ac | | |
| EW5 | EW5 Emergent Wetland | | n/a | ~20.13 ac | | |
| EW6 | EW6 Emergent Wetland | | n/a | ~4.86 ac | | |

| | EW7 | Emergent Wetland | n/a | n/a | ~0.62 ac |
|-------------------------|-----|------------------|-----|-----|-----------|
| Emergent Wetlands Total | | | n/a | n/a | ~49.59 ac |

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal:

Non-Tidal:

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date: Field Determination. Date(s):

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether

the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

D-1-SUPPO

| JPPORTING DATA. Data reviewed for preliminary JD (check all that apply | | | | | |
|---|--|--|--|--|--|
| - checked items should be included in case file and, where checked and | | | | | |
| requested, appropriately reference sources below): | | | | | |
| \boxtimes Maps, plans, plots or plat submitted by or on behalf of the | | | | | |
| applicant/consultant: Vicinity Map, USGS Topographic Map, NWI map, Soil | | | | | |
| Survey Map, Aerial photos (multiple years). | | | | | |
| Data sheets prepared/submitted by or on behalf of the applicant/consultant. | | | | | |
| Office concurs with data sheets/delineation report. | | | | | |
| Office does not concur with data sheets/delineation report. | | | | | |
| Data sheets prepared by the Corps: | | | | | |
| Corps navigable waters' study: | | | | | |
| U.S. Geological Survey Hydrologic Atlas: | | | | | |
| USGS NHD data. | | | | | |
| USGS 8 and 12 digit HUC maps. | | | | | |
| U.S. Geological Survey map(s). Cite scale & quad name: | | | | | |
| USDA Natural Resources Conservation Service Soil Survey. Citation: | | | | | |
| Web soil survey. | | | | | |
| National wetlands inventory map(s). Cite name: USFWS NWI: East Fork | | | | | |
| Trinity Watershed (HUC 12030106) Data | | | | | |
| State/Local wetland inventory map(s): | | | | | |
| ☑ FEMA/FIRM maps: 448085C0440J (effective 6/2/2009) | | | | | |
| 100-year Floodplain Elevation is: (National Geodectic Vertical Datum | | | | | |
| of 1929) | | | | | |
| 🛛 Photographs: 🖂 Aerial (Name & Date): Nearmap 2018, TNRIS - NAIP | | | | | |
| 2015 and 2004, TNRIS - TOP 1996 | | | | | |
| or 🛛 Other (Name & Date): Site Photographs 5/14/18, 5/16/18, | | | | | |
| 11/16/18, and 12/12/18 | | | | | |
| Previous determination(s). File no. and date of response letter: | | | | | |
| Other information (please specify): | | | | | |
| | | | | | |

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Authorized Agent

Carland S. Halsteach

Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

Signature and date of Regulatory Project Manager (REQUIRED)

| Site number | Latitude | Longitude | Cowardin Class | Estimated amount of aquatic resource in review area | Class of aquatic resource |
|----------------|----------|-----------|---------------------------|--|---------------------------------|
| S1 | 33.0161 | -96.5085 | Riverine, Ephemeral | 480 linear feet (0.02 acre) | Section 404- nontidal |
| S2 | 33.0152 | -96.5038 | Riverine, Intermittent | 4,260 linear feet (0.42 acre) | Section 404- nontidal |
| S3 | 33.0152 | -96.5037 | Riverine, Intermittent | 180 linear feet (0.01 acre) | Section 404- nontidal |
| S4 | 33.0112 | -96.4878 | Riverine, Perennial | 1,270 linear feet (0.49 acre) | Section 404- nontidal |
| S5 | 33.011 | -96.4868 | Riverine, Perennial | 845 linear feet (0.31 acre) | Section 404- nontidal |
| S6 | 33.0106 | -96.4852 | Riverine, Perennial | 3,380 linear feet (5.15 acres) | Section 404- nontidal |
| S7 | 33.0081 | -96.473 | Riverine, Perennial | 1,880 linear feet (1.06 acres) | Section 404- nontidal |
| S8 | 33.0076 | -96.4577 | Riverine, Perennial | 415 linear feet (0.16 acre) | Section 404- nontidal |
| S9 | 33.0075 | -96.458 | Riverine, Ephemeral | 80 linear feet (0.002 acre) | Section 404- nontidal |
| OW1 | 33.0117 | -96.4991 | Lacustrine, Open Water | 0.23 acre | Section 404- nontidal |
| OW2 | 33.0124 | -96.4934 | Lacustrine, Open Water | 0.54 acre | Section 404- nontidal |
| OW3 | 33.0114 | -96.4914 | Lacustrine, Open Water | 0.59 acre | Section 404- nontidal |
| OW4 | 33.0104 | -96.4886 | Lacustrine, Open Water | 0.10 acre | Section 404- nontidal |
| OW5 | 33.0086 | -96.4777 | Lacustrine, Open Water | 7.06 acres | Section 404- nontidal |

Table 1: Summary of Observed waters of the U.S. on the Project Area

| OW6 | 33.0086 | -96.47 | Lacustrine, | 2.05 acres | Section 404- |
|------|---------|----------|-------------|-------------|--------------|
| | | | Open Water | | nontidal |
| OW7 | 33.0079 | -96.4577 | Lacustrine, | 0.60 acre | Section 404- |
| | | | Open Water | | nontidal |
| OW8 | 33.0072 | -96.4539 | Lacustrine, | 0.09 acre | Section 404- |
| | | | Open Water | | nontidal |
| OW9 | 33.0071 | -96.4534 | Lacustrine, | 0.13 acre | Section 404- |
| | | | Open Water | | nontidal |
| FW1 | 33.0115 | -96.4887 | Riparian, | 5.54 acres | Section 404- |
| | | | Forested | | nontidal |
| FW2 | 33.0112 | -96.4874 | Riparian, | 3.14 acres | Section 404- |
| | | | Forested | | nontidal |
| FW3 | 33.0109 | -96.4861 | Riparian, | 5.46 acres | Section 404- |
| | | | Forested | | nontidal |
| FW4 | 33.01 | -96.4824 | Riparian, | 14.38 acres | Section 404- |
| | | | Forested | | nontidal |
| FW5 | 33.011 | -96.483 | Riparian, | 1.29 acres | Section 404- |
| | | | Forested | | nontidal |
| FW6 | 33.0093 | -96.4803 | Riparian, | 4.08 acres | Section 404- |
| | | | Forested | | nontidal |
| FW7 | 33.0083 | -96.4759 | Riparian, | 3.21 acres | Section 404- |
| | | | Forested | | nontidal |
| FW8 | 33.0081 | -96.4721 | Riparian, | 13.23 acres | Section 404- |
| | | | Forested | | nontidal |
| FW9 | 33.007 | -96.4692 | Riparian, | 15.41 acres | Section 404- |
| | | | Forested | | nontidal |
| FW10 | 33.0076 | -96.4589 | Riparian, | 0.07 acre | Section 404- |
| | | | Forested | | nontidal |
| FW11 | 33.0075 | -96.4566 | Riparian, | 1.27 acres | Section 404- |
| | | | Forested | | nontidal |
| EW1 | 33.0106 | -96.4885 | Riparian, | 1.45 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW2 | 33.0104 | -96.4875 | Riparian, | 1.63 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW3 | 33.0099 | -96.4861 | Riparian, | 3.96 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW4 | 33.0087 | -96.4804 | Riparian, | 16.94 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW5 | 33.0079 | -96.4686 | Riparian, | 20.13 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW6 | 33.0088 | -96.4712 | Riparian, | 4.86 acres | Section 404- |
| | | | Emergent | | nontidal |
| EW7 | 33.0076 | -96.4582 | Riparian, | 0.62 acre | Section 404- |
| | | | Emergent | | nontidal |

Attachment B

NWP 12 PCN FORM

U.S. Army Corps of Engineers (USACE) Fort Worth District



Nationwide Permit (NWP) Pre-Construction Notification (PCN) Form

This form integrates requirements of the Nationwide Permit Program within the Fort Worth District, including General and Regional Conditions. Please consult instructions included at the end prior to completing this form.

Contents

- Description of NWP 12
- Part I: NWP Conditions and Requirements Checklist
 - General Conditions Checklist
 - NWP 12-Specific Requirements Checklist
 - Regional Conditions Checklist
- Part II: Project Information Form
- Part III: Project Impacts and Mitigation Form
- Part IV: Attachments Form
- Instructions

DESCRIPTION OF NWP 12 – UTILITY LINE ACTIVITIES

Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States (U.S.), provided the activity does not result in the loss of greater than 1/2-acre of waters of the U.S for each single and complete project.

Utility lines: This NWP authorizes the construction, maintenance, or repair of utility lines, including outfall and intake structures, into waters of the U.S., provided there is no change in pre-construction contours. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and internet, radio and television communication. The term "utility line" does not include activities that drain a water of the U.S., such as drainage tile or french drains, but it does apply to pipes conveying drainage from another area.

Material resulting from trench excavation may be temporarily sidecast into waters of the U.S. for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a french drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.

Utility line substations: This NWP authorizes the construction, maintenance, or expansion of substation facilities associated with a power line or utility line in non-tidal waters of the U.S., provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1/2-acre of waters of the U.S. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters of the U.S. to construct, maintain, or expand substation facilities.

Foundations for overhead utility line towers, poles, and anchors: This NWP authorizes the construction or maintenance of foundations for overhead utility line towers, poles, and

anchors in all waters of the U.S., provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible.

Access roads: This NWP authorizes the construction of access roads for the construction and maintenance of utility lines, including overhead power lines and utility line substations, in non-tidal waters of the U.S., provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1/2-acre of non-tidal waters of the U.S. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary. Access roads must be constructed so that the length of the road minimizes any adverse effects on waters of the U.S. and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the U.S. must be properly bridged or culverted to maintain surface flows.

This NWP may authorize utility lines in or affecting navigable waters of the U.S. even if there is no associated discharge of dredged or fill material (See 33 CFR part 322). Overhead utility lines constructed over section 10 waters and utility lines that are routed in or under section 10 waters without a discharge of dredged or fill material require a section 10 permit.

This NWP authorizes, to the extent that Department of the Army authorization is required, temporary structures, fills, and work necessary for the remediation of inadvertent returns of drilling fluids to waters of the United States through sub-soil fissures or fractures that might occur during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines. These remediation activities must be done as soon as practicable, to restore the affected waterbody. District engineers may add special conditions to this NWP to require a remediation plan for addressing inadvertent returns of drilling fluids to waters of the United States during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the utility line activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After construction, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if any of the following criteria are met: (1) the activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials. (See general condition 32.) (Authorities: Sections 10 and 404)

Part I: NWP Conditions and Requirements Checklist

To ensure compliance with the General Conditions (GC), in order for an authorization by a NWP to be valid, please answer the following questions:

- 1. Navigation (Applies to Section 10 waters [i.e. navigable waters of the U.S.], see instruction 4 for link to list):

 - b. Does the project require the installation and maintenance of any safety lights and signals prescribed by the U.S. Coast Guard on authorized facilities in navigable waters of the U.S.?
 ☐ Yes
 ☐ No
 N/A
 - **c.** Does the Applicant understand and agree that if future operations by the U.S. require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the Applicant will be required, upon due notice from the USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S.; and no claim shall be made against the U.S. on account of any such removal or alteration?

☐ Yes ☐ No 🖾 N/A

If you answered yes to question a. or b. above, or if you answered no to question c. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

2. Aquatic Life Movements:

- **a.** Does the project substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area? Yes No
- **b.** Is the project's primary purpose to impound water? \Box Yes \boxtimes No
- **c.** Will culverts placed in streams be installed to maintain low flow conditions to sustain the movement of those aquatic species? ☐ Yes ☐ No ⊠ N/A

If you answered yes to question a. or b. above, or if you answered no to question c. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

3. Spawning Areas:

- a. Does the project avoid spawning areas during the spawning season to the maximum extent practicable? ☐ Yes ☐ No 🖾 N/A
- b. Does the project result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area?
 Yes No N/A

If you answered no to question a. above, or if you answered yes to question b. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

4. Migratory Bird Breeding Areas:

a. Does the project avoid waters of the U.S. that serve as breeding areas for migratory birds to the maximum extent practicable? ⊠ Yes □ No □ N/A

If you answered no to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

5. Shellfish Beds:

a. Does the project occur in areas of concentrated shellfish populations? \Box Yes \boxtimes No

If you answered yes to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

6. Suitable Material:

- a. Does the project use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.)? □ Yes ⊠ No
- **b.** Is the material used for construction or discharged in a water of the U.S. free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act)? Yes No

If you answered yes to question a. above, or if you answered no to question b. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

7. Water Supply Intakes:

a. Does the project occur in the proximity of a public water supply intake? \Box Yes \boxtimes No

If you answered yes to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

8. Adverse Effects From Impoundments:

- **a.** Does the project create an impoundment of water? \Box Yes \boxtimes No
- b. If you answered yes to question a. above, are the adverse effects (to the aquatic system due to accelerating the passage of water, and/or restricting its flow) minimized to the maximum extent practicable? ☐ Yes ☐ No ☑ N/A

If you answered no to question b. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

9. Management of Water Flows:

- **a.** Does the project maintain the pre-construction course, condition, capacity, and location of open waters to the maximum extent practicable, for each activity, including stream channelization and storm water management activities? ⊠ Yes □ No
- **b.** Will the project be constructed to withstand expected high flows? \square Yes \square No
- **c.** Will the project restrict or impede the passage of normal or high flows? \Box Yes \Box No

If you answered no to question a. or b. above, or if you answered yes to question c. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

10. Fills Within 100-Year Floodplains:

a. Does the project comply with applicable FEMA-approved state or local floodplain management requirements? X Yes No N/A

If you answered no to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

11. Equipment:

a. Will heavy equipment working in wetlands or mudflats be placed on mats, or other measures be taken to minimize soil disturbance? X Yes No N/A

If you answered no to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

12. Soil Erosion and Sediment Controls:

- **a.** Will the project use appropriate soil erosion and sediment controls and maintain them in effective operating condition throughout construction? Yes No
- **b.** Will all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, be permanently stabilized at the earliest practicable date? 🛛 Yes 🗌 No
- **c.** Be aware that if work will be conducted within waters of the U.S., Applicants are encouraged to perform that work during periods of low-flow or no-flow.

If you answered no to question a. or b. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

13. Removal of Temporary Fills:

- a. Will temporary fills be removed in their entirety and the affected areas returned to preconstruction elevations? X Yes No N/A
- **b.** Will the affected areas be revegetated, as appropriate? \square Yes \square No \square N/A

If you answered no to question a. or b. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

14. Proper Maintenance:

a. Will any authorized structure or fill be properly maintained, including maintenance to ensure public safety? 🖂 Yes 🗌 No

If you answered no to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

15. Single and Complete Project:

a. Does the Applicant certify that the project is a "single and complete project" as defined below? ⊠ Yes □ No

Single and complete project:

<u>Single and complete linear project</u>: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

<u>Single and complete non-linear project</u>: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Independent utility: Defined as a test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

16. Wild and Scenic River:

There are no Wild and Scenic Rivers within the geographic boundaries of the Fort Worth District. Therefore, this GC does not apply.

17. Tribal Rights:

a. Will the project or its operation impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights? Yes No X/A

If you answered yes to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

18. Endangered Species (see also Box 8 in Part III):

- **a.** Is the project likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or will the project directly or indirectly destroy or adversely modify the critical habitat of such species? Yes No
- **b.** Might the project affect any listed species or designated critical habitat? \Box Yes \Box No
- **d.** If the project "may affect" a listed species or critical habitat, has Section 7 consultation addressing the effects of the proposed activity been completed?

If you answered yes to question a. or b. or c. above, or if you answered no to question d. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application:

19. Migratory Birds and Bald and Golden Eagles:

If you answered yes to question a. above, you are responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to obtain any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act.

20. Historic Properties (see also Box 9 in Part III):

a. Does the project have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National <u>Register of Historic Places</u>, including previously unidentified properties?

 If you answered yes to question a. above, please explain how the project would be in compliance with this GC or be aware that the project would require an individual permit application: Cultural Resources Survey will be performed as required by the USACE and Texas Historical Commission.

21. Discovery of Previously Unknown Remains and Artifacts:

If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, *you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed*. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters:

a. Will the project impact critical resource waters, which include NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment? □Yes ⊠ No

If you answered yes to question a. above, be aware that discharges of dredged or fill material into waters of the U.S. are not authorized by NWP 12 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

23. Mitigation (see also Box 10 in Part III):

a. Will the project include appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal? 🖂 Yes 🗌 No

If you answered no to question a. above, please include an explanation in Box 10 of why no mitigation would be necessary in order to be in compliance with this GC or be aware that the project would require an individual permit application.

24. Safety of Impoundment Structures:

a. Has the impoundment structure been safely designed to comply with established state dam safety criteria or has it been designed by qualified persons? ☐ Yes ☐ No ⊠ N/A

If you answered yes to question a. above, non-federal applicants may be required to provide documentation that the design has been independently reviewed by similarly qualified persons with appropriate modifications to ensure safety. If you answered no, please include an explanation in Box 10 of why the structure is exempt from state dam safety criteria or be aware that the project may require an individual permit application.

25. Water Quality (see also Box 11 in Part III):

- **b.** If in "Indian Country," does the project comply with the conditions of the EPA water quality certification for NWPs? Yes No X/A
- **c.** If in Louisiana, does the project comply with the conditions of the LADEQ water quality certification for NWP 12? \Box Yes \Box No \boxtimes N/A

If you answered no to question a. or b. above, please be aware that the project would require an individual permit application.

26. Coastal Zone Management:

The Fort Worth District does not cover any Coastal Zone; therefore, this GC does not apply.

27. Regional and Case-By-Case Conditions:

See the Regional Conditions checklist to ensure compliance with this GC.

28. Use of Multiple Nationwide Permits:

- **a.** Does the project use more than one NWP for a single and complete project? \Box Yes \boxtimes No
- **b.** If you answered yes to question a. above, be aware that unless the project's acreage loss of waters of the U.S. authorized by the NWPs is below the acreage limit of the NWP with the highest specified acreage limit, no NWP can be issued and the project would require an individual permit application.

If you answered yes to question a. above, please explain how the project would be in compliance with this GC and what additional NWP number you intend to use:

29. Transfer of Nationwide Permit Verifications:

a. Does the Applicant agree that if he or she sells the property associated with the nationwide permit verification, the Applicant may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate USACE district office to validate the transfer?
 ∑ Yes

30. Compliance Certification:

a. Does the Applicant agree that if he or she receives the NWP verification from the USACE, they must submit a signed certification regarding the completed work and any required mitigation (the certification form will be sent by the USACE with the NWP verification letter)?
 Xes

31. Activities Affecting Structure or Works Built by the United States

a. Does the project temporarily or permanently alter and/or occupy a USACE federally authorized Civil Works project? ☐ Yes ☐ No

If you answered yes to question a. above, notification is required in accordance with general condition 32, for any activity that requires permission from the Corps. The district engineer may authorize activities under these NWPs only after a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

32. Pre-Construction Notification:

- **a.** Reason for notification:
 - \boxtimes Mechanized land clearing in a forested wetland.
 - Require a Section 10 permit.
 - Utility line exceeds 500 feet in waters of the U.S., excluding overhead lines.
 - Utility line is within a jurisdictional area (i.e., water of the U.S.), and the utility line runs parallel to or along a stream bed that is within that jurisdictional area.
 - \boxtimes The loss of waters of the U.S. exceeds 1/10 acre.
 - Permanent access roads are constructed above grade in waters of the U.S. for a distance of more than 500 feet.
 - Permanent access roads are constructed in waters of the U.S. with impervious materials.
 - Potential endangered species.
 - Potential historic properties.
 - Discharge into pitcher plant bog or bald cypress-tupelo swamp.

Discharge into the area of Caddo Lake within Texas that is designated as a "Wetland of International Importance" under the Ramsar Convention.

- Work that would result in the modification or alteration of any completed Corps of Engineers projects that are either locally or federally maintained or if work would occur within the conservation pool or flowage easement of any Corps of Engineers lake project.
 - Required by Louisiana Regional Conditions.
 - Other:
- **b.** Does the Applicant agree that he or she will not begin the project until either:

1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. \boxtimes Yes \square No

c. Does the Applicant agree that if the district or division engineer notifies the Applicant in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the Applicant cannot begin the activity until an individual permit has been obtained? ∑ Yes □ No

To ensure compliance with the NWP 12-specific requirements please answer the first question regarding all utility line activities and then answer the other questions as they apply to your project.

All utility line activities:

1. Does the project cause the loss of greater than 1/2-acre non-tidal waters of the U.S. at any crossing considered a single and complete project? □ Yes ⊠ No

If you answered yes to question 1. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application or the use of regional general permit CESWF-05-RGP-2 (see USACE Fort Worth District website for information on conditions and requirements).

2. Does each activity/crossing considered a single and complete project have independent utility? ∑ Yes □ No □ N/A

If you answered no to question 2. above, be aware that the project may require an individual permit application.

3. a. Will any temporary structures, fills, and work necessary to construct the project meet the criteria for maintaining flows, minimizing flooding, and withstanding high flows? ∑ Yes □ No □ N/A

| \sim | 1.00 | | | | | | | | | | | | | |
|--------|--------|--------------|--------------|-----------|-----|------------|------|---------|----------|-----|-----|----------|-------|----|
| b. | Will | temporary | structures | and fills | be | removed | in | their | entirety | and | the | affected | areas | be |
| rel | turned | d to pre-cor | nstruction e | levations | and | d revegeta | itec | l, as a | ppropria | te? | | | | |
| Х | Yes | 🗌 No | 🗌 N/A | | | | | | | | | | | |

If you answered no to question a. or b. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application.

Utility lines:

4. Does the project involve a change in pre-construction contours? \Box Yes \boxtimes No

If you answered yes to question 4. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

If you answered yes to question 5. above, be aware that the project is not considered a "utility line" and would not be authorized by a NWP 12 and may require an individual permit application. Note: Pipes that convey drainage from another area are considered a "utility line."

6. a. Does the project involve leaving sidecasts from trench excavation in waters of the U.S. for more than three months? ☐ Yes ⊠ No

b. Does the project involve placing sidecasts from trench excavation in waters of the U.S. in such a manner that the sidecasts are dispersed by current or other forces? Yes No

If you answered yes to question a. above, be aware that the district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate, and otherwise an individual permit application may be required. If you answered yes to question b. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

7. In wetlands, does the project involve backfilling the top 6 to 12 inches of the trench with topsoil from the trench? ∑ Yes □ No □ N/A

If you answered no to question 7. above, please explain how the project would be in compliance with this requirement and be aware that the project may not be authorized by a NWP 12 and may require an individual permit application:

B. Does the project involve constructing or backfilling a trench in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a french drain effect?
 ☐ Yes ∑ No

If you answered yes to question 8. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

9. Will the project, upon completion of the utility line crossing of each waterbody, immediately stabilize exposed slopes and stream banks? ⊠ Yes □ No □ N/A

If you answered no to question 9. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

10. Does the project involve pipes or pipelines that will be used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the U.S.? Yes No X/A

If you answered yes to question 10. above, be aware that these pipes or pipelines are considered to be bridges, not utility lines, and may require a permit from the U.S. Coast Guard pursuant to Section 9 of the Rivers and Harbors Act of 1899. However, any discharges of dredged or fill material into waters of the U.S. associated with such pipes or pipelines will require a Section 404 permit (see NWP 15).

Utility line substations:

If you answered yes to question 11. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

Foundations for overhead utility line towers, poles, and anchors:

12. If the project includes construction or maintenance of foundations for overhead utility line towers, poles, and/or anchors in waters of the U.S., are these the minimum size necessary and are separate footings for each tower leg (rather than a larger single pad) used where feasible?
 ☐ Yes ☐ No ○ N/A

If you answered no to question 12. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

Access Road(s):

- **13.** Will the access road(s) be used for the construction and maintenance of utility lines, including overhead power lines and utility line substations, and, for a single and complete project, cause the loss of no greater than 1/2-acre of non-tidal waters of the U.S.? ⊠ Yes □ No □ N/A If you answered no to question 13. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

If you answered yes to question 14. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

15. a. Will the access road(s) in waters of the U.S. be the minimum width necessary? Yes No
b. Will the access road be constructed so that the length of the road minimizes any adverse effects on waters of the U.S.? Yes No

If you answered no to question a. or b. above, be aware that the project would not be authorized by a NWP 12 and may require an individual permit application.

16. a. Will the access road(s) be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy road or geotextile/gravel road) so as to minimize any adverse effects on waters of the U.S.? Xes No **b.** Will access roads constructed above pre-construction contours and elevations in waters of the U.S. be properly bridged or culverted to maintain surface flows? Xes No

If you answered no to question a. or b. above, be aware that the project may not be authorized by a NWP 12 and may require an individual permit application.

17. Will access roads used solely for construction of the utility line be removed upon completion of the work, in accordance with the requirement for temporary fills? X Yes No

If you answered no to question 17. above, be aware that the project may not be authorized by a NWP 12 and may require an individual permit application.

REGIONAL CONDITIONS CHECKLIST

To ensure compliance with the Regional Conditions within the Fort Worth District, in the State of Texas, in order for an authorization by a NWP to be valid, please answer the following questions (for projects in Texas only):

1. Does the project involve a discharge into habitat types that are wetlands (typically referred to as pitcher plant bogs) that are characterized by an organic surface soil layer and include vegetation such as pitcher plants (*Sarracenia* sp.), sundews (*Drosera* sp.), and sphagnum moss (*Sphagnum* sp.) or wetlands (typically referred to as bald cypress-tupelo swamps) comprised predominantly of bald cypress trees (*Taxodium distichum*), and/or water tupelo (*Nyssa aquatica*)? ☐ Yes X No

If you answered yes to question 1. above, notification of the District Engineer is required in accordance with NWP GC 32, and the USACE will coordinate with other resource agencies as specified in NWP GC 32(d).

2. Will the project include required compensatory mitigation at a minimum one-for-one ratio for all special aquatic sites that exceed 1/10 acre and require pre-construction notification, and for all losses to streams that exceed 300 linear feet and require pre-construction notification (unless the appropriate District Engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement)? ∑ Yes □ No □ N/A

If you answered no to question 2. above, be aware that the project would not be authorized by a NWP and would require an individual permit application.

3. Is the project in the area of Caddo Lake within Texas that is designated as a "Wetland of International Importance" under the Ramsar Convention? ☐ Yes ⊠ No

If you answered yes to question 3. above, notification of the District Engineer is required in accordance with NWP GC 32(d).

4. Would the proposed work involve a discharge of fill material associated with mechanized land clearing of wetlands dominated by native woody shrubs? ☐ Yes ⊠ No

If you answered yes to question 4. above, notification of the District Engineer is required in accordance with NWP GC 32(d).

Note: For the purpose of this regional condition, a shrub dominated wetland is characterized by woody vegetation less than 3.0 inches in diameter at breast height but greater than 3.2 feet in height, which covers 20% or more of the area. Woody vines are not included.

5. Would the proposed work result in the modification or alteration of any completed Corps of Engineers projects that are either locally or federally maintained or if work would occur within the conservation pool or flowage easement of any Corps of Engineers lake project? Yes No

If you answered yes to question 5. above, the applicant shall notify the Fort Worth District Engineer in accordance with NWP GC 32. PCNs are not deemed complete until such a time as the Corps has made a determination relative to 33 USC Section 408, 33 CFR Part 208, Section 208.10, 33 CFR Part 320, Section 320.4.

6. Is there is the risk of transferring invasive plants to or from your project site? \Box Yes \boxtimes No

If you answered yes to question 6. above, information concerning state specific lists of invasive species and threats can be found at: <u>http://www.invasivespeciesinfo.gov/unitedstates/tx.shtml</u>. Best management practices can be found at Information concerning state specific lists and

threats can be found at: <u>http://www.invasivespeciesinfo.gov/unitedstates/tx.shtml</u>. Known zebra mussel waters within can be found at: <u>http://nas.er.usgs.gov/queries/zmbyst.asp</u>.

7. Will the proposed activity involve a temporary discharge of fill material into 1/2 acre or more of emergent wetland OR 1/10 acre or more of scrub0shrub/forested wetland? ⊠ Yes □ No

If you answered yes to question 7. above, notification of the District Engineer is required in accordance with NWP GC 32(d).

8. Would your project meet the scope of work and conditions of NWPs 51 or 52?
Yes No

If you answered yes to question 8. above, the Corps will provide the PCN to the US Fish and Wildlife Service as specified in NWP General Condition 32(d)(2) for its review and comments.

To ensure compliance with the Regional Conditions within the Fort Worth District, in the State of Louisiana, in order for an authorization by a NWP to be valid, please answer the following questions (for projects in Louisiana only):

1. Does the activity cause the permanent loss of greater than 1/2 acre of seasonally inundated cypress swamp and/or cypress-tupelo swamp? Yes No

If you answered yes to question 1. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application.

2. Does the activity cause the permanent loss of greater than 1/2 acre of pine savanna, pine flatwoods, and/or pitcher plant bogs? Yes No

If you answered yes to question 2. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application.

3. Has the activity been determined to have an adverse impact upon a federal or state designated rookery and/or bird sanctuary? Yes No

If you answered yes to question 3. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application.

- 4. While Endangered Species Act Section 7 consultation is no longer required for the Louisiana black bear (which has been delisted due to recovery), permittees are advised that the Louisiana black bear is still protected under State of Louisiana law, and the Louisiana Department of Wildlife and Fisheries (LDWF) will continue to actively manage this subspecies. To learn more about State law requirements for Louisiana black bear protection and habitat conservation, permittees shall contact Maria Davidson (Louisiana Department of Wildlife and Fisheries Large Carnivore Program Manager) at (337) 948-0255.
- 5. Does the project involve instream activities in the following waterways: Abita River and tributaries; Amite River (LA Highway 37 at Grangeville to Port Vincent); Bayou Bartholomew in Morehouse Parish; Bayou Boeuf and Bayou Rapides Tributaries in Rapides Parish: (Bayou Clear, Brown Creek, Burney Branch, Castor Creek, Clear Creek, Haikey's Creek, Little Bayou Clear, Little Brushy Creek, Loving Creek, Little Loving Creek, Long Branch, Mack Branch, Patterson Branch, Valentine Creek, and Williamson Branch), Bayou Rigolette tributaries in Grant Parish (Beaver Creek, Black Creek, Chandler Creek, Clear Branch, Coleman Branch, Cress Creek, Cypress Creek, Glady Hollow, Gray Creek, Hudson Creek, James Branch, Jordon Creek, Moccasin Branch, and Swafford Creek); Bogue Falaya River and Tributaries, Bogue Chitto River and Tributaries, Lake Borgne, Lake Pontchartrain and its tributaries, Lake Saint Catherine, Little Lake, Tchefuncta River, Little Tchefuncta River, the Rigolets and West Pearl River? Yes No

If you answered yes to question 5. above, notification of the District Engineer is required in accordance with NWP GC 32 due to the occurrence of threatened or endangered species.

6. To the best of the applicant's knowledge, is any excavated and/or fill material to be placed within wetlands free of contaminants? Yes No N/A

If you answered no to question 6. above, be aware that the project would not be authorized by a NWP 12 and would require an individual permit application.

- **7.** Regional Condition 7 applies to work within the Louisiana Coastal Zone and/or the Outer Continental Shelf off Louisiana, and therefore does not apply in the USACE Fort Worth District. Work in these areas may require coordination with the USACE Galveston or New Orleans districts.
- B. Does the activity adversely affect greater than 1/10 acre of wetlands, and/or adversely impact a designated Natural and Scenic River, a state or federal wildlife management area, and/or refuge?
 Yes No

If you answered yes to question 8. above, notification of the District Engineer is required in accordance with NWP GC 32.

9. For activities involving the installation of a culvert, is twenty percent (20%) of the culvert diameter (20 percent of the height of elliptical culverts) installed below the natural grade of the stream. ☐ Yes ☐ No

If you answered no to question 9. above, be aware that the project would not be authorized by a NWP 13and would require an individual permit application.

- 10. Pre-Construction Notification, as defined under nationwide general condition 32, is required for regulated utility line activities regardless of impact acreage for all projects located In Louisiana. The U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency and, if applicable, National Marine Fisheries Service will be forwarded a copy of the Pre-Construction Notification for all NWP #12 activities.
- **11**. A 50-foot gap shall be required for every 500 linear feet of sidecast material resulting from trench excavation activities associated with utility line construction. Under certain circumstances the gap intervals may be modified. Additionally, no fill shall be placed in a manner which would impede natural watercourses.
- **12.** This NWP, via disavowal of Coastal Zone certification by the Louisiana Department of Natural Resources, is considered denied without prejudice within the Louisiana Coastal Zone. Individual requests for approval under this NWP will be conditioned to require the applicant to obtain a Louisiana Department of Natural Resources determination/certification before the NWP is valid.

Note: This specific regional condition for NWP 12 applies to work within the Louisiana Coastal Zone and/or the Outer Continental Shelf off Louisiana, and therefore does not apply in the USACE Fort Worth District. Work in these areas may require coordination with the USACE Galveston or New Orleans districts.

Additional Discussion:

The purpose of the project is to replace an aging 36-inch diameter water line that is undersized and not adequately pressure rated for future planned use. The proposed 48inch diameter water line will be owned and maintained by the NTMWD and will serve as a transmission line for Wylie, Rockwall, Farmersville, and other communities located in the eastern portion of the Dallas-Fort Worth Metroplex. Additional aspects of the project will include installing necessary valves, appurtenances and connections to existing water infrastructure. For the purpose of this proposal, each separate water type crossing was considered a single and complete project.

Part II: Project Information (*Project No. SWF-* 2018-00201)

| Box 1 Project Name: | | Applicant Name | |
|--|---|---|---|
| Wylie-Rockwall-Farmersv | ille 48-Inch Pineline | Kara Byrnes, P.E. | |
| Applicant Title | | Applicant Compan | v Agency etc |
| Project Manager | | North Texas Municipa | |
| Mailing Address | | | racking number (if any) |
| 501 E. Brown Street Wyl | ie TX 75098 | Applicant 5 internal ti | |
| Work Phone with area code | Home Phone with area co | ode Fax # | E-mail Address |
| 469-626-4732 | | | kbyrnes@ntmwd.com |
| Relationship of applicant | to property: | | |
| | | Other: Easement Own | ier |
| Application is hereby made for | | | ted with subject project qualify |
| | | | in. I certify that I am familiar |
| | | | / knowledge and belief, such |
| | | | ne authority to undertake the made the right to enter the |
| | | | rk. I agree to start work <u>only</u> |
| after all necessary permits have | | 5 / 1 | |
| Signature of applicant | | | Date (mm/dd/yyyy) |
| | | | |
| | | | |
| Box 2 Authorized Age | ent/Operator Name | and Signature: (If al | n agent is acting for the applicant |
| during the permit process) | - | | |
| Carland G. Holstead, PWS | | Agant/Onarator C | ompany, Agency, etc. |
| Agent/Operator Title | | Agent/Operator C | ombany, Adency, etc. |
| Drojoct Managor | | | |
| Project Manager | | Kimley-Horn and Ass | |
| Mailing Address | Galleria Office Tower, 9 | Kimley-Horn and Ass | ociates, Inc. |
| Mailing Address 13455 NBoel Road, Two | Galleria Office Tower, S | Kimley-Horn and Ass | ociates, Inc. |
| Mailing Address 13455 NBoel Road, Two E-mail Address | · · · | Kimley-Horn and Ass | ociates, Inc. |
| Mailing Address 13455 NBoel Road, Two E-mail Address carland.holstead@kimley | -horn.com | Kimley-Horn and Ass Suite 700 Dallas, TX 7 | ociates, Inc. 75240 |
| Mailing Address 13455 NBoel Road, Two E-mail Address carland.holstead@kimley Work Phone with area code | · · · | Kimley-Horn and Ass Suite 700 Dallas, TX 7 | ociates, Inc. 75240 Cell Phone # |
| Mailing Address 13455 NBoel Road, Two E-mail Address carland.holstead@kimley Work Phone with area code 469-914-8717 | -horn.com Home Phone with area co | Kimley-Horn and Ass Suite 700 Dallas, TX 7 Dade Fax # | ociates, Inc. 75240 |
| Mailing Address 13455 NBoel Road, Two E-mail Address carland.holstead@kimley- Work Phone with area code 469-914-8717 I hereby authorize the above-nam upon request, supplemental infor | -horn.com Home Phone with area conned agent to act in my behalf a mation in support of this pern | Kimley-Horn and Ass Suite 700 Dallas, TX 7 ode Fax # as my agent in the processing nit application. I understand | ociates, Inc. 75240 Cell Phone # 504-452-4791 g of this application and to furnish, that I am bound by the actions of |
| Mailing Address 13455 NBoel Road, Two E-mail Address carland.holstead@kimley Work Phone with area code 469-914-8717 I hereby authorize the above-nam upon request, supplemental infor my agent, and I understand that | -horn.com Home Phone with area conned agent to act in my behalf a mation in support of this pern if a federal or state permit is is | Kimley-Horn and Ass Suite 700 Dallas, TX 7 ode Fax # as my agent in the processing nit application. I understand | ociates, Inc. 75240 Cell Phone # 504-452-4791 of this application and to furnish, that I am bound by the actions of sign the permit. |
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| Mailing Address 13455 NBoel Road, Two (E-mail Address carland.holstead@kimley- Work Phone with area code 469-914-8717 I hereby authorize the above-nam upon request, supplemental infor my agent, and I understand that Signature of applicant I certify that I am familiar knowledge and belief, such inf Signature of authorize | -horn.com Home Phone with area conned agent to act in my behalf a mation in support of this permit if a federal or state permit is is with the information conta formation is true, complete, ad agent ty owner, if other th | Kimley-Horn and Ass Suite 700 Dallas, TX 7 ode Fax # as my agent in the processing nit application. I understand ssued, I, or my agent, must s ained in this application, and accurate. | ociates, Inc. 75240 Cell Phone # 504-452-4791 g of this application and to furnish, that I am bound by the actions of ign the permit. Date (mm/dd/yyyy) and that to the best of my Date (mm/dd/yyyy) 01/25/2019 |

Mailing Address

Box 4 Project location, including street address, city, county, state, and zip code where proposed activity will occur:

Between Kreymer Lane in Wylie, Collin County, Texas 75098 and County Road 484 in Lavon, Collin County, Texas 75166

Nature of Activity (Description of project; include all features; see instructions):

The project includes the construction of approximately 20,000 linear feet of 48-inch diameter water line. A permanent easement will be established and a temporary construction easement will be utilized. Additional aspects of the project will include installing necessary valves, appurtenances and connections to existing water infrastructure.

Project Purpose (Description of the reason or purpose of the project; see instructions):

The purpose of the project is to replace an aging 36-inch diameter water line that is undersized and not adequately pressure rated for future planned use. The proposed 48-inch diameter water line will be owned and maintained by the NTMWD and will serve as a transmission line for Wylie, Rockwall, Farmersville, and other communities located in the eastern portion of the Dallas-Fort Worth Metroplex.

Has a delineation of waters of the U.S., including wetlands, been completed? (see instructions) \boxtimes Yes, Attached \square No

If a delineation has been completed, has it been verified in writing by the USACE?

Yes, Date of approved or preliminary jurisdictional determination (mm/dd/yyyy): USACE project:

Are color photographs of the existing conditions available? \boxtimes Yes, Attached \square No Are aerial photographs available? \boxtimes Yes, Attached \square No

Multiple Single and Complete Crossings (If multiple single and complete crossings, check here and complete the table in Attachment D)

Waterbody(ies) (if known; otherwise enter "an unnamed tributary to"): East Fork Trinity River, Pilot Grove Creek, unnamed tributaries to East Fork Trinity River and Lake Ray Hubbard

Tributary(ies) to what known, downstream waterbody(ies): East Fork Trinity River and Lake Ray Hubbard

Latitude & longitude (Decimal Degrees):

Latitude: 33.008759° N; Longitude: -96.478824° W

USGS Quad map name(s):

Wylie and Lavon, TX

Watershed(s) and other location descriptions, if known:

East Fork Trinity Watershed (HUC 12030106)

Directions to the project location:

From Fort Worth, east on I-30 towards Dallas; take exit 61B for President George Bush Turnpike north; exit Merritt Road toward Miles Road; right on Merritt Road; right on Pleasant Valley Road; right on Elm Grove Road; left on Whitley Road; left on Vinson Road (road changes to FM 544); right on E Stone Road; left on Kreymer Lane; project begins south of intersection of Kreymer Lane and E Brown Street.

Part III: Project Impacts and Mitigation

Box 5 Reason(s) for Discharge into waters of the U.S.:

The purpose of the project is to replace an aging undersized 36-inch diameter water line that is undersized and not adequately pressure rated for future planned use. The proposed 48-inch diameter water line will be owned and maintained by the NTMWD and will serve as a transmission line for Wylie, Rockwall, Farmersville, and other communities located in the eastern portion of the Dallas-Fort Worth Metroplex. The installation of the 48-inch water line will result in discharge of fill material into Waters of the U.S.

Type(s) of material being discharged and the amount of each type in cubic yards:

Existing soil from trench; 14,942.7 cubic yards total

Total surface area (in acres) of wetlands or other waters of the U.S. to be filled:

Temporary impacts: 0.13 acre perennial streams, 0.041 acre intermittent streams, 0.001 acre ephemeral streams, 0.24 open waters, 7.31 acres forested wetlands, 1.54 acres emergent wetlands

Indicate the proposed impacts to **waters of the U.S.** in ACRES (for wetlands and impoundments) and LINEAR FEET (for rivers and streams), and identify the impact(s) as permanent and/or temporary for each waterbody type listed below. For projects with multiple single and complete crossings, the table below should indicate the cumulative totals of those single and complete crossings that require notification as outlined in Part I, GC question 32, and would not determine the threshold for whether a project qualifies for a NWP. The table below is intended as a tool to summarize impacts by resource type for planning compensatory mitigation and does not replace the summary table of single and complete crossings in Attachment D for those projects with multiple single and complete crossings.

| | Perm | anent | Temporary | | | |
|---------------------|-------|-------------|-----------|-------------|--|--|
| Waterbody Type | Acres | Linear feet | Acres | Linear feet | | |
| Emergent wetland | | | 1.54 | - | | |
| Scrub-shrub wetland | | | - | - | | |
| Forested wetland | | | 7.31 | - | | |
| Perennial stream | | | 0.13 | 293.75 | | |
| Intermittent stream | | | 0.041 | 422.63 | | |
| Ephemeral stream | | | 0.001 | 15.96 | | |
| Impoundment | | | 0.24 | - | | |
| Other: | | | | | | |
| Total: | | | 9.26 | 732.34 | | |

Potential indirect and/or cumulative impacts of proposed discharge (if any): No indirect or cumulative impacts are anticipated as a result of the project.

Required drawings (see instructions):

Vicinity map: \square Attached

To-scale plan view drawing(s): \square Attached

To-scale elevation and/or cross section drawing(s): Attached

Is any portion of the work already complete? \Box Yes \Box No

If yes, describe the work:

Box 6 Authority: (see instructions)

Is Section 10 of the Rivers and Harbors Act for projects affecting navigable waters applicable? Yes X No (see Fort Worth District Navigable Waters list)

Is Section 404 of the Clean Water Act applicable? Xes

Page 19 of 25

No

Box 7 Larger Plan of Development:

Is the discharge of fill or dredged material for which Section 10/404 authorization is sought intended for a utility line project which is part of a larger plan of development?

| Yes | 🖂 No | (If yes, please provide the information in the remainder of Box 7) |
|-----|------|--|
| | | |

Does the utility line project have independent utility in addition to the larger plan of development (e.g., major transmission line, main water line, etc.)? Yes No If yes, explain:

If discharge of fill or dredged material is part of development, name and proposed schedule for that larger development (start-up, duration, and completion dates):

| Location of la | rge | r dev | elo | pment (I | f discha | rge c | of fill o | r dre | edged | l mate | rial is p | art o | f a plan | of |
|----------------|-----|-------|-----|----------|----------|-------|-----------|-------|-------|--------|-----------|-------|----------|----|
| development, | а | map | of | suitable | quality | and | detail | for | the | entire | project | site | should | be |
| included): | | | | | | | | | | | | | | |

Total area in acres of entire project area (including larger plan of development, where applicable):

| Box 8 Federally Threatened or Endangered Species (see instructions) |
|---|
| Please list any federally-listed (or proposed) threatened or endangered species or critical habitat |
| potentially affected by the project (use scientific names (i.e., genus species), if known): |
| Species identified within Collin County by the USFWS include the Least Tern (Sterna |
| antillarum), the Piping Plover (Charadrius melodus), the Red Knot (Calidris canutus rufa), and |
| the Whooping Crane (Grus americana). According to the USFWS, the Piping Plover and Red |
| Knot should only be considered in the effects analysis for wind energy projects. Given that |
| the proposed project is not a wind energy project, these two species are dismissed from |
| evaluation. The project would have no effect on the Least Tern or the Whooping Crane. |
| Have surveys, using U.S. Fish and Wildlife Service (USFWS) protocols, been conducted? |
| Species specific surveys have not been |
| performed; however, a threatened and endangered species assessment was performed while |
| performing the aquatic resources delineation onsite. |
| If a federally-listed species would potentially be affected, please provide a description and a |
| biological evaluation. |
| Yes, Report attached 🛛 🖾 Not attached |
| Has Section 7 consultation been initiated by another federal agency? |
| 🗌 Yes, Initiation letter attached 🛛 🖾 No |
| Has Section 10 consultation been initiated for the proposed project? |
| 🗌 Yes, Initiation letter attached 🛛 🖾 No |
| Has the USFWS issued a Biological Opinion? |
| 🗌 Yes, Report attached 🛛 🖂 No |
| If yes, list date Opinion was issued (mm/dd/yyyy): |

| Box 9 Historic properties and cultural resources Please list any historic properties listed (or eligible to be listed) on the National Register of Historic |
|--|
| Places which the project has the potential to affect: |
| A review of the Texas Historic Commission (THC) Atlas Map (http://atlas.thc.state.tx.us/shell- |
| couty.htm) revealed no markers or historic sites within the vicinity of the study area. |
| Has an archaeological records search been conducted? |
| Yes, Report attached 🗌 No (explain): |
| Are any cultural resources of any type known to exist on-site? |
| 🗌 Yes 🛛 No |
| Has an archaeological pedestrian survey been conducted for the site? |
| Yes, Report attached 🛛 🖂 No (explain): Kimley-Horn retained Stone Point Services, LLC to |
| prepare a cultural resources survey scope and obtain an Antiquities Permit. An Antiquities |
| Permit was obtained, and the scope was approved; however, the cultural resources survey has |
| not been initiated. Once the survey is performed, Kimley-Horn will provide the cultural |
| resources survey report to the USACE archeologist for review and approval. |
| Has Section 106 or SHPO consultation been initiated by another federal or state agency? |
| \Box Yes, Initiation letter attached \boxtimes No |
| Has a Section 106 MOA been signed by another federal agency and the SHPO? |
| \Box Yes, Attached \boxtimes No |
| If yes, list date MOA was signed (mm/dd/yyyy): |
| |

Box 10 Proposed Conceptual Mitigation Plan Summary (see instructions)

Measures taken to avoid and minimize impacts to waters of the U.S. (if any): The proposed project includes open-cut trenching and boring. The East Fork Trinity River and OW will be avoided by boring beneath. Impacts to all other features will be limited to the minimum width of construction and permanent easement as necessary for the project. The project will minimize impacts to wetlands and will return wetland areas to pre-construction contours and conditions, so these areas can continue to function as wetlands following construction completion.

It is anticipated that compensatory mitigation for the impacts to the jurisdictional aquatic resources will be accomplished by purchasing the appropriate number of credits from an approved mitigation bank. The East Fork Trinity River and OW will be avoided by boring beneath. Other streams and open waters will be impacted temporarily from open-cut trenching and utilization of temporary cofferdams as necessary; however, these features will be restored to pre-construction contours and conditions upon project completion. Therefore, no mitigation is proposed for streams or open waters.

Following completion of construction activities, impacted wetlands will be restored to preconstruction contours and conditions. Emergent wetlands that will be impacted by the project will continue to function as emergent wetlands following completion of construction activities. Therefore, no mitigation is proposed for the temporary impacts to emergent wetlands. Forested wetlands that will be impacted by the project will function as emergent wetlands following completion of construction activities; however, they will no longer be considered forested wetlands based on tree clearing being required for construction activities. Based on this, the Applicant is proposing to mitigate for the loss of function from a conversion from forested wetlands to emergent wetlands.

For construction activities in wetlands, the top 6 to 12 inches of the trench will be sidecast and replaced upon completion of the installation of the water line. The trench will not be backfilled in a manner as to drain Waters of the U.S. Heavy equipment working in wetlands will be placed on mats, or other measures will be taken to minimize soil disturbance.

Applicant proposes combination of one or more of the following mitigation types:

Mitigation Bank On-site Off-site (Number of sites:) None

Applicant proposes to purchase mitigation bank credits: Yes No

Mitigation Bank Name: Bunker Sands Mitigation Bank

Number of Credits:

Indicate in ACRES (for wetlands and impoundments) and LINEAR FEET (for rivers and streams) the total quantity of waters of the U.S. proposed to be created, restored, enhanced, and/or preserved for purposes of providing compensatory mitigation. Indicate mitigation site type (on- or off-site) and number. Indicate waterbody type (non-forested wetland, forested wetland, perennial stream, intermittent stream, ephemeral stream, impoundment, other) or non-jurisdictional (uplands¹).

| · · | , 3 | | | | |
|---------------------------------------|---|-----------------------|--------------------|-------------------|-----------------|
| Mitigation Site Type and Number | Waterbody Type | Created | Restored | Enhanced | Preserved |
| e.g., On-site 1 | Non-forested wetland | 0.5 acre | | | |
| e.g., Off-site 1 | Intermittent stream | | 500 LF | 1000 LF | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | Totals: | | | | |
| ¹ For uplands, pleas | e indicate if designed as an | upland buffer. | | | |
| Summary of Mi | itigation Work Plan (I | Describe the | mitigation activit | ies listed in the | table above): |
| - | n is proposed, provi | | | · · | |
| necessary to er | nsure that adverse ef | fects on the | aquatic environm | nent are minim | al: |
| • | ual mitigation plan be | en preparec | l in accordance w | ith the USACE | regulations and |
| guidelines? | | ١. | | | |
| Yes, Attach | ed <u></u> No (explain (s) latitude & longit | | USGS Quad map | | |
| Degrees): | | uue (Decimai | | name(s). | |
| | descriptions, if know | n: | | | |
| Directions to th | ne mitigation location | (s) [.] | | | |
| | | (3) | | | |
| | | | | | |
| Box 11 Wate For Texas: | er Quality Certificat | tion (see inst | ructions) : | | |
| | ect meet the condit Nater Act Section 40 | | | | |

| Does | the | project | include soil | erosion | control | and | sediment | control | Best | Management | Practices |
|------|-----|---------|--------------|---------|---------|-----|----------|---------|------|------------|-----------|
| (BMP | s)? | Yes | 🗌 No | | | | | | | - | |

Does the project include BMPs for post-construction total suspended solids control?

Yes No

For Louisiana:

LDEQ has issued water quality certification for NWP 12 without conditions.

For Tribal Lands ("Indian Country"):

Does the project meet the conditions of the EPA water quality certification for NWPs?

Yes No

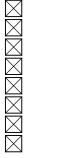
Box 12 List of other certifications or approvals/denials received from other federal, state, or local agencies for work described in this application:

| Agency | Approval Type ² | Identification No. | Date Applied | Date Approved | Date Denied |
|------------------------|-------------------------------|--------------------------|-----------------|------------------|-------------|
| City of Dallas | Floodplain | Unassigned | Not Applied Yet | n/a | n/a |
| | | | | | |
| | | | | | |
| | | | | | |
| Would include but is n | ot restricted to zoning, | building, and floodplain | permits | | |

Would include but is not restricted to zoning, building, and floodplain permits

Part IV: Attachments

- A. Delineation of Waters of the U.S., Including Wetlands
- B. Color Photographs
- C. Summary Table of Single and Complete Crossings
- D. Required Drawings/Figures
- E. Threatened or Endangered Species Reports and/or Letters
- F. Historic Properties and Cultural Resources Reports and/or Letters
- G. Conceptual Mitigation Plan
- H. Other: Agent Authorization Form; List of Property Owners



Included

End of Form

Summary Table of Single and Complete Crossings

| Waterbody ID ¹ | Latitude | Longitude | Resource Type² | Linear Feet IN Project Area | Acres in Project Area | Impact Type ³ | Linear Feet of Impact | Acres of Impact | Cubic Yards of Material to be Discharged | PCN Required | Reason⁴ |
|------------------------------|----------|-----------|-------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------|--|-----------------|---------|
| S1 | 33.0161 | -96.5085 | ES | 480 lf | 0.02 ac | D/T | 15.96 lf | 0.001 ac | 1.61 | N | n/a |
| S2 | 33.0152 | -96.5038 | IS | 4,260 lf | 0.42 ac | D/T | 379.02 lf | 0.04 ac | 64.53 | N | n/a |
| S3 | 33.0152 | -96.5037 | IS | 180 lf | 0.01 ac | D/T | 43.61 lf | 0.001 ac | 1.61 | N | n/a |
| S4 | 33.0112 | -96.4878 | PS | 1,270 lf | 0.49 ac | D/T | 82.27 lf | 0.02 ac | 32.27 | N | n/a |
| S5 | 33.0110 | -96.4868 | PS | 845 lf | 0.31 ac | D/T | 81.32 lf | 0.04 ac | 64.53 | N | n/a |
| S6 | 33.0106 | -96.4852 | PS | 3,380 lf | 5.15 ac | n/a | 0.00 lf | 0.00 ac | - | N | n/a |
| S7 | 33.0081 | -96.4730 | PS | 1,880 lf | 1.06 ac | D/T | 84.62 lf | 0.05 ac | 80.67 | N | n/a |
| S8 | 33.0076 | -96.4577 | PS | 415 lf | 0.16 ac | D/T | 45.54 lf | 0.02 ac | 32.27 | N | n/a |
| S9 | 33.0075 | -96.4577 | ES | 80 lf | 0.002 ac | n/a | 0.00 lf | 0.00 ac | - | N | n/a |
| OW1 | 33.0075 | -96.4991 | I | n/a | 0.23 ac | n/a | - | 0.00 ac | - | N | n/a |
| OW2 | 33.0124 | -96.4934 | I | n/a | 0.54 ac | n/a | - | 0.00 ac | - | N | n/a |
| OW3 | 33.0114 | -96.4914 | I | n/a | 0.59 ac | n/a | - | 0.00 ac | - | N | n/a |
| OW4 | 33.0104 | -96.4886 | I | n/a | 0.10 ac | n/a | - | 0.00 ac | - | N | n/a |
| OW5 | 33.0086 | -96.4777 | I | n/a | 7.06 ac | D/T | - | 0.13 ac | 209.73 | N | n/a |
| OW6 | 33.0086 | -96.4700 | I | n/a | 2.05 ac | D/T | - | 0.05 ac | 80.67 | N | n/a |
| OW7 | 33.0079 | -96.4577 | I | n/a | 0.60 ac | D/T | - | 0.06 ac | 96.80 | N | n/a |
| OW8 | 33.0072 | -96.4539 | I | n/a | 0.09 ac | n/a | - | 0.00 ac | - | N | n/a |
| OW9 | 33.0071 | -96.4534 | I | n/a | 0.13 ac | n/a | - | 0.00 ac | - | N | n/a |
| FW1 | 33.0115 | -96.4887 | FW | n/a | 5.54 ac | D/T | - | 0.85 ac | 1,371.33 | Y | A, E |
| FW2 | 33.0112 | -96.4874 | FW | n/a | 3.14 ac | D/T | - | 0.54 ac | 871.20 | Y | A, E |
| FW3 | 33.0109 | -96.4861 | FW | n/a | 5.46 ac | D/T | - | 0.83 ac | 1,339.07 | Y | A, E |
| FW4 | 33.0100 | -96.4824 | FW | n/a | 14.38 ac | D/T | - | 2.37 ac | 3,823.60 | Y | A, E |
| FW5 | 33.011 | -96.483 | FW | n/a | 1.29 ac | n/a | - | 0.00 ac | - | N | n/a |
| FW6 | 33.0093 | -96.4803 | FW | n/a | 4.08 ac | D/T | - | 0.68 ac | 1,097.07 | Y | A, E |
| FW7 | 33.0083 | -96.4759 | FW | n/a | 3.21 ac | D/T | - | 0.47 ac | 758.27 | Y | A, E |
| FW8 | 33.0081 | -96.4721 | FW | n/a | 13.23 ac | D/T | - | 1.01 ac | 1,629.46 | Y | A, E |
| FW9 | 33.007 | -96.4692 | FW | n/a | 15.41 ac | n/a | - | 0.00 ac | - | N | n/a |
| FW10 | 33.0076 | -96.4589 | FW | n/a | 0.07 ac | D/T | - | 0.05 ac | 80.67 | Y | А |
| FW11 | 33.0075 | -96.4566 | FW | n/a | 1.27 ac | D/T | - | 0.51 ac | 822.80 | Y | A, E |
| EW1 | 33.0106 | -96.4885 | NFW | n/a | 1.45 ac | n/a | - | 0.00 ac | - | N | n/a |
| EW2 | 33.0104 | -96.4875 | NFW | n/a | 1.63 ac | n/a | - | 0.00 ac | - | N | n/a |

Summary Table of Single and Complete Crossings

| | EW3 | 33.0099 | -96.4861 | NFW | n/a | 3.96 ac | n/a | - | 0.00 ac | - | Ν | n/a |
|------|-------------|---------------|--------------|---------------|-----------------|----------------|-------------|---|---------|----------|---|-----|
| Γ | EW4 | 33.0087 | -96.4804 | NFW | n/a | 16.94 ac | n/a | - | 0.00 ac | - | Ν | n/a |
| Γ | EW5 | 33.0079 | -96.4686 | NFW | n/a | 20.13 ac | D/T | - | 0.71 ac | 1,145.47 | Y | E |
| Γ | EW6 | 33.0088 | -96.4712 | NFW | n/a | 4.86 ac | D/T | - | 0.60 ac | 968 | Y | E |
| | EW7 | 33.0076 | -96.4582 | NFW | n/a | 0.62 ac | D/T | - | 0.23 ac | 371.07 | Y | E |
| / ¬+ | arhady ID m | you ha tha no | mo of a feat | uro or an aco | ianod Ishol cuv | ch ac "W-1" fo | r a watland | | | | | |

¹ Waterbody ID may be the name of a feature or an assigned label such as "W-1" for a wetland.

² Resource Types: NFW – Non-forested wetland, FW – Forested wetland, PS – Perennial Stream, IS - Intermittent Stream, ES - Ephemeral Stream, I - Impoundment

³ Impact Types:

D/P - Direct* and Permanent, D/T - Direct and Temporary, I/P - Indirect** and Permanent, I/T - Indirect and Temporary * Direct impacts are here defined as those adverse affects caused by the proposed activity, such as discharge or excavation.

** Indirect impacts are here defined as those adverse affects caused subsequent to the proposed activity, such as flooding or effects of drainage on adjacent waters of the U.S.

⁴ Reasons for PCN requirement:

- A Mechanized land clearing in a forested wetland
- B Require a Section 10 permit
- C Utility line exceeds 500 feet in waters of the U.S., excluding overhead lines
- D Utility line is within a jurisdictional area (i.e., water of the U.S.), and the utility line runs parallel to a stream bed that is within that jurisdictional area
- E The loss of waters of the U.S. exceeds 1/10 acre
- F Permanent access roads are constructed above grade in waters of the U.S. for a distance of more than 500 feet
- G Permanent access roads are constructed in waters of the U.S. with impervious materials
- H Potential endangered species
- I Potential historic properties
- J Discharge into pitcher plant bog or bald cypress-tupelo swamp
- K- Discharge into the area of Caddo Lake within Texas that is designated as a "Wetland of International Importance" under the Ramsar Convention
- L Required by Regional Conditions
- M Other

| Tract ID# | Legal Description | Current Owner Name | Property Address | Mailing Address |
|-----------|--|---|---|---|
| 1 | ABS A0180 HENRY B COLE SURVEY, TRACT 4 | PARKARO SA LTD | 2700 E STONE ROAD, WYLIE, TX 75098 | PO BOX 307, WYLIE, TX 75098-0307 |
| 2 | ABS A0180 HENRY B COLE SURVEY, TRACT 16 | TRIPLE A LEASING INC. | TOU CH STONE DRIVE, WYLIE, TX 75098 | 7703 G LENCREST DRIVE, SACH SE, TX 75048-6636 |
| 3 | ABS A0180 HENRY B COLE SURVEY, TRACT 3 (SPLIT BY COUNTY LINE 199.96 ACRS IN CC) | CITY OF DALLAS | WYLIE, TX 75098 | 1500 MARILLA STREET, DALLAS, TX 75201-6318 |
| 4 | ABS A0121 W A S BOH ANNAN SURVEY, SHEET 2, TRACT 20 (SPLIT BY COUNTY LINE 122.7 ACRES IN CC) | CITY OF DALLAS | WYLIE, TX 75098 | 1501 MARILLA STREET, DALLAS, TX 75201-6318 |
| 5 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 231 | WYLIE ISD | E BROWN ST., WYLIE, TX 75098 | PO BOX 490, WYLIE, TX 75098-0490 |
| 6 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 219 | WYLIE ISD | E BROWN ST., WYLIE, TX 75098 | PO BOX 490, WYLIE, TX 75098-0491 |
| 7 | ABS A0688 F DE LA PINA SURVEY, SHEET 5, TRACT 232 | WYLIE ISD | KREYMER LAN E, WYLIE, TX 75098 | PO BOX 490, WYLIE, TX 75098-0492 |
| 8 | ABS A0688 F DE LA PINA SURVEY, SHEET 5, TRACT 220 | SH AW KET AYUB | E BROWN ST., WYLIE, TX 75098 | 8800 CALISTOGA SPRINGS WAY, PLANO, TX 75024-3776 |
| 9 | HUNTER'S COVE, BLK A, LOT 21X (OPEN SPACE&DRNINAGE EASEMENT) | HUNTER'S COVE OWNER ASSOCIATION INC. | 108 RUTHERFORD AVEN UE, WYLIE, TX 75098 | 1512 CRESCENT DR., STE 112, CARROLLTON, TX 75006- 3627 |
| 10 | H UN TER'S COVE, BLK C, LOT 20X (OPEN SPACE&BRANNAGE EASEMENT) | HUNTER'S COVE OWNER ASSOCIATION INC. | 109 RUTHERFORD AVENUE, WYLIE, TX 75098 | 1513 CRESCENT DR., STE 112, CARROLLTON, TX 75006- 3627 |
| 11 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 165 | G ARNER LEWIS KOCH | 102 COUNTRY PLACE LANE, WYLIE, TX 75098 | 102 COUNTRY PLACE LANE, WYLIE, TX 75098-7505 |
| 12 | ABS AD688 F DE LA PINA SURVEY | DWIDCLANTON | N/A | N/A |
| 13 | ABS A0002 DRURY ANGLIN SURVEY, SHEET 4, TRACT 68 | BLAKE MCCARTNEY | NA | 3845 FORNEY ROAD, MESQUITE, TX 75149-2752 |
| 14 | LOST ACRE (CW Y), LOT 3 | WOODLANDER ENVIRONMENTS INC. | E. BROWN STREET, WYLIE, TX 75098 | 2230 E. BROWN STREET, WYLIE, TX 75098-5702 |
| 15 | LOST ACRE (CW Y), LOT 1 | WOODLANDER ENVIRONMENTS INC. | 2230 E. BROWN ST., WYLIE, TX 75098 | 2230 E. BROWN STREET, WYLIE, TX 75098-5702 |
| 16 | MEADOW HEIGHTS ESTATES, BLK B, LOT 1 | MARK STEVE & KAREN SUE SOWERS | 2250 E. BROWN ST., WYLIE, TX 75098 | 2250 E. BROWN ST., WYLIE, TX 75098-5702 |
| 17 | MEADOW HEIGHTS ESTATES, BLK B, LOT 2 | EUGENE & LINDA DAFFIN | 2262 E. BROWN ST., WYLIE, TX 75098 | 673 CROCKETT DR., LAVON, TX 75166-1741 |
| 18 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 174 | DONALD R & CAROLYN C BRIDGES | 2274 E BROWN STREET, WYLIE, TX 75098 | PO BOX 553, WYLIE, TX 75098 |
| 19 | MEADOW HEIGHTS ESTATES, BLK A, LOT 4A | RAYMON D BAEZ | E BROWN ST., WYLIE, TX 75098 | 635 CINDY LANE, WYLIE, TX 75098-6834 |
| 20 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 173 | JONATHAN PAUL & ASHLEY BLACK | 2705 E STONE ROAD, WYLIE, TX 75098 | 1892 BUTLER ROAD, WYLIE, TX 75098-6744 |
| | | | | 2000 INTERSTATE HIGHWAY 30 E, GREENVILLE, TX 75402 |
| 21 | ABS AD688 F DE LA PINA SURVEY, SHEET 5, TRACT 218 | FARMERS ELECTRIC COOPERATIVE INC. | 2655 E STONE ROAD, WYLIE, TX 75098 | 9084 |
| 22 | ABS A0688 F DE LA PINA SURVEY, SHEET 5, TRACT 240 | CJG DEVELOPMENT GROUP | WYLIE, TX | 127 HOWELL ST., DALLAS, TX 75207-7103 |
| 23 | ABS A0121 W A S BOH ANNAN SURVEY, SHEET 3, TRACT 29 | DWIEL & JUDY PANESSITI | 10954 STATE HWY 205, LAVON, TX 75166 | 10954 STATE H WY 205, LAVON, TX 75166-1808 |
| 24 | ABS A0773 S A ROBERTS SURVEY, TRACT 9 | GEORGE MOSLENER | 10984 STATE H W Y 205, LAVON, TX 75166 | 10984 STATE H WY 205, LAVON, TX 75166-1808 |
| 25 | 205 NORTH BUSINESS PARK ADDITION (GCN), BLK A, LOT 3 | CALVIN CLARK | STATE HWY 205, LAVON , TX 75166 | 11061 MORGAN DRIVE, LAVON, TX 75166-1671 |
| 26 | 205 NORTH BUSINESS PARK ADDITION (GCN), BLK A, LOT 2 | LONE STAR HARDSCAPES LLC/ DBA PEARSON STONE COMPANY | 10913 STATE H W Y 205, LAVON, TX 75166 | PO BOX 153, LAVON, TX 75166-0153 |
| 27 | ABS A0121 W A S BOHANNAN SURVEY, SHEET 3, TRACT 3 | RICH ARD & BETSIE CALDWELL | 14644 COUNTY ROAD 746, LAVON, TX 75166 | 14644 COUNTY ROAD 746, LAVON, TX 75166-1829 |
| 28 | WHITSON ESTATES (GCN), LOT 3-9 | KURT & SHELLEY VAN DORAN | COUNTRY ROAD 485, LAVON, TX 75166 | 14697 COUNTY ROAD 485, LAVON, TX 75166-1825 |
| 29 | WHITSON ESTATES (GCN), LOT 4&5 | CRAIG SW ORD | 14777 CO UNTY ROAD 485, LAVON, TX 75166 | 14777 COUNTY ROAD 485, LAVON, TX 75166-1824 |
| 30 | WHITSON ESTATES (GCN), LOT 6 | RICH ARD & MARY BENEDICT | COUNTY ROAD 485, LAVON, TX 75166 | 14879 COUNTY ROAD 485, LAVON, TX 75166-1823 |
| 31 | WHITSON ESTATES (GCN), LOT 11 | JACK & SUSAN HUGHES | 10986 COUNTY ROAD 484, LAVON, TX 75166 | PO BOX 134, LAVON, TX 75166-0134 |

Attachment C

AQUATIC RESOURCES DELINEATION REPORT

January 17, 2019

Ms. Kara Byrnes, P.E. North Texas Municipal Water District 501 E. Brown Street Wylie, Texas 75098

RE: Wylie-Rockwall-Farmersville 48-Inch Pipeline Aquatic Resource Delineation Report Between Kreymer Lane in Wylie and County Road 484 in Lavon, Collin County, Texas

Dear Ms. Byrnes:

Kimley-Horn and Associates, Inc. (Kimley-Horn) is providing the following Aquatic Resource Delineation Report. The purpose of this report is to identify potential waters of the U.S. along the ±20,000 linear foot Wylie-Rockwall-Farmersville 48-Inch Pipeline study area. Kimley-Horn conducted a site visit to the study area on May 14, May 16, November 16, and December 12, 2018. Information gathered from the site visits, along with various other sources, is presented below. It should be noted that only the U.S. Army Corps of Engineers (Corps or USACE) has the authority to determine jurisdiction, and that this report is based on Kimley-Horn's site visit, current Corps regulations, and our experience within the Fort Worth District.

Purpose:

Kimley-Horn conducted a site visit to the study area with the objective of delineating aquatic resources. The site visit occurred on May 14, May 16, November 16, and December 12, 2018. This report details the methodology used to identify aquatic resources within the study area and details our results. A proposed project could trigger permitting requirements under Section 404 of the Clean Water Act if waters of the U.S. are impacted.

Methods:

APPROACH

Guidance from the "Corps of Engineers Wetlands Delineation Manual" USACE Waterways Experiment Station Wetlands Research Program Technical Report Y-87-1, dated January 1987 for routine wetland determinations for areas greater than five-acres (as modified by the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region, Version 2.0, March 2010), was used to determine the absence of wetlands within this study area.

Additional observations for waters of the U.S. as defined at 33 CFR Part 328.3 were made. Specifically, the presence of an ordinary high-water mark (OHWM) is evident by the presence of physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas. Definitions for non-wetland aquatic features follow those provided in the 2017 Nationwide Permit program and the 2008 revised guidance on Clean Water Act Jurisdiction following the Supreme Court decision in Rapanos v. U.S. and Carabell v. U.S. (2006).

Following the Rapanos Decision, the Corps issued a Regional Guidance Letter (RGL-08-02) on June 26, 2008 documenting the procedures for Preliminary and Approved Jurisdictional Determinations. This guidance was clarified and superseded in October 2016 by RGL 16-01. An Approved Jurisdictional Determination (AJD) is a document that precisely identifies the limits of waters of the U.S. on a study area. A Preliminary Jurisdictional Determination (PJD) is an unofficial document that indicates that there are waters of the U.S. present. Approved JDs can be appealed while PJDs cannot. Regional Guidance Letter-16-01 indicates that the recipient of a PJD can request and obtain an AJD if that later becomes necessary. A No Permit Required letter is a Corps issued document that indicates that a specific project will not involve activities subject to the requirements of Section 404 or Section 10; therefore, that project would not require a Department of Army permit. Under the Rapanos Guidance, there is a test for jurisdiction which is commonly referred to as a significant nexus evaluation. A *significant nexus* is established if the aquatic feature provides more than an insubstantial or speculative effect on the chemical, physical, and/or biological integrity of a traditional navigable water (TNW). As an example, a significant nexus could be established between a stream and TNW, if the stream could deliver pollutants to the TNW.

Mapping and Background Information:

The study area is shown on Sheets 1 through 9 in Appendix A. Sheet 1 provides a vicinity map which depicts the general location of the study area. Sheet 2 depicts the boundaries of the study area on United States Geological Survey (USGS) Topographic base data. Sheet 3 depicts color infrared aerial photography from 1996 as base data. Sheet 4 depicts color infrared aerial photography from 2015 as base data. Sheet 5 uses recent aerial photography as base data. Sheets 6, 7, 8, and 9 depict the aquatic resources delineated on the study area.

The general location and direction of ground-level photographs taken during the site visits are shown on Sheet 1 in Appendix B. The two-digit numbering system on the map sheet corresponds to the site visit photograph sheets, included in Appendix B.

The Federal Emergency Management Agency (FEMA) designates areas of mapped floodplain; these mapped areas are shown in Appendix C. The central portion of the proposed water line crosses FEMA designated 100-year floodplain.

The United States Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) Wetlands Mapper was used to generate a NWI map for the study area. A reproduction of this map is provided in Appendix D. The NWI maps can be useful in identifying the potential presence of aquatic features; however, they are created at a coarse scale and are not always accurate.

A current soils map from the United States Department of Agriculture (USDA) was generated. This soils map can be useful in identifying soils typically associated with wetlands. This current soil map, included in Appendix E, has boundaries that approximate the study area boundaries on a recent aerial photograph.

Study Area Description:

The study area is generally located between Kremer Lane in Wylie and County Road 484 in Lavon, in Collin County, Texas (Sheet 1 in Appendix A). The study area appears to be located in the East Fork Trinity Watershed (USGS Hydrologic Unit Code (HUC) 12030106). The approximate center coordinates of the

study area are Latitude: 33.008759° N and Longitude: -96.478824° W (1983 North American Datum (NAD83) Coordinates).

Referencing both the Aquatic Resources Delineation Maps shown on Sheets 6-9 in Appendix A, as well as the photo location maps shown on Sheet 1 in Appendix B will help supplement the following discussion.

HYDROLOGIC CHARACTERISTICS

According to the USGS Topographic Map (Sheet 2 in Appendix A), the entire study area generally slopes toward the south. There are multiple mapped unnamed 'blue-line' aquatic features within this study area. The East Fork Trinity River and Pilot Grove Creek are depicted within the study area. During the site visit the mapped 'blue-line' features were generally confirmed. Based on the FEMA designated areas of mapped floodplain, the areas around the East Fork Trinity River and Pilot Grove Creek are mapped 100-year floodplain (Appendix C). Typically, the USACE will assert jurisdiction on wetlands and waters located within the mapped suspect wetlands and waterbodies within the study area. Some are depicted in the same general area of the mapped 'blue-line' aquatic features within the study area (Appendix D).

During the site visit, nine stream features were observed exhibiting signs of an OHWM (labeled as S1 - S9 on Sheets 6-9 in Appendix A). Streams 1 and 9 (S1 and S9) can be characterized by an ephemeral flow regime. Streams 2 and 3 (S2 and S3) can be characterized by an intermittent flow regime. Streams 4 through 8 (S4-S8) can be characterized by a perennial flow regime.



Representative photographs of ephemeral stream (S2) and perennial stream (S8) located on the study area (photograph numbers 76 and 89 in Appendix B). The general location of these photographs is shown on Sheet 1 in Appendix B. Note: these photographs were taken on different field days as noted on the pages with site photographs.

During the site visit, nine open water features were observed in the vicinity of the study area (labeled as OW1-OW9 on Sheets 6-9 in Appendix A). Four open water features (OW4-OW7) were observed to be onchannel, abutting likely jurisdictional streams, and/or within the FEMA designated 100-year floodplain. Five open water features (OW1-OW3, OW8-OW9) were observed to be off-channel and not associated with other jurisdictional features.

Representative photographs of OW5 located on the study area (photograph numbers 38 and 39 in Appendix B). The general

location of these photographs is shown on Sheet 1 in Appendix B.

During the site visit, 11 forested wetland features (labeled as FW1-FW11 on Sheets 6-9 in Appendix A) and seven emergent wetland features (labeled as EW1-EW7 on Sheets 6-9 in Appendix A) were observed. Additional detailed information about the wetlands can be found on the Wetland Determination Data Forms in Appendix F.



Representative photographs of forested wetlands (FW1 and FW8) located on the study area (photograph numbers 15 and 29 in Appendix B). The general location of these photographs is shown on Sheet 1 in Appendix B. Note: these photographs were taken on different field days as noted on the pages with site photographs.

Page 4

Page 5



Representative photographs of emergent wetlands (EW1 and FW8) located on the study area (photograph numbers 16 and 84 in Appendix B). The general location of these photographs is shown on Sheet 1 in Appendix B. Note: these photographs were taken on different field days as noted on the pages with site photographs.

VEGETATION CHARACTERISTICS

The majority of the study area was comprised of upland areas vegetated with a wide range of species. Vegetation observed within the study area can best be characterized by current and historic land use practices. The vegetation can be divided into two categories: (1) Grass Uplands, (2) Forest, and (3) Grass Wetlands:

- (1) Grass Uplands: The Grass Upland areas within the study area consisted of Johnsongrass (*Sorghum halepense*), Common Bermudagrass (*Cynodon dactylon*), and various other upland ruderal species;
- (2) Forest: The Forest areas within the study area consisted of Green Ash (*Fraxinus pennsylvanica*) in the wetland areas and Hackberry (*Celtis occidentalis*); and
- (3) Grass Wetlands: The Grass Wetland areas within the study area consisted of Spikerush (*Eleocharis spp.*) and Swamp Smartweed (*Persicaria hydropiperoides*).

SOIL CHARACTERISTICS

According to the USDA Soil Survey for Collin County, mapped soil types within the study area include: Altoga silty clay, 5 to 8 percent slopes, eroded (AID2); Burleson clay, 0 to 1 percent slopes (BcA); Heiden clay, 3 to 5 percent slopes, eroded (HcC2); Houston Black clay, 1 to 3 percent slopes (HoB); Houston Black clay, 2 to 4 percent slopes, eroded (HoB2); Lewisville silty clay, 3 to 5 percent slopes, eroded (LeC2); Tinn clay, 0 to 1 percent slopes, frequently flooded (Tf); Trinity clay, 0 to 1 percent slopes, occasionally flooded (To); and Wilson clay loam, 1 to 3 percent slopes (WcB). A USDA soils map is located in Appendix E. The Tf and To soil types are located on the Collin County hydric soils list, suggesting wetlands could be expected.

Results:

The nine streams (S1-S9) are likely waters of the U.S. because they have an OHWM, and eventually flow to the Trinity River, a traditional navigable water (TNW).

Four open water features (OW4-OW7) are likely waters of the U.S. because they are located on-channel, are abutting likely jurisdictional streams, and/or are located within the FEMA designated 100-year floodplain. They appear to connect to other aquatic features that eventually flow to the Trinity River, a TNW). Five open water features (OW1-OW3, OW8-OW9) are likely not waters of the U.S. because they are located off-channel, do not connect to other likely jurisdictional features, and are not within the FEMA designated 100-year floodplain.

All wetland features (forested wetlands FW1-FW11 and emergent wetlands EW1-EW7) are likely waters of the U.S. because they appear to connect to other aquatic features that eventually flow to the Trinity River, a TNW. The table provided below provides details about the aquatic resources identified in the vicinity of the study area. It should be known that some of the features extend beyond the limits of the study area and some acreages and linear foot measurements for portions outside of the study area were made utilizing recent and color infrared aerial photographs. This would explain the large acreages and location of some features away from the proposed water line alignment. Further, at the time of the site visits, the final alignment was not selected and a larger area was analyzed in the field during alignment selection.

| Feature | Feature Type | Approximate Amount of Aquatic Resources | | | Likely Waters | | | | |
|--------------------------------|------------------------------|--|--------------|-----------|---------------|--|--|--|--|
| ID | | Linear Feet | онwм | Acres | of the U.S. | | | | |
| Likely Jurisdictional Features | | | | | | | | | |
| STREAMS | | | | | | | | | |
| S1 | Ephemeral Stream | ~480 lf | ~2 ft | ~0.02 ac | Yes | | | | |
| S2 | Intermittent Stream | ~4,260 lf | ~4 ft | ~0.42 ac | Yes | | | | |
| S3 | Intermittent Stream | ~180 lf | ~ 1 ft | ~0.01 ac | Yes | | | | |
| S4 | Perennial Stream | ~1,270 lf | ~7 to 30 ft | ~0.49 ac | Yes | | | | |
| S5 | Perennial Stream | ~845 lf | ~14 to 25 ft | ~0.31 ac | Yes | | | | |
| S6 | Perennial Stream | ~3,380 lf | ~65 to 75 ft | ~5.15 ac | Yes | | | | |
| S7 | Perennial Stream | ~1,880 lf | ~28 to 30 ft | ~1.06 ac | Yes | | | | |
| S8 | Perennial Stream | ~415 lf | ~20 to 25 ft | ~0.16 ac | Yes | | | | |
| S9 | Ephemeral Stream | ~80 lf | ~ 1 ft | ~0.002 ac | Yes | | | | |
| Jurisdictional Stream Total: | | ~12,790 lf | n/a | ~7.62 ac | n/a | | | | |
| | | OPEN WATE | RS | | | | | | |
| OW4 | Open Water | n/a | n/a | ~0.10 ac | Yes | | | | |
| OW5 | Open Water | n/a | n/a | ~7.06 ac | Yes | | | | |
| OW6 | Open Water | n/a | n/a | ~2.05 ac | Yes | | | | |
| OW7 | Open Water | n/a | n/a | ~0.60 ac | Yes | | | | |
| Juris | sdictional Open Water Total: | n/a | n/a | ~9.81 ac | n/a | | | | |
| | FOI | RESTED WET | LANDS | | | | | | |
| FW1 | Forested Wetland | n/a | n/a | ~5.54 ac | Yes | | | | |
| FW2 | Forested Wetland | n/a | n/a | ~3.14 ac | Yes | | | | |
| FW3 | Forested Wetland | n/a | n/a | ~5.46 ac | Yes | | | | |
| FW4 | Forested Wetland | n/a | n/a | ~14.38 ac | Yes | | | | |
| FW5 | Forested Wetland | n/a | n/a | ~1.29 ac | Yes | | | | |
| FW6 | Forested Wetland | n/a | n/a | ~4.08 ac | Yes | | | | |
| FW7 | Forested Wetland | n/a | n/a | ~3.21 ac | Yes | | | | |

Table 1: Summary of observed aquatic resources within the study area.

| Feature | Feature Type | Approximate Amount of Aquatic Resources | | | Likely Waters | | | | |
|------------------------------------|---------------------------------|--|------|-----------|---------------|--|--|--|--|
| ID | | Linear Feet | онwм | Acres | of the U.S. | | | | |
| FW8 | Forested Wetland | n/a | n/a | ~13.23 ac | Yes | | | | |
| FW9 | Forested Wetland | n/a | n/a | ~15.41 ac | Yes | | | | |
| FW10 | Forested Wetland | n/a | n/a | ~0.07 ac | Yes | | | | |
| FW11 | Forested Wetland | n/a | n/a | ~1.27 ac | Yes | | | | |
| Jurisdic | tional Forested Wetlands Total: | n/a | n/a | ~67.08 ac | n/a | | | | |
| EMERGENT WETLANDS | | | | | | | | | |
| EW1 | Emergent Wetland | n/a | n/a | ~1.45 ac | Yes | | | | |
| EW2 | Emergent Wetland | n/a | n/a | ~1.63 ac | Yes | | | | |
| EW3 | Emergent Wetland | n/a | n/a | ~3.96 ac | Yes | | | | |
| EW4 | Emergent Wetland | n/a | n/a | ~16.94 ac | Yes | | | | |
| EW5 | Emergent Wetland | n/a | n/a | ~20.13 ac | Yes | | | | |
| EW6 | Emergent Wetland | n/a | n/a | ~4.86 ac | Yes | | | | |
| EW7 | Emergent Wetland | n/a | n/a | ~0.62 ac | Yes | | | | |
| Jurisdic | tional Emergent Wetlands Total: | n/a | n/a | ~49.59 ac | n/a | | | | |
| Likely Non-Jurisdictional Features | | | | | | | | | |
| OPEN WATER | | | | | | | | | |
| OW1 | Open Water | n/a | n/a | ~0.23 ac | No | | | | |
| OW2 | Open Water | n/a | n/a | ~0.54 ac | No | | | | |
| OW3 | Open Water | n/a | n/a | ~0.59 ac | No | | | | |
| OW8 | Open Water | n/a | n/a | ~0.09 ac | No | | | | |
| OW9 | Open Water | n/a | n/a | ~0.13 ac | No | | | | |
| Non-Ju | risdictional Open Water Total: | n/a | n/a | ~1.58 ac | n/a | | | | |

Disclaimer:

Kimley-Horn has prepared this document based on limited field observations and our interpretation, as wetland scientists, of the Corps' regulations at 33 CFR 328 Definition of Waters of the United States as well as joint Corps and EPA guidance regarding the Rapanos Decision issued on June 5, 2007 (revised in December 2008). While Kimley-Horn believes our interpretation to be accurate, final authority to interpret the regulations lies with the Corps and EPA. Corps and EPA Headquarters occasionally issue guidance that changes the interpretation of published regulations. Guidance issued after the date of this report has the potential to invalidate our conclusion and/or recommendations and may cause a need to reevaluate our recommendation. Because Kimley-Horn has no regulatory authority, the Client understands that proceeding based solely upon this document does not protect the Client from potential sanction or fines from the Corps. The Client acknowledges that they have the opportunity to submit a proposed jurisdictional determination to the Corps for concurrence prior to proceeding with any work. If the Client elects not to do so, then the Client proceeds at their sole risk.

Please contact Mr. Carland Holstead by phone at (469) 914-8717 or by email at <u>carland.holstead@kimley-horn.com</u> if you have questions or need additional information.

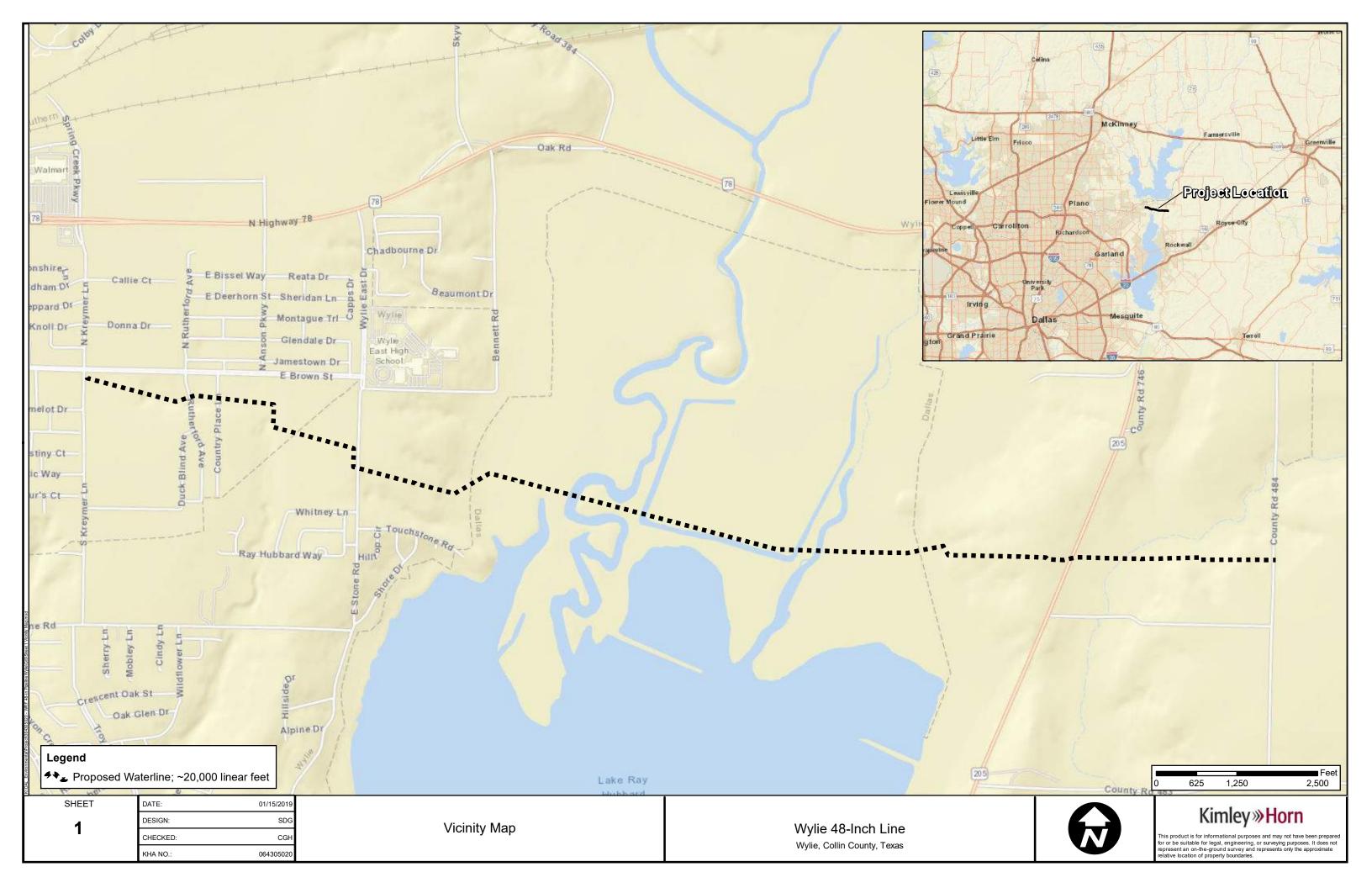
Sincerely,

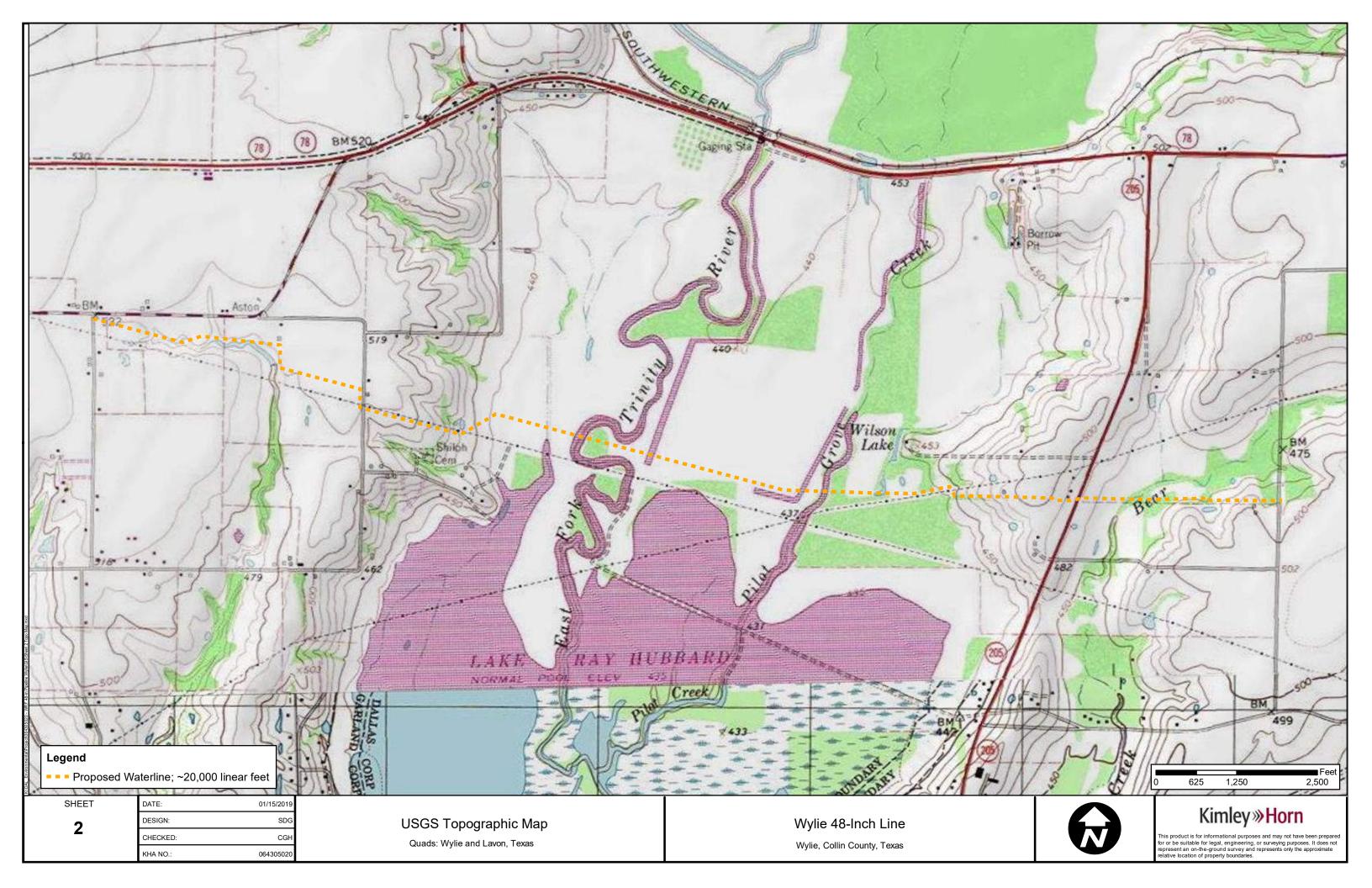
Carland S. Halstead

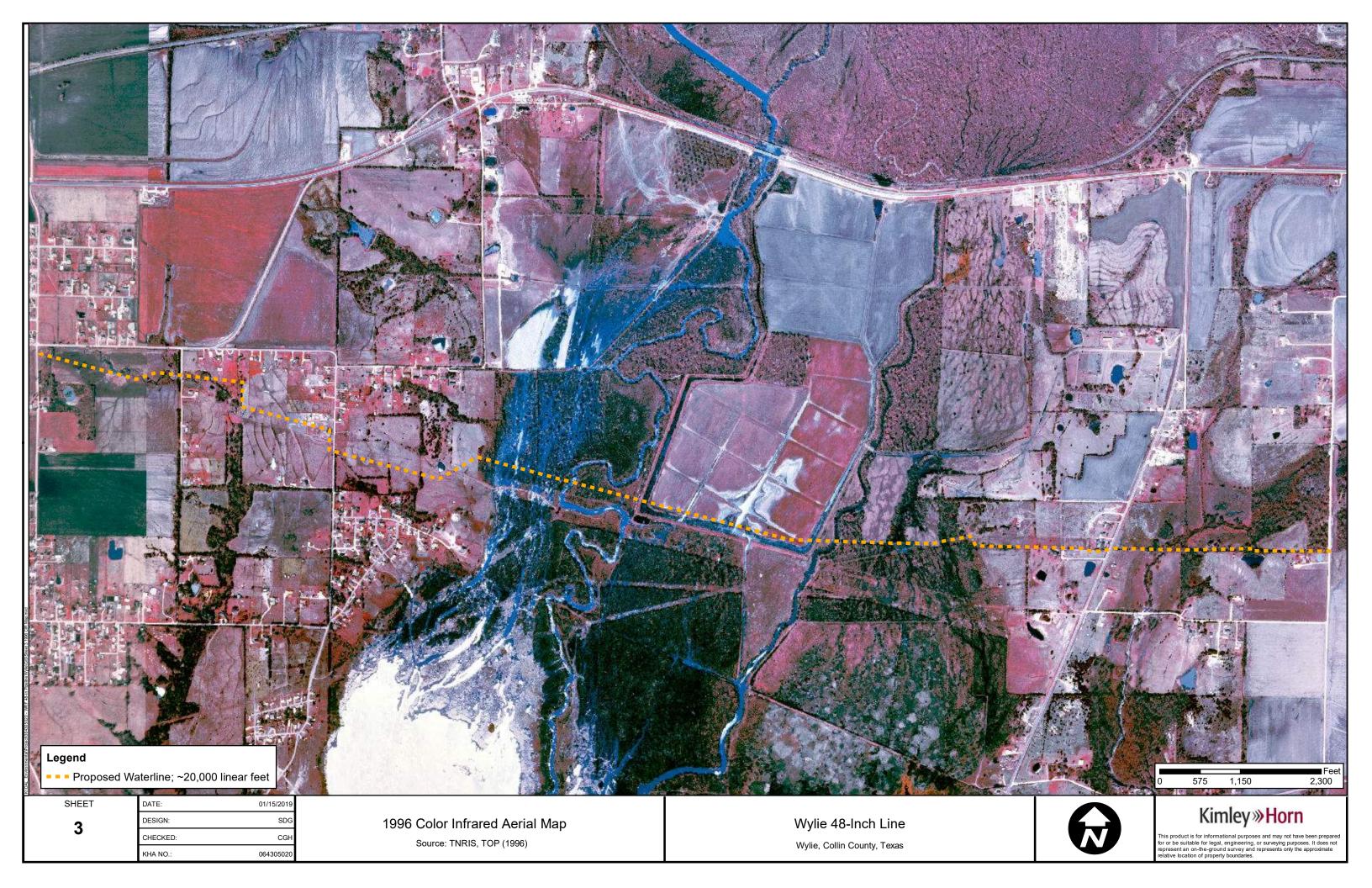
Carland G. Holstead, PWS Project Manager

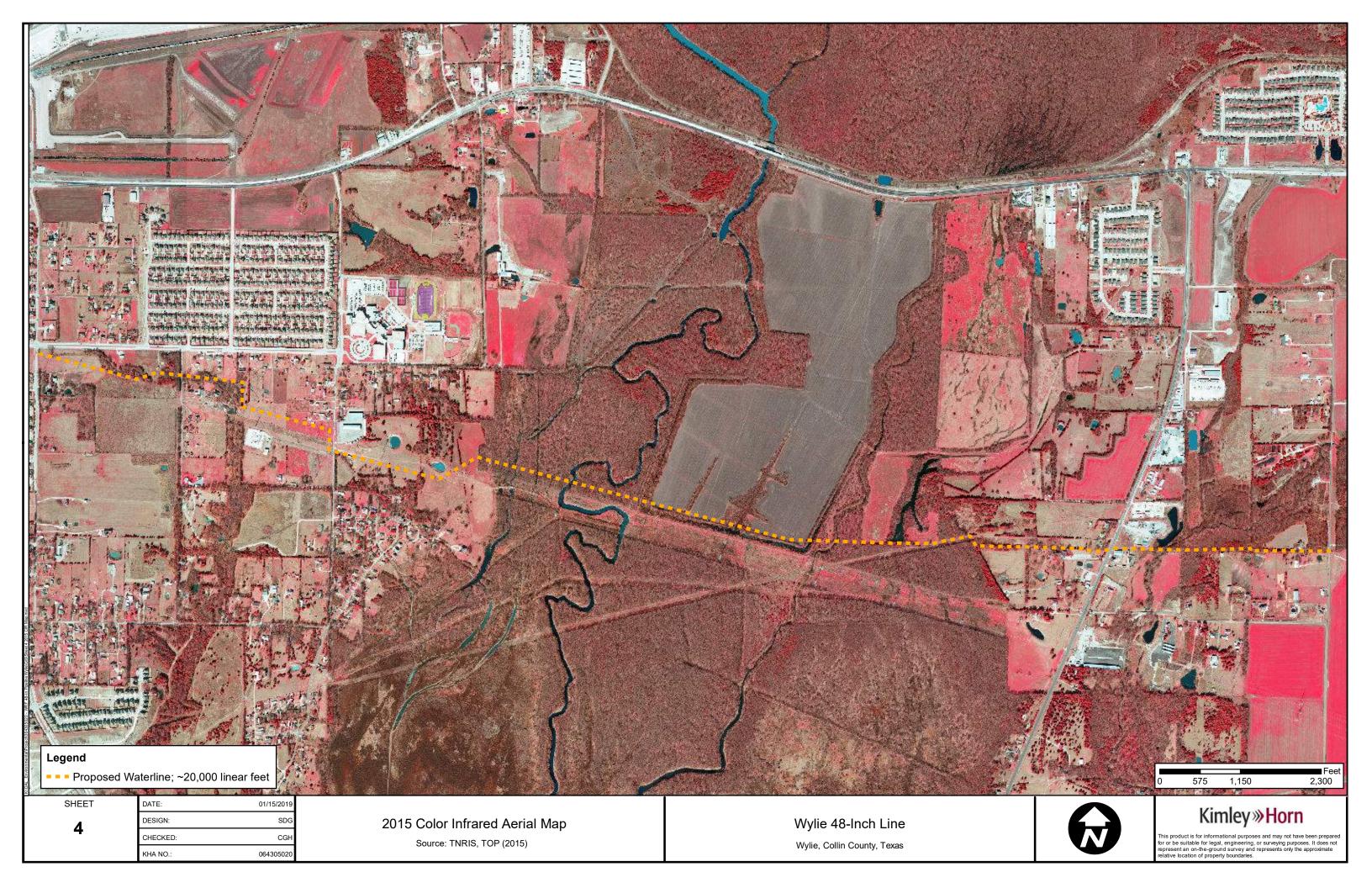
Appendix A

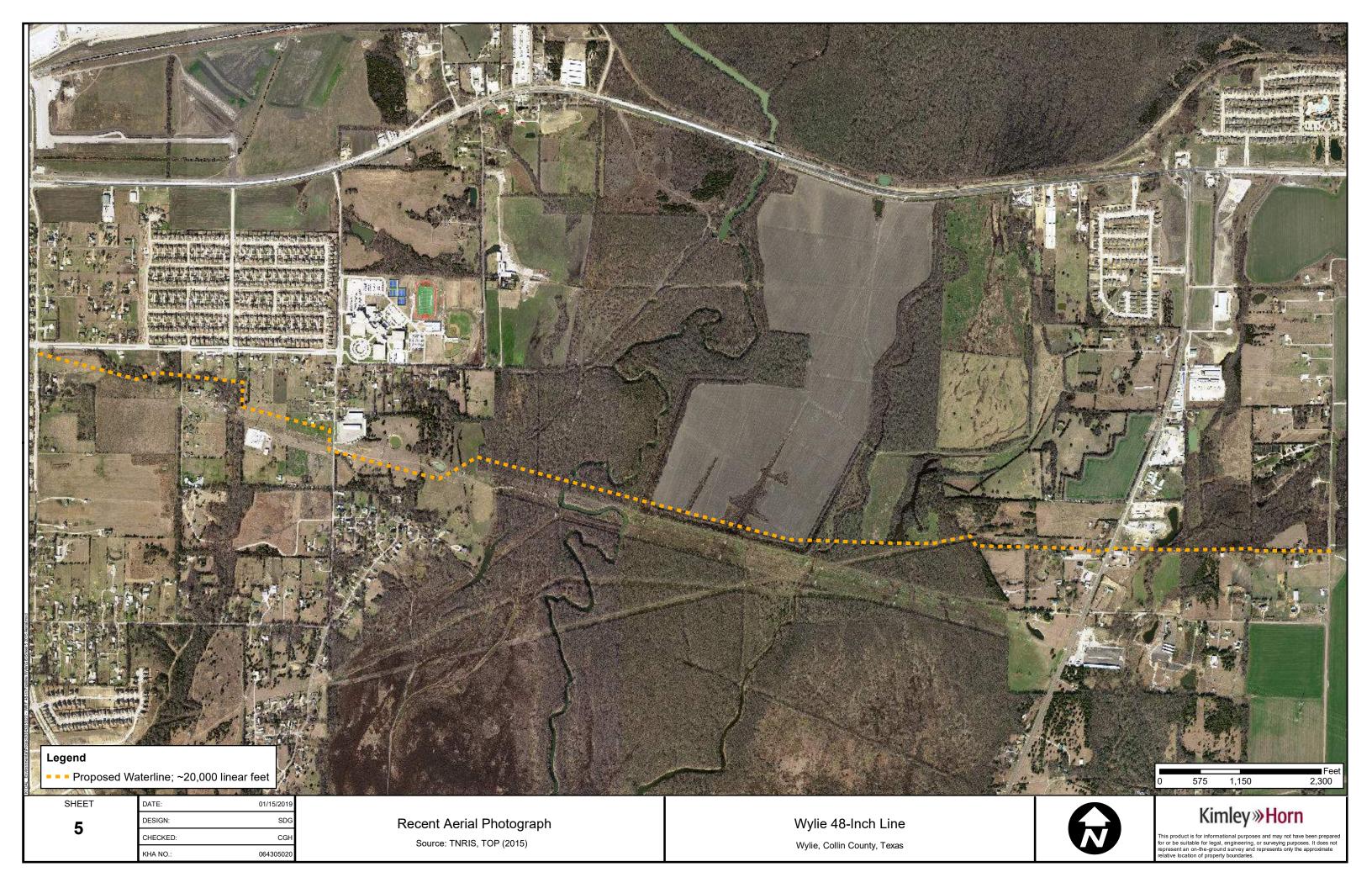
STUDY AREA MAPS

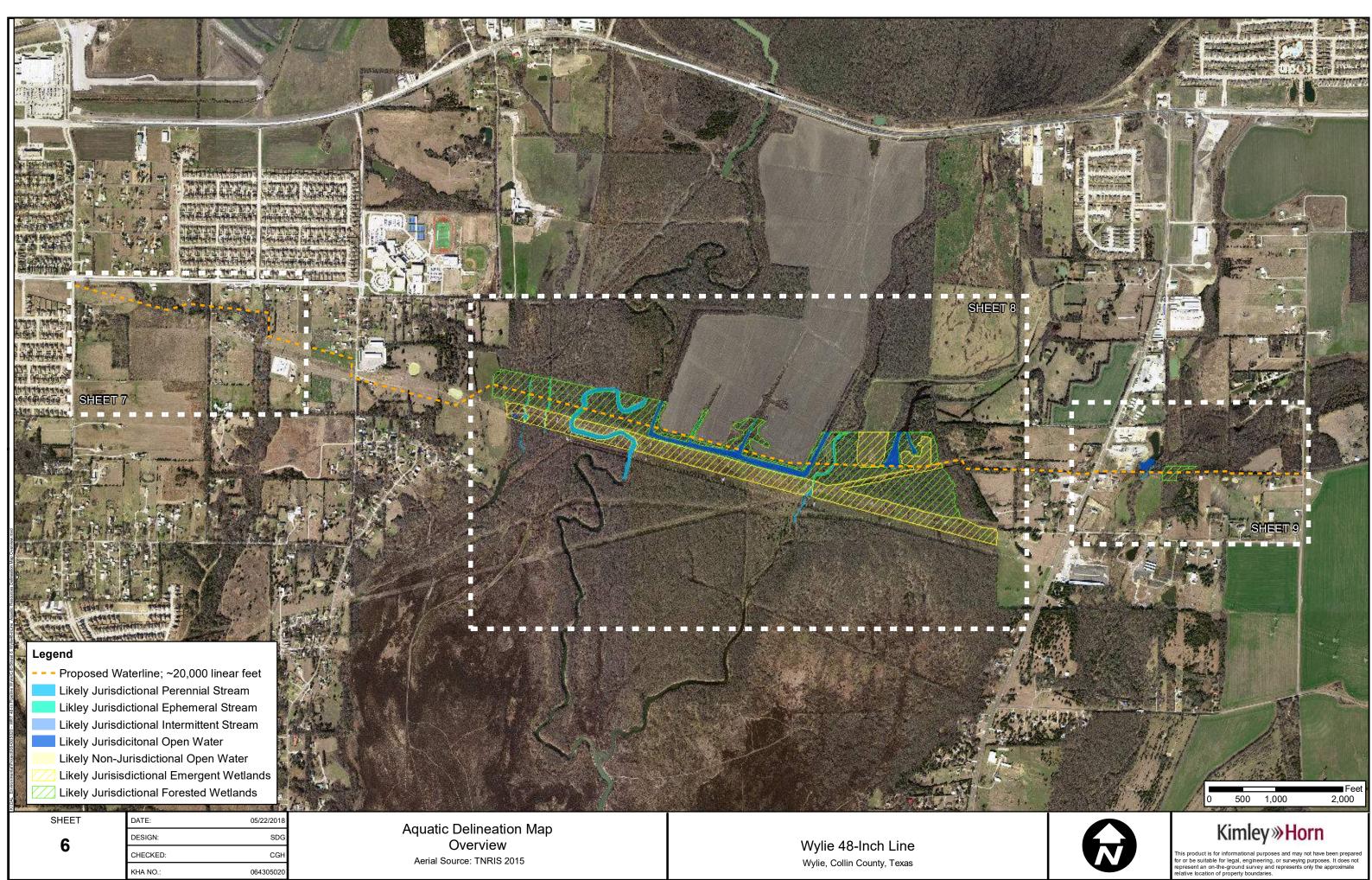


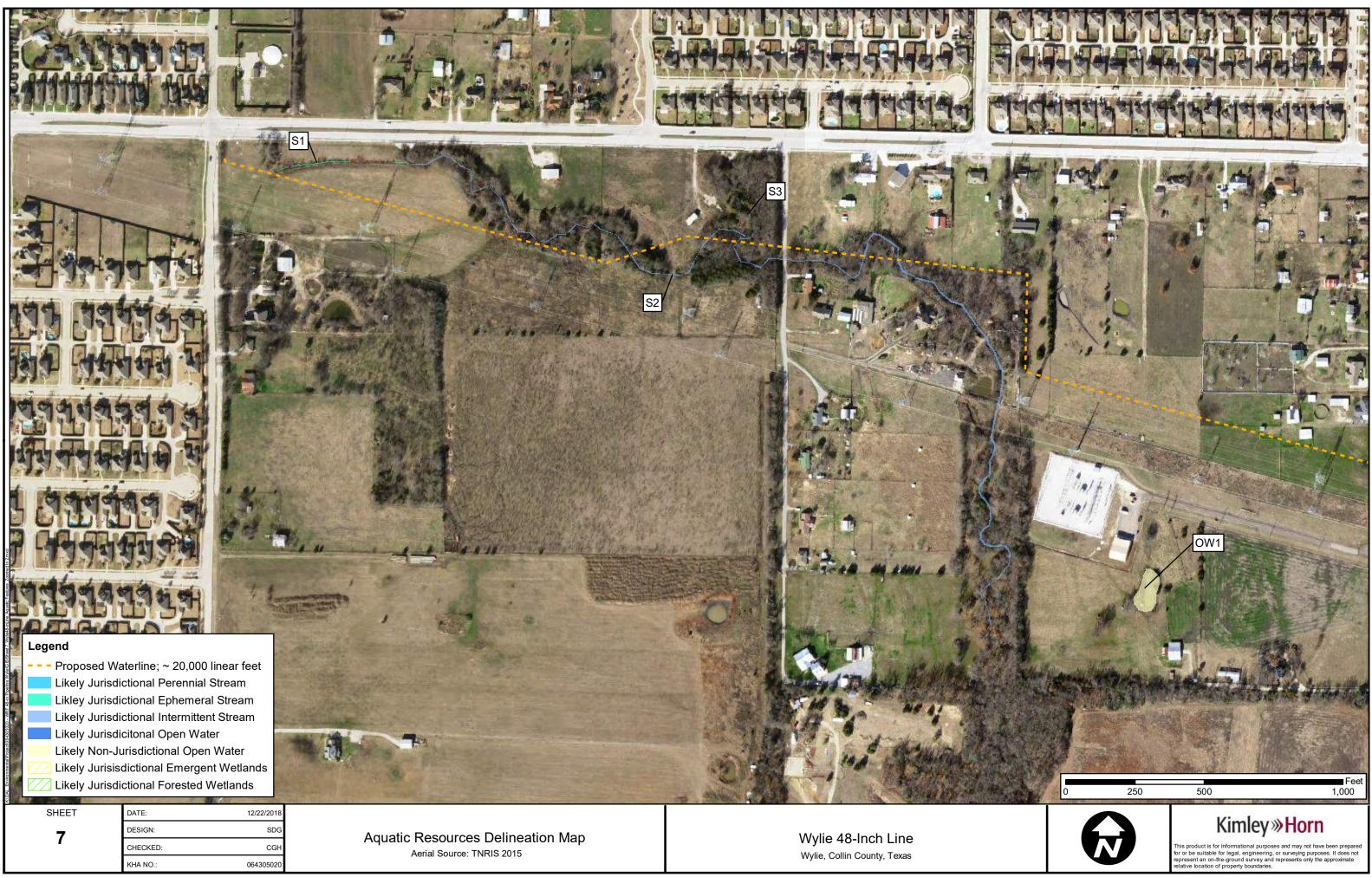




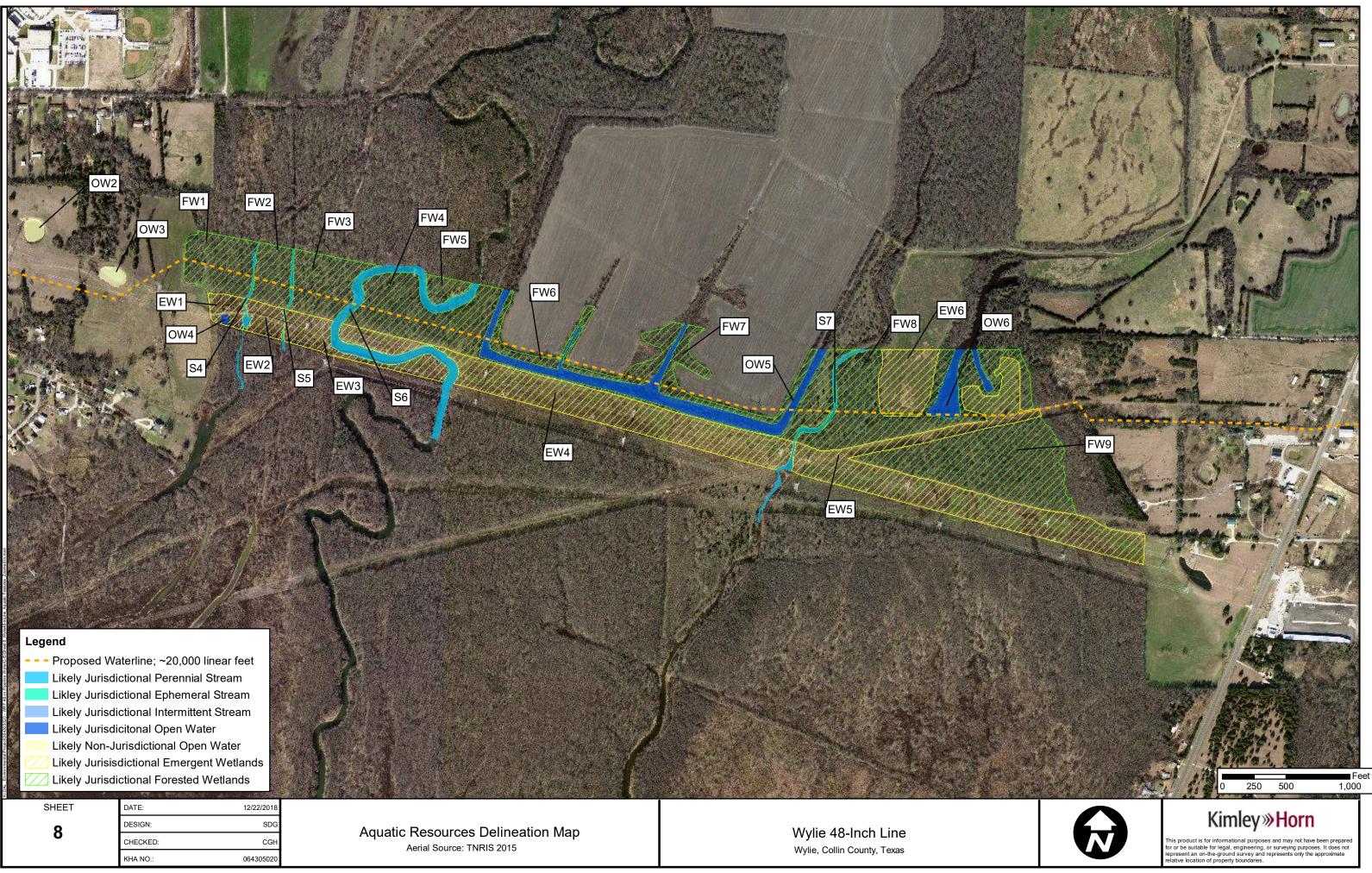








| Aquatic Resources Delineation | Ma |
|-------------------------------|----|
| Aerial Source: TNRIS 2015 | |



| Aquatic Resources Delineation | Ma |
|-------------------------------|----|
| Aerial Source: TNRIS 2015 | |



| | DATE: | 12/22/2018 | |
|---|----------|------------|--|
| 9 | DESIGN: | SDG | |
| 9 | CHECKED: | CGH | |
| | KHA NO.: | 064305020 | |

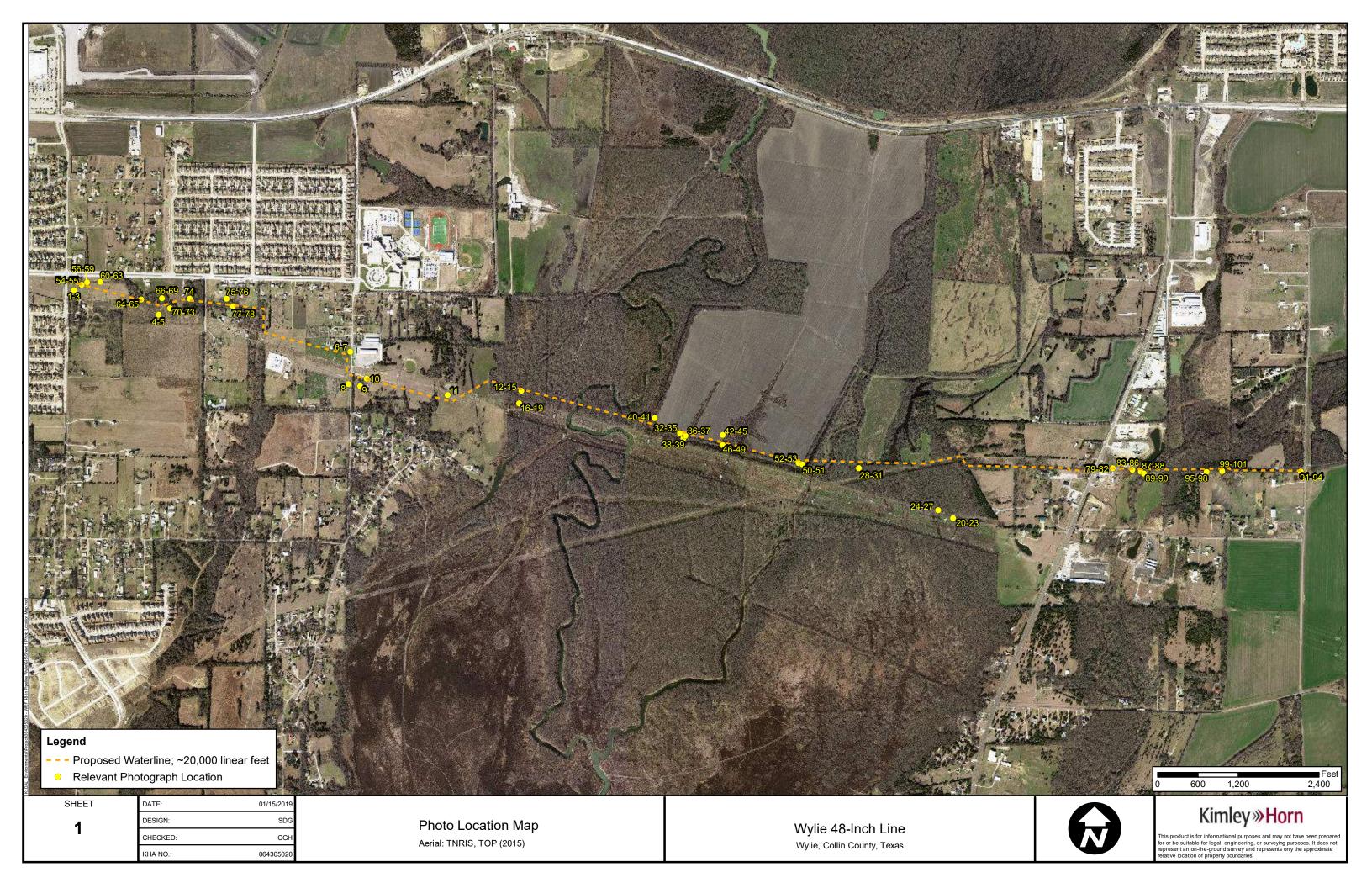
Aerial Source: TNRIS 2015

Wylie, Collin County, Texas

Appendix B

PHOTO LOCATION MAP

GROUND LEVEL PHOTOGRAPHS

















































































































































































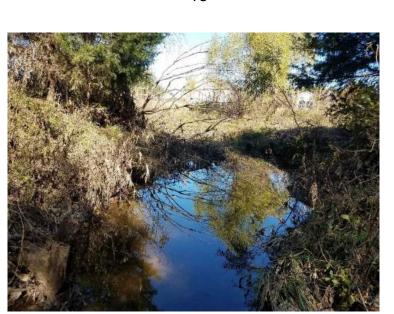






































































Appendix C

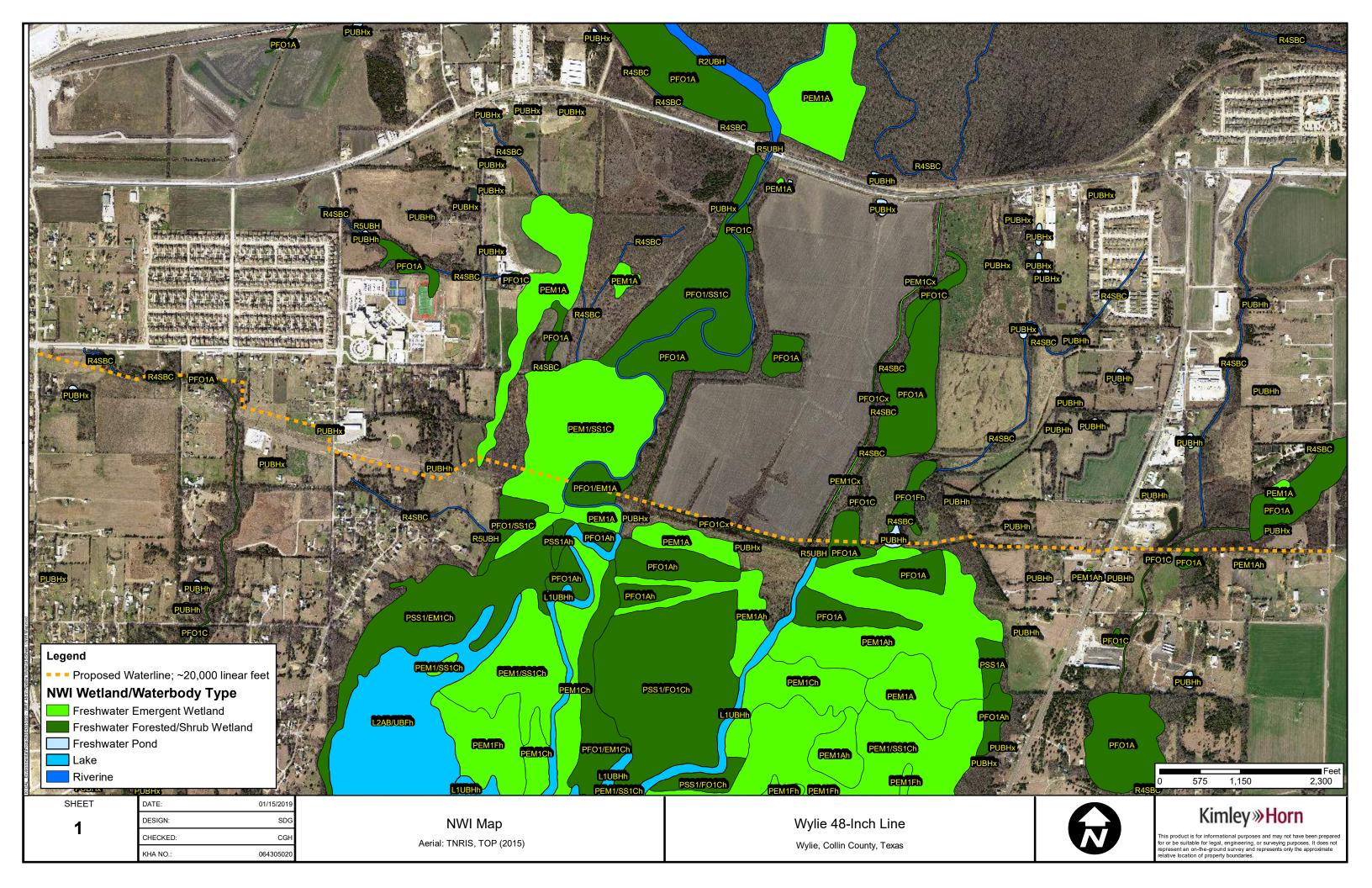
FEMA FLOOD HAZARD MAP

| FEMA Floodplai | | | |
|----------------|---|--|--|
| | | | |
| | | | |
| | | | |
| | and the second se | | |



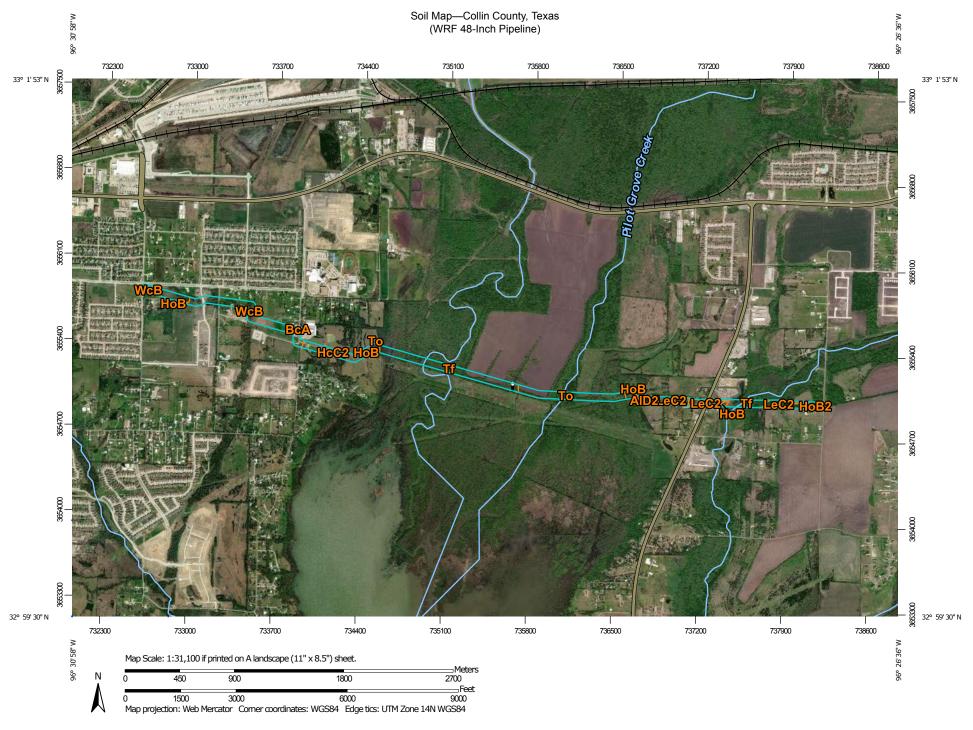
Appendix D

USFWS NWI MAP



Appendix E

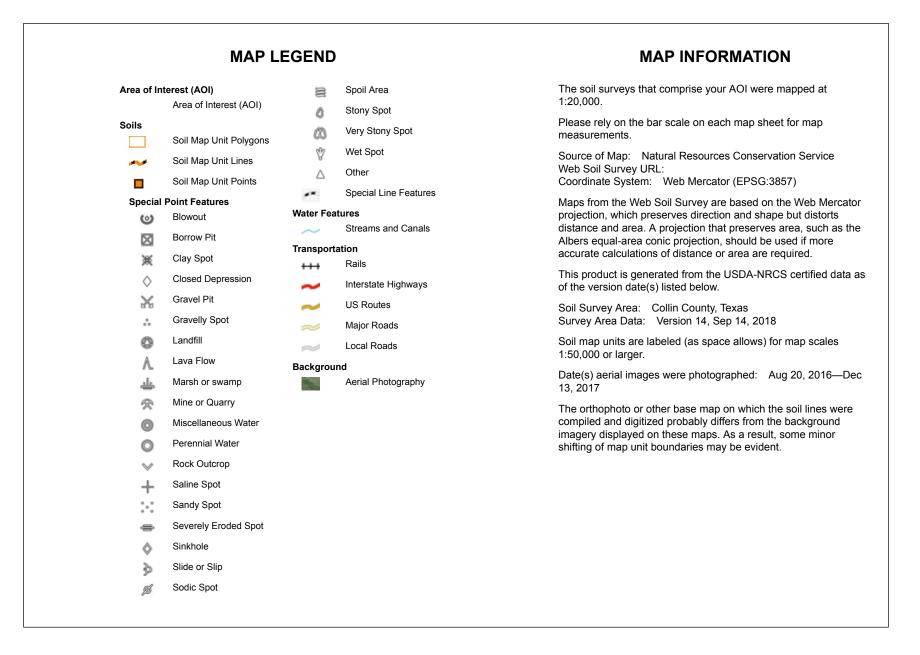
WEB SOIL SURVEY SOILS MAP



USDA Natural Resources

Conservation Service

Web Soil Survey National Cooperative Soil Survey



USDA

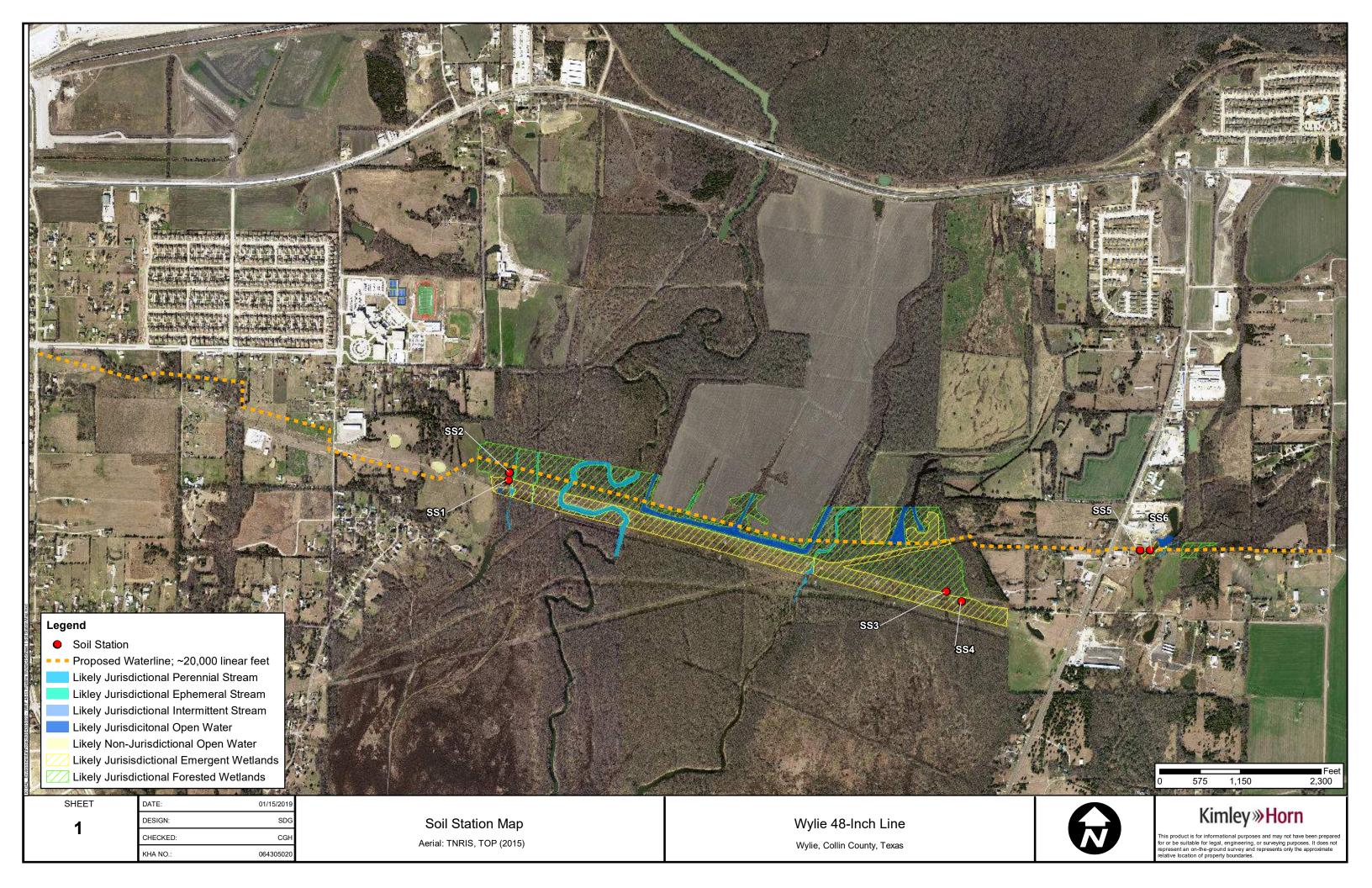
Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|-----------------------------|---|--------------|----------------|
| AID2 | Altoga silty clay, 5 to 8 percent slopes, eroded | 2.2 | 2.4% |
| BcA | Burleson clay, 0 to 1 percent slopes | 0.4 | 0.4% |
| HcC2 | Heiden clay, 3 to 5 percent slopes, eroded | 9.2 | 10.1% |
| НоВ | Houston Black clay, 1 to 3 percent slopes | 10.2 | 11.2% |
| HoB2 | Houston Black clay, 2 to 4 percent slopes, eroded | 2.7 | 3.0% |
| LeC2 | Lewisville silty clay, 3 to 5 percent slopes, eroded | 10.0 | 11.1% |
| Tf | Tinn clay, 0 to 1 percent slopes, frequently flooded | 22.6 | 24.9% |
| То | Trinity clay, 0 to 1 percent slopes, occasionally flooded | 14.6 | 16.1% |
| WcB | Wilson clay loam, 1 to 3 percent slopes | 18.7 | 20.6% |
| Totals for Area of Interest | | 90.6 | 100.0% |

Appendix F

WETLAND DETERMINATION DATA FORM LOCATION MAP

WETLAND DETERMINATION DATA FORMS



WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | City/County: Collin County | Sampling Date: <u>5/14/2018</u> |
|--|--|---------------------------------|
| Applicant/Owner: North Texas Municipal Water District | State: TX | Sampling Point: <u>1</u> |
| Investigator(s): SDG, CGH | Section, Township, Range: <u>N/A</u> | |
| Landform (hillslope, terrace, etc.): Flat | Local relief (concave, convex, none): | Slope (%): >1 |
| Subregion (LRR): LRR J Lat: <u>33.010</u> | Long: <u>-96.488</u> | Datum: NAD83 |
| Soil Map Unit Name: Tf - Tinn clay, 0 to 1 percent slopes, free | quently flooded NWI classificat | on: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this time of y Are Vegetation Soil, or Hydrology significant | ear? Yes 🖌 No 🦳 (If no, explain in F | Remarks.) |
| | oroblematic? (If needed, explain any answe | |
| SUMMARY OF FINDINGS – Attach site map showing | g sampling point locations, transect | s, important features, etc. |
| Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No | Is the Sampled Area within a Wetland? Yes | No |
| Remarks: | | |
| Emergent Wetland, Photos 16-19 | | |

VEGETATION – Use scientific names of plants.

| | Absolute | Domina | nt Indicator | Dominance Test worksheet: |
|---|----------|-----------|---------------|--|
| Tree Stratum (Plot size: <u>30</u> ') | % Cover | Species | <u>Status</u> | Number of Dominant Species |
| 1 | | | | That Are OBL, FACW, or FAC (A) |
| 2 | | | | (excluding FAC-): <u>Z</u> (A) |
| 3 | | | | Total Number of Dominant |
| 4 | | | | Species Across All Strata: <u>3</u> (B) |
| 5 | | | | Durant of Duration (Duration |
| ··· | 0 | = Total | | Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B) |
| Sapling/Shrub Stratum (Plot size: 15') | | | Cover | |
| 1 Fraxinus pennsylvanica | 5 | Y | FAC | Prevalence Index worksheet: |
| | | | | Total % Cover of: Multiply by: |
| 2 | | | | OBL species X 1 =75 |
| 3 | | | | FACW species x 2 = |
| 4 | | | | FAC species 5 $x_3 = 15$ |
| 5 | | | | FACU species 20 $x = 100$ |
| | 5 | _ = Total | Cover | · · · · · · · · · · · · · · · · · · · |
| Herb Stratum (Plot size: 5') | | | 0.01 | UPL species x 5 = |
| 1. Eleocharis spp. | 75 | <u>Y</u> | OBL | Column Totals: <u>100</u> (A) <u>190</u> (B) |
| 2. Sorghum halepense | 10 | N | FACU | 10 |
| 3 | | | | Prevalence Index = B/A = <u>1.9</u> |
| 4 | | | | Hydrophytic Vegetation Indicators: |
| 5 | | | | 1 - Rapid Test for Hydrophytic Vegetation |
| | | | | ✓ 2 - Dominance Test is >50% |
| 6 | | | | ✓ 3 - Prevalence Index is ≤3.0 ¹ |
| 7 | | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | | | |
| 10 | | | | Problematic Hydrophytic Vegetation ¹ (Explain) |
| | 85 | = Total | Cover | |
| Woody Vine Stratum (Plot size:15') | | | | ¹ Indicators of hydric soil and wetland hydrology must |
| 1 Rubus trivialis | 10 | Y | FACU | be present, unless disturbed or problematic. |
| 2. | | | | Hydrophytic |
| | 10 | | | Vegetation |
| % Bare Ground in Herb Stratum <u>15%</u> | 10 | = Total | Cover | Present? Yes Yes No |
| Remarks: (Include photo numbers here or on a separate s | sheet.) | | | |
| | | | | |
| Hydrophytic vegetation was observed. | | | | |

SOIL

Sampling Point: 1

| Profile Desc | ription: (Describe | to the dept | h needed to docum | ent the | indicator | or confirm | m the absence | e of indicators.) |
|------------------------------|---|----------------|------------------------------|-----------|-------------------|-------------|-----------------------|--|
| Depth | Matrix | | | Feature | s | | | |
| (inches) | Color (moist) | | Color (moist) | % | Type ¹ | | <u> </u> | Remarks |
| <u>0-18</u> | 10Y 3/1 | 95 | 10YR 4/6 | 5 | С | М | clay loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | · | · | |
| | | | | | | | · | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | letion RM- | Reduced Matrix, CS | -Covere | d or Coat | ad Sand G | raine ² Lo | cation: PL=Pore Lining, M=Matrix. |
| Hydric Soil | | | Neuliceu Mairix, CO | | | eu Sanu G | | s for Problematic Hydric Soils ³ : |
| Histos | | | Sa Sa | ndv Glev | ed Matrix | (S4) | | Muck (A9) (LRRI, J) |
| | Epipedon (A2) | | | ndy Red | | (04) | | st Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | | atrix (S6) | | | Surface (S7) (LRR G) |
| Hydrog | gen Sulfide (A4) | | Lo | amy Muc | ky Minera | al (F1) | | Plains Depressions (F16) |
| | ed Layers (A5) (LRF | | | | ed Matrix | (F2) | | H outside of MLRA 72 & 73) |
| | luck (A9) (LRR F, G | | | | atrix (F3) | | | uced Vertic (F18) |
| | ed Below Dark Surfa | ace (A11) | | | Surface | | | Parent Material (TF2) |
| | Dark Surface (A12) | | | • | ark Surfa | . , | | (Explain in Remarks) |
| | Mucky Mineral (S1) | | | | ressions (| , | | ators of hydrophytic vegetation and |
| | Mucky Peat or Pea lucky Peat or Peat (| . , . | · · · | - | 73 of LR | ions (F16) | | nd hydrology must be present, s disturbed or problematic. |
| | _ayer (if observed) | | (111 | | 10 OI EI | | | |
| Type: | | • | | | | | | |
| Depth (inc | ches). | | | | | | Hydric Soi | I Present? Yes 🖌 No |
| Remarks: | | | | | | | injune con | |
| | ils along the alignme | ent. | | | | | | |
| | ie along the alightin | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| HYDROLO | GY | | | | | | | |
| - | drology Indicators: | | | | | | | |
| Primary India | ators (minimum of c | one is require | ed; <u>check all that ap</u> | oly) | | | Second | ary Indicators (minimum of two required) |
| Surfac | e Water (A1) | | Salt Crust | (B11) | | | Su | rface Soil Cracks (B6) |
| High W | /ater Table (A2) | | Aquatic In | vertebrat | es (B13) | | Sp | arsely Vegetated Concave Surface (B8) |
| 🖌 Satura | tion (A3) | | Hydrogen | Sulfide C | dor (C1) | | Dra | ainage Patterns (B10) |
| | Marks (B1) | | Dry-Seaso | n Water | Table (C2 | 2) | Ox | kidized Rhizospheres on Living Roots |
| (C3) | | | | | | | | |
| | ent Deposits (B2) | | | | eres on L | iving Roots | | ere tilled) |
| | eposits (B3) | | (where not | , | | | | ayfish Burrows (C8) |
| | lat or Crust (B4) | | Presence | | , | (4) | | ituration Visible on Aerial Imagery (C9) |
| | eposits (B5) | (5 | | | · / | | | eomorphic Position (D2) |
| | tion Visible on Aeria | 0 , (| | | , | | LFA | C-Neutral Test (D5) |
| | Stained Leaves (B9 |) | Frost-Hea | ve Humm | iocks (D7 |) (LRR F) | | |
| Field Obser | | | | <i>.</i> | | | | |
| Surface Wat | | | | (inches): | | | | |
| Water Table | | | | (inches): | | — | | |
| Saturation P | | res 🖌 | No Depth | (inches): | U | Wet | land Hydrolog | gy Present? Yes 🖌 No 🔄 |
| (includes cap Describe Re | | n gauge, mor | nitoring well, aerial p | hotos, pr | evious in | spections). | , if available: | |
| | , | 5 6 7 - | | , | | . /: | | |
| Remarks: | | | | | | | | |

Wetland hydrology was observed.

WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | City/County: Collin County | _ Sampling Date: <u>5/14/2018</u> |
|---|--|---|
| Applicant/Owner: North Texas Municipal Water District | State: TX | _ Sampling Point: 2 |
| Investigator(s): SDG, CGH | Section, Township, Range: <u>N/A</u> | |
| Landform (hillslope, terrace, etc.): Flat | Local relief (concave, convex, none): <u>none</u> | Slope (%): <u>>1</u> |
| Subregion (LRR): LRR J Lat: 33.011 | Long: <u>-96.488</u> | Datum: NAD83 |
| Soil Map Unit Name: Tf - Tinn clay, 0 to 1 percent slopes, fre | quently flooded NWI classification | ion: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this time of the vegetation Soil, or Hydrology significant Are Vegetation Soil, or Hydrology naturally SUMMARY OF FINDINGS – Attach site map showing the stress of the site map showing the stress of the site map showing the stress of t | tly disturbed? Are "Normal Circumstances" problematic? (If needed, explain any answer) | present? Yes No No present? Yes rs in Remarks.) |
| Hydrophytic Vegetation Present?YesNoHydric Soil Present?YesNoWetland Hydrology Present?YesNo | Is the Sampled Area within a Wetland? Yes | No |
| Remarks: Forested Wetland, Photos 12-15 | · | |
| VEGETATION – Use scientific names of plants. | | |

| | Absolute | Dominan | t Indicator | Dominance Test worksheet: |
|---|----------|-------------|-------------|---|
| Tree Stratum (Plot size: <u>30</u> ') | | | ? Status | Number of Dominant Species |
| 1. Fraxinus pennsylvanica | 80 | Y | FAC | That Are OBL, FACW, or FAC |
| 2 | | | | (excluding FAC-): <u>5</u> (A) |
| 3 | | | | Total Number of Dominant |
| 4 | | | | Species Across All Strata: <u>5</u> (B) |
| 5 | | | | Percent of Dominant Species |
| | 00 | = Total C | Cover | That Are OBL, FACW, or FAC: <u>100%</u> (A/B) |
| Sapling/Shrub Stratum (Plot size: <u>15</u> ') | | | | |
| 1. Fraxinus pennsylvanica | 30 | Υ | FAC | Prevalence Index worksheet: |
| 2 | | | | Total % Cover of: Multiply by: |
| 3 | | | | OBL species <u>25</u> x 1 = <u>25</u> |
| 4 | | | | FACW species x 2 = |
| 5. | | | | FAC species 110 x 3 = 330 |
| J | 30 | | | FACU species x 4 = |
| Herb Stratum (Plot size: 5') | | _ = Total (| Cover | UPL species x 5 = |
| 1 Persicaria hydropiperoides | 20 | Y | OBL | Column Totals: 135 (A) 355 (B) |
| 2. Typha latifolia | 5 | Y | OBL | |
| | | | | Prevalence Index = $B/A = 2.63$ |
| 3 | | | | Hydrophytic Vegetation Indicators: |
| 4 | | | | 1 - Rapid Test for Hydrophytic Vegetation |
| 5 | | | | ✓ 2 - Dominance Test is >50% |
| 6 | · | | | \checkmark 3 - Prevalence Index is ≤3.0 ¹ |
| 7 | · | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | | | |
| 10 | | | | Problematic Hydrophytic Vegetation ¹ (Explain) |
| | 25 | _ = Total (| Cover | |
| Woody Vine Stratum (Plot size:15') | | | | ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 1 | | | | |
| 2 | | | | Hydrophytic |
| % Bare Ground in Herb Stratum 75% | | _= Total C | Cover | Vegetation Present? Yes No |
| Remarks: (Include photo numbers here or on a separate s | sheet.) | | | 1 |
| | | | | |
| Hydrophytic vegetation was observed. | | | | |

SOIL

| Profile Des | cription: (Describ | e to the depth n | eeded to do | cument the indic | ator or confirm | n the absence o | of indicators.) |
|------------------------|--------------------------|-------------------|----------------------|---------------------|----------------------------------|--------------------------|---|
| Depth | Matrix | | | edox Features | 1 0 | | |
| (inches) | Color (moist) | %(| <u>Color (moist)</u> | %Ту | pe ¹ Loc ² | Texture | Remarks |
| | | | | | | | |
| | | | | | | | |
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| | <u> </u> | | | | | · | |
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| | | | | | | | |
| | | | | | | | |
| ¹ Type: C=C | oncentration, D=D | epletion, RM=Red | duced Matrix | . CS=Covered or (| Coated Sand Gr | rains. ² Loca | ation: PL=Pore Lining, M=Matrix. |
| | Indicators: | | | , | | | for Problematic Hydric Soils ³ : |
| | ol (A1) | | | Sandy Gleyed M | atrix (S4) | | /uck (A9) (LRRI, J) |
| | Epipedon (A2) | | | Sandy Redox (S | | | Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | Stripped Matrix (| | | Surface (S7) (LRR G) |
| | gen Sulfide (A4) | | | Loamy Mucky M | , | | Plains Depressions (F16) |
| | ied Layers (A5) (LI | RR F) | | Loamy Gleyed N | · · · | - | l outside of MLRA 72 & 73) |
| 1 cm | Muck (A9) (LRR F, | G, H) | | Depleted Matrix | (F3) | | ed Vertic (F18) |
| Deple | ted Below Dark Su | rface (A11) | | Redox Dark Surf | ace (F6) | | arent Material (TF2) |
| | Dark Surface (A12 | , | | Depleted Dark S | . , | | Explain in Remarks) |
| | / Mucky Mineral (S | | | Redox Depression | () | | ors of hydrophytic vegetation and |
| | n Mucky Peat or Pe | | H) | High Plains Dep | . , | | hydrology must be present, |
| | Mucky Peat or Pea | | | (MLRA 72 & 73 o | f LRR H) | unless o | disturbed or problematic. |
| Restrictive | Layer (if observe | d): | | | | | |
| Туре: | | | | | | | |
| Depth (in | iches): | | | | | Hydric Soil I | Present? Yes 🚩 No |
| Remarks: | | | | | | • | |
| | | | The soil stati | on is assumed to h | nave hydric soils | s based on the s | standing water, presence of hydric soils, |
| and presenc | e of hydrophytic ve | getation. | | | | | |
| | | | | | | | |
| | | | | | | | |
| HYDROLC | | | | | | | |
| Wetland Hy | drology Indicator | s: | | | | | |
| | <u>cators (minimum o</u> | | | | | Secondar | ry Indicators (minimum of two required) |
| Surfac | ce Water (A1) | | Salt C | rust (B11) | | Surf | ace Soil Cracks (B6) |
| High \ | Water Table (A2) | | Aquat | ic Invertebrates (B | 13) | Spai | rsely Vegetated Concave Surface (B8) |
| Satura | ation (A3) | | Hydro | gen Sulfide Odor (| C1) | Drai | nage Patterns (B10) |
| | Marks (B1) | | Dry-S | eason Water Table | e (C2) | Oxid | lized Rhizospheres on Living Roots |
| (C3) | | | | | | | |
| | nent Deposits (B2) | | Oxidiz | ed Rhizospheres | on Living Roots | (C3) (whe | re tilled) |
| Drift D | eposits (B3) | | (where | not tilled) | | 🖌 Cray | /fish Burrows (C8) |
| Algal | Mat or Crust (B4) | | Prese | nce of Reduced Ire | on (C4) | Satu | ration Visible on Aerial Imagery (C9) |
| Iron D | eposits (B5) | | Thin N | /luck Surface (C7) | | Geo | morphic Position (D2) |
| Inund | ation Visible on Ae | rial Imagery (B7) | Other | (Explain in Remar | ks) | FAC | -Neutral Test (D5) |
| Water | -Stained Leaves (E | 39) | Frost- | Heave Hummocks | (D7) (LRR F) | | |
| Field Obser | vations: | | | | | | |
| Surface Wa | ter Present? | Yes 🖌 No | De | epth (inches): 2 | | | |
| Water Table | Present? | Yes 🖌 No | | epth (inches): 0 | | | |
| Saturation F | | Yes 🖌 No | | epth (inches): 0 | Wetl | and Hydrology | Present? Yes 🖌 No 🦳 |
| | pillary fringe) | | | | | ana nyarorogy | |
| | ecorded Data (strea | ım gauge, monito | ring well, aei | ial photos, previou | is inspections), | if available: | |
| | | | | | | | |
| Remarks: | | | | | | | |

Wetland hydrology was observed.

WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | ounty Sampling Date: <u>5/14/2018</u> | | | |
|---|---------------------------------------|---------------------|-------------------------|--|
| Applicant/Owner: North Texas Municipal Water Distric | ct | | | State: TX Sampling Point: 3 |
| Investigator(s): SDG, CGH | S | Section, T | ownship, Ran | nge: <u>N/A</u> |
| | | | | , convex, none): <u>none</u> Slope (%): <u>>1</u> |
| Subregion (LRR): LRR J Lat: 33.006 | | | Long: <u>-96</u> | .468 Datum: NAD83 |
| Soil Map Unit Name: To - Trinity clay, 0 to 1 percent s | lopes, oc | casiona | lly flooded | NWI classification: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this | time of yea | ar? Yes | V No | |
| Are Vegetation Soil, or Hydrology s | - | - | | Normal Circumstances" present? Yes 🖌 No 🛄 |
| Are Vegetation Soil, or Hydrology n | | | | eded, explain any answers in Remarks.) |
| | | | | |
| SUMMARY OF FINDINGS – Attach site map s | nowing | Sampi | ing point i | ocations, transects, important reatures, etc. |
| Hydrophytic Vegetation Present? Yes 🖌 No | \square | ls | the Sampled | |
| Hydric Soil Present? Yes V No | ┝╼┥╴ | | thin a Wetlar | |
| Wetland Hydrology Present? Yes V No Remarks: | | | | |
| | | | | |
| Forested Wetland, Photos 24-27 | | | | |
| VEGETATION – Use scientific names of plants. | | | | |
| | Absolute | | int Indicator | Dominance Test worksheet: |
| <u>Tree Stratum</u> (Plot size: <u>30'</u>) <u>1.</u> <i>Fraxinus pennsylvanica</i> | <u>% Cover</u> 60 | <u>Species</u> Y | <u>s?</u> Status FAC | Number of Dominant Species |
| 2. Celtis laevigata | 20 | Y | FAC | That Are OBL, FACW, or FAC (excluding FAC-): 7 (A) |
| 3 Ulmus crassifolia | 20 | Y | FAC | Total Number of Dominant |
| 4. | | | | Species Across All Strata: 7 (B) |
| 5. | | | | Percent of Dominant Species |
| | 100 | _= Total | Cover | That Are OBL, FACW, or FAC: <u>100</u> (A/B) |
| <u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>) 1. <i>Fraxinus pennsylvanica</i> | 15 | Y | FAC | Prevalence Index worksheet: |
| 2. Ulmus crassifolia | 15 | Y | FACU | Total % Cover of:Multiply by: |
| 3 Celtis laevigata | 10 | Y | FAC | OBL species x 1 = |
| 4. | | | | FACW species $\frac{5}{105}$ x 2 = $\frac{10}{105}$ |
| 5 | | | | FAC species 125 $x_3 = 375$ EACLI species 15 $x_4 = 60$ |
| | 40 | _ = Total | l Cover | |
| Herb Stratum (Plot size: <u>5'</u>) 1 Carex grisea | 5 | Y | FACW | UPL species $x = $ Column Totals: 145 (A) 445 (B) |
| 2 | | <u> </u> | · | |
| 3 | | | | Prevalence Index = B/A = <u>3.07</u> |
| 4 | | | | Hydrophytic Vegetation Indicators: |
| 5 | | | | 1 - Rapid Test for Hydrophytic Vegetation |
| 6 | | | | 2 - Dominance Test is >50% 3 - Prevalence Index is $\leq 3.0^{1}$ |
| 7 | | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | | | Problematic Hydrophytic Vegetation ¹ (Explain) |
| 10 | 5 | | l Cover | |
| Woody Vine Stratum (Plot size: 15') | | | | ¹ Indicators of hydric soil and wetland hydrology must |
| 1/ | | | | be present, unless disturbed or problematic. |
| 2 | | | | Hydrophytic |
| % Bare Ground in Herb Stratum <u>60%</u> | 0 | _= Total | Cover | Vegetation Present? Yes No |
| Remarks: (Include photo numbers here or on a separate sl | heet.) | | | · |
| Hydrophytic vegetation was observed. | | | | |

SOIL

Sampling Point: 3

| Profile Desc | ription: (Describe | to the dept | h needed to docur | nent the | indicator | or confirm | m the absence | e of indicators.) |
|-------------------------------|----------------------|---------------|-----------------------|-----------------------|-------------------|---|-----------------|--|
| Depth | Matrix | | | x Feature | es | | | |
| (inches) | Color (moist) | % | Color (moist) | % | Type ¹ | Loc ² | Texture | Remarks |
| <u>0-18</u> | 10Y 3/2 | 90 | 10YR 4/6 | 10 | <u>C</u> | Μ | clay loam | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | _ | | | | |
| 1 | | | | | . <u> </u> | | | |
| Hydric Soil | | pletion, RM= | Reduced Matrix, CS | S=Covere | d or Coat | ed Sand G | | cation: PL=Pore Lining, M=Matrix. |
| | | | | | un al Manaturia | (04) | | • |
| Histos | Epipedon (A2) | | | andy Gley andy Red | /ed Matrix | (54) | | Muck (A9) (LRRI, J) t Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | ripped Ma | . , | | | Surface (S7) (LRR G) |
| | gen Sulfide (A4) | | | | ky Minera | al (F1) | | Plains Depressions (F16) |
| | ed Layers (A5) (LR | RF) | | • | yed Matrix | . , | 0 | Houtside of MLRA 72 & 73) |
| | luck (A9) (LRR F, O | | | | latrix (F3) | | Redu | iced Vertic (F18) |
| Deplet | ed Below Dark Surf | ace (A11) | R | edox Darl | < Surface | (F6) | Red I | Parent Material (TF2) |
| | Dark Surface (A12) | | | • | ark Surfa | · · · | | (Explain in Remarks) |
| | Mucky Mineral (S1 | · | | | ressions | · · | | ators of hydrophytic vegetation and |
| | Mucky Peat or Pea | . , . | · · · | - | • | ions (F16) | | d hydrology must be present, |
| | lucky Peat or Peat | |) (M | LRA 72 8 | 73 of LF | (RH) | unless | disturbed or problematic. |
| | _ayer (if observed |): | | | | | | |
| Туре: | | | | | | | | |
| Depth (in | ches): | | | | | | Hydric Soil | I Present? Yes 🚩 No 📃 |
| Remarks: | | | | | | | | |
| Hydric soils v | vere observed. | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| HYDROLO | GY | | | | | | | |
| Wetland Hv | drology Indicators | : | | | | | | |
| - | ••• | | ed; check all that ap | nolv) | | | Second | ary Indicators (minimum of two required) |
| | e Water (A1) | ono io roqui | Salt Crust | | | | | rface Soil Cracks (B6) |
| | /ater Table (A2) | | Aquatic Ir | . , | oc (B13) | | | arsely Vegetated Concave Surface (B8) |
| | tion (A3) | | | | ``` | | | ainage Patterns (B10) |
| | () | | | | • • | 2) | | - · · · · |
| (C3) | Marks (B1) | | Dry-Seas | on water | Table (C | 2) | | idized Rhizospheres on Living Roots |
| | ent Deposits (B2) | | Oxidized | Rhizosph | eres on L | iving Roots | s (C3) (wh | ere tilled) |
| | eposits (B3) | | (where no | t tilled) | | 0 | | ayfish Burrows (C8) |
| | lat or Crust (B4) | | Presence | , | ed Iron (| C4) | | turation Visible on Aerial Imagery (C9) |
| | eposits (B5) | | Thin Muc | | , | | | eomorphic Position (D2) |
| | tion Visible on Aeri | al Imagery (F | | | ` ' | | | C-Neutral Test (D5) |
| | Stained Leaves (B | 0,1 | | | |) (LRR F) | | |
| Field Obser | | , | | | (| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | |
| Surface Wat | | Yes 🖌 | No Depth | (inches): | 2" | | | |
| Water Table | | | | | : | _ | | |
| | | | | , | - | | | |
| Saturation P (includes cap | | Yes | | (inches): | | | ianu nyuroiog | y Present? Yes ∠ No |
| | | n gauge, mo | nitoring well, aerial | photos, pi | revious in | spections) | , if available: | |
| | | | | | | | | |
| Remarks: | | | | | | | | |

Wetland hydrology was observed. Standing water was observed in portions of wetland.

WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | City/County: Collin County | Sampling Date: <u>5/14/2018</u> |
|--|---|--|
| Applicant/Owner: North Texas Municipal Water District | State: TX | |
| Investigator(s): SDG, CGH | _ Section, Township, Range: <u>N/A</u> | |
| Landform (hillslope, terrace, etc.): Flat | Local relief (concave, convex, none): <u>no</u> | one Slope (%): >1 |
| Subregion (LRR): LRR J Lat: 33.006 | Long: <u>-96.467</u> | Datum: NAD83 |
| Soil Map Unit Name: To - Trinity clay, 0 to 1 percent slopes, | occasionally flooded NWI class | ification: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this time of Are Vegetation Soil , or Hydrology significan Are Vegetation Soil , or Hydrology naturally SUMMARY OF FINDINGS – Attach site map showir | htly disturbed? Are "Normal Circumstand problematic? (If needed, explain any a | nswers in Remarks.) |
| Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No | Is the Sampled Area within a Wetland? Yes | |
| Remarks: | | |
| Emergent Wetland, Photos 20-23 | | |

VEGETATION – Use scientific names of plants.

| | Absolute | Domina | nt Indicator | Dominance Test worksheet: |
|---|-----------|-----------|--------------|---|
| Tree Stratum (Plot size: <u>30</u> ') | % Cover | Species | ? Status | Number of Dominant Species |
| 1 | | | | That Are OBL, FACW, or FAC (avaluating EAC.) 3 (A) |
| 2 | | | | (excluding FAC-): <u>3</u> (A) |
| 3 | . <u></u> | | | Total Number of Dominant |
| 4 | | | | Species Across All Strata: <u>3</u> (B) |
| 5 | | | | Percent of Dominant Species |
| | 0 | = Total | Cover | That Are OBL, FACW, or FAC: <u>100%</u> (A/B) |
| Sapling/Shrub Stratum (Plot size: 15') | - | | | |
| 1 | | | | Prevalence Index worksheet: |
| 2 | | | | Total % Cover of: Multiply by: |
| 3 | | | | OBL species $\frac{90}{10}$ x 1 = $\frac{90}{20}$ |
| 4 | | | | FACW species <u>10</u> x 2 = <u>20</u> |
| 5. | · | 5 | N | FAC species x 3 = |
| ··· | 0 | = Total | Cover | FACU species x 4 = |
| Herb Stratum (Plot size: <u>5</u> ') | <u> </u> | – 10tai | Cover | UPL species x 5 = |
| 1. Persicaria hydropiperoides | 50 | Y | OBL | Column Totals: <u>100</u> (A) <u>110</u> (B) |
| 2 Typha latifolia | 20 | Y | OBL | |
| 3 Eleocharis spp. | 20 | Y | OBL | Prevalence Index = B/A = <u>1.1</u> |
| 4 Carex grisea | 5 | N | FACW | Hydrophytic Vegetation Indicators: |
| 5 Juncus mexicanus | 5 | N | FACW | 1 - Rapid Test for Hydrophytic Vegetation |
| 0 | | | | ✓ 2 - Dominance Test is >50% |
| 6 | | | | \checkmark 3 - Prevalence Index is ≤3.0 ¹ |
| 7 | | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | | | Problematic Hydrophytic Vegetation ¹ (Explain) |
| 10 | | | | |
| | 100 | _ = Total | Cover | |
| Woody Vine Stratum (Plot size: 15') | | | | ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 1 | | | | |
| 2 | | | | Hydrophytic |
| % Bare Ground in Herb Stratum <u>0%</u> | 0 | = Total | Cover | Vegetation Present? Yes V No |
| Remarks: (Include photo numbers here or on a separate s | sheet.) | | | |
| | | | | |
| Hydrophytic vegetation was observed. | | | | |

SOIL

| | cription: (Describe t | o the depth n | | | | or confirm | the absence o | of indicators.) |
|-------------------|--|--|----------------------------|---------------------------|------------------------|------------------|------------------|---|
| Depth (inches) | <u>Matrix</u> Color (moist) | % | <u>Re</u> Color (moist) | edox Feature % | s Type ¹ | Loc ² | Texture | Remarks |
| <u>(increa)</u> | | | | 70 | _турс | | | Remarks |
| | · | | | | · | | | |
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| | oncentration, D=Depl | etion, RM=Re | duced Matrix, | CS=Covered | d or Coate | ed Sand Gra | | ation: PL=Pore Lining, M=Matrix. |
| Hydric Soil | Indicators: | | | | | | Indicators f | for Problematic Hydric Soils ³ : |
| Histos | ol (A1) | | | Sandy Gley | | (S4) | 1 cm N | /luck (A9) (LRRI, J) |
| Histic | Epipedon (A2) | | | Sandy Redo | | | Coast | Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | Stripped Ma | . , | | | Surface (S7) (LRR G) |
| | gen Sulfide (A4) | | | Loamy Muc | • | . , | - | Plains Depressions (F16) |
| | ed Layers (A5) (LRR | | | Loamy Gley | | (F2) | <u> </u> | l outside of MLRA 72 & 73) |
| | Muck (A9) (LRR F, G, | | | Depleted M | . , | | | ed Vertic (F18) |
| | ted Below Dark Surfac | ce (A11) | | Redox Dark | | . , | | arent Material (TF2) |
| | Dark Surface (A12) | | | Depleted Da | | () | | Explain in Remarks) |
| | Mucky Mineral (S1) Mucky Peat or Peat | (82) /I PP C | _ ⊢⊣ | Redox Depr High Plains | | , | | ors of hydrophytic vegetation and hydrology must be present, |
| | Mucky Peat of Peat (S | | · | (MLRA 72 & | • | , , | | disturbed or problematic. |
| | Layer (if observed): | (E (K (T)) | | | | K HJ | uness c | disturbed of problematic. |
| | | | | | | | | |
| Type: | | | | | | | | |
| Depth (in | cnes): | | | | | | Hydric Soil I | Present? Yes 🔽 No 📃 |
| Remarks: | | | | | | | | |
| | ter. Soil profile was n e of hydrophytic vege | | The soil static | on is assume | d to have | hydric soils | s based on the s | standing water, presence of hydric soils, |
| and presence | e of flydropflytic vege | | | | | | | |
| | | | | | | | | |
| HYDROLO | GY | | | | | | | |
| Wetland Hv | drology Indicators: | | | | | | | |
| - | cators (minimum of or | o is required: | check all that | apply) | | | Secondar | ry Indicators (minimum of two required) |
| | | ie is required, | | | | | | · · · · · · |
| | e Water (A1) | | | ust (B11) | (5.40) | | | ace Soil Cracks (B6) |
| | Vater Table (A2) | | | c Invertebrate | · · / | | | rsely Vegetated Concave Surface (B8) |
| | ation (A3) | | | gen Sulfide C | . , | | | nage Patterns (B10) |
| | Marks (B1) | | Dry-Se | eason Water | Table (C2 |) | Oxid | lized Rhizospheres on Living Roots |
| (C3) | ent Deposits (B2) | | | ad Dhizoanh | araa an Li | ving Dooto | (02) (whe | |
| | 1 () | | | ed Rhizosphe | eres on Li | Ving Rools | | re tilled) |
| | eposits (B3) | | | not tilled) | | | | /fish Burrows (C8) |
| | Mat or Crust (B4) | | | nce of Reduc | | 4) | | iration Visible on Aerial Imagery (C9) |
| | eposits (B5) | | | uck Surface | | | | morphic Position (D2) |
| | ation Visible on Aerial | Imagery (B7) | | Explain in R | | | FAC | -Neutral Test (D5) |
| Water | -Stained Leaves (B9) | | Frost-I | leave Humm | nocks (D7) |) (LRR F) | | |
| Field Obser | vations: | | | | 4 | | | |
| Surface Wat | er Present? Ye | es 🖌 No | De | pth (inches): | 4 | | | |
| Water Table | Present? Ye | es 🖌 No | De | pth (inches): | 0 | | | |
| Saturation P | resent? Ye | es 🖌 No | De | pth (inches): | 0 | Wetla | and Hydrology | Present? Yes 🖌 No 🦳 |
| | pillary fringe) | | | | - | _ | , | |
| Describe Re | corded Data (stream | gauge, monito | oring well, aeri | al photos, pr | evious ins | pections), i | if available: | |
| | | | | | | | | |
| Remarks: | | | | | | | | |
| Wetland hyd | rology was observed. | Standing wat | er was observ | ved in portior | ns of wetla | and. | | |
| - | | - | | | | | | |
| | | | | | | | | |

WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | | City/Count | ty: Collin Co | ounty Sampling Date: <u>12/12/2018</u> |
|---|----------------------|--------------|---------------------------------|---|
| Applicant/Owner: North Texas Municipal Water Distric | ct | | | State: TX Sampling Point: 5 |
| Investigator(s): SDG, CGH | | | | |
| Landform (hillslope, terrace, etc.): Toe of Slope | | Local re | elief (concave | , convex, none): Concave Slope (%): 2 |
| | | | | .459 Datum: NAD83 |
| Soil Map Unit Name: HoB - Houston Black clay, 1 to | | | | NWI classification: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this | | | | (If no, explain in Remarks.) |
| Are Vegetation Soil, or Hydrologys | | - | | Normal Circumstances" present? Yes 🔽 No |
| Are Vegetation Soil Soil , or Hydrology n n | | | | eded, explain any answers in Remarks.) |
| | | | | |
| SUMMARY OF FINDINGS – Attach site map s | snowing | sampi | ing point i | beations, transects, important features, etc. |
| Hydrophytic Vegetation Present? Yes 🖌 No | | ls | the Sampled | Area |
| Hydric Soil Present? Yes Yes No | | | ithin a Wetlaı | |
| Wetland Hydrology Present? Yes V | | | | |
| Remarks: | | | | |
| Forested Wetland, Photos 83-86 | | | | |
| VEGETATION – Use scientific names of plants. | | | | |
| | Absolute | | int Indicator | Dominance Test worksheet: |
| <u>Tree Stratum</u> (Plot size: <u>30</u> ') 1. Salix nigra | <u>% Cover</u> 15 | Species Y | <u>s?</u> <u>Status</u> FACW | Number of Dominant Species |
| 1. Satix high 2. Celtis laevigata | 15 | Y | FAC | That Are OBL, FACW, or FAC (excluding FAC-): <u>8</u> (A) |
| 2. Cerns devigana 3. Acer negundo | 15 | Y | FAC | |
| | 15 | Y | | Total Number of Dominant Species Across All Strata: 8 (B) |
| 4. Ulmus americana | 15 | <u> </u> | FAC | |
| 5 | 60 | | | Percent of Dominant Species |
| Sapling/Shrub Stratum (Plot size:15') | 00 | _= Total | Cover | That Are OBL, FACW, or FAC: 100% (A/B) |
| 1. Ambrosia trifida | 15 | Y | FAC | Prevalence Index worksheet: |
| 2. Ulmus americana | 5 | Y | FAC | Total % Cover of:Multiply by: |
| 3. | | | | OBL species $\frac{20}{27}$ x 1 = $\frac{20}{77}$ |
| 4. | | | | FACW species 35 x 2 = 70 |
| 5. | | | | FAC species <u>65</u> x 3 = <u>195</u> |
| | 20 | = Total | l Cover | FACU species x 4 = |
| Herb Stratum (Plot size: 5') | 00 | V | | UPL species x 5 = |
| 1. <u>Eleocharis spp.</u> | 20 | Y | OBL | Column Totals: <u>120</u> (A) <u>285</u> (B) |
| 2. Andropogon glomeratus | 20 | Y | FACW | Prevalence Index = B/A = 2.38 |
| 3 | | | · | Hydrophytic Vegetation Indicators: |
| 4 | | | · | 1 - Rapid Test for Hydrophytic Vegetation |
| 5 | | | | ✓ 2 - Dominance Test is >50% |
| 6 | | | · | ✓ 3 - Prevalence Index is $\leq 3.0^1$ |
| 7 | | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | | · | Problematic Hydrophytic Vegetation ¹ (Explain) |
| 10 | 40 | | | |
| | 40 | _ = Total | l Cover | ¹ Indicators of hydric soil and wetland hydrology must |
| <u>Woody Vine Stratum</u> (Plot size: <u>15</u>) | | | | be present, unless disturbed or problematic. |
| 1 | | | · | Hydrophytic |
| 2% Bare Ground in Herb Stratum <u>60%</u> | 0 | = Total | | Vegetation |
| | | i otal | Cover | Present? Yes No |
| Remarks: (Include photo numbers here or on a separate s | heet.) | | | |
| Hydrophytic vegetation was observed. | | | | |

SOIL

| Depth | Matrix | 0/ | Redox Features | 1 . 2 | T 1 | |
|--|---|--|--|---|--|---|
| (inches) | Color (moist) | <u>%</u> (| Color (moist) % Ty | ype ¹ Loc ² | Texture | Remarks |
| | | <u> </u> | | | | |
| | | . <u> </u> | | | <u></u> | |
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| | | · | | | <u> </u> | |
| 21 | · · · | letion, RM=Rec | luced Matrix, CS=Covered or | Coated Sand Gra | | ion: PL=Pore Lining, M=Matrix. |
| lydric Soil I | | | | | | r Problematic Hydric Soils ³ : |
| Histoso | . , | | Sandy Gleyed N | | | uck (A9) (LRRI, J) |
| | Epipedon (A2) Histic (A3) | | Sandy Redox (S | | | rairie Redox (A16) (LRR F, G, H) rface (S7) (LRR G) |
| | isiic (A3) jen Sulfide (A4) | | Loamy Mucky M | . , | | ains Depressions (F16) |
| | ed Layers (A5) (LRR | F) | Loamy Gleyed N | () | - | outside of MLRA 72 & 73) |
| | luck (A9) (LRR F, G | | Depleted Matrix | | | d Vertic (F18) |
| | ed Below Dark Surfa | ice (A11) | Redox Dark Sur | . , | | ent Material (TF2) |
| | Dark Surface (A12) | | Depleted Dark S | . , | | plain in Remarks) |
| | Mucky Mineral (S1) Mucky Peat or Peat | (S2) (I PP C | H) Redox Depressi | · · · | | rs of hydrophytic vegetation and ydrology must be present, |
| | lucky Peat or Peat (| | (MLRA 72 & 73 c | . , | | sturbed or problematic. |
| | _ayer (if observed): | | | - , | | |
| Туре: | | | | | | |
| | | | | | | |
| Depth (ind | ches): | | | | Hydric Soil Pi | resent? Yes 🖌 No 📃 |
| Depth (inc Remarks: | | | | | Hydric Soil Pi | resent? Yes 🖌 No 📃 |
| Remarks: Standing wate | ches): er. Soil profile was n | not assessed. T | The soil station is assumed to | have hydric soils | | resent? Yes No No |
| Remarks: Standing wate | ches): | not assessed. T | The soil station is assumed to | have hydric soils | | |
| Remarks: tanding wate | ches): er. Soil profile was n | not assessed. T | The soil station is assumed to | have hydric soils | | |
| Remarks: tanding wate nd presence | ches): er. Soil profile was n e of hydrophytic vege | not assessed. T | The soil station is assumed to | have hydric soils | | |
| Remarks: tanding wate nd presence | ches): er. Soil profile was n e of hydrophytic vege GY | not assessed. T | The soil station is assumed to | have hydric soils | | |
| Remarks: tanding wate nd presence YDROLO Vetland Hyd | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: | not assessed. T | | have hydric soils | based on the st | anding water, presence of hydric soi |
| Remarks: tanding wate nd presence YDROLO Vetland Hyd Primary Indic | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o | not assessed. T | | have hydric soils | based on the sta | anding water, presence of hydric soi |
| Remarks: tanding wate nd presence YDROLO Yotland Hyo Yrimary Indic | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) | not assessed. T | check all that apply) | | based on the sta | anding water, presence of hydric soi |
| Remarks: tanding wate nd presence YDROLO Yotland Hyo Primary Indic Surface High W | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o | not assessed. T | <u>check all that apply)</u> Salt Crust (B11) Aquatic Invertebrates (E | 313) | based on the sta <u>Secondary</u> Surfac | anding water, presence of hydric soi Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 |
| Remarks: tanding wate nd presence YDROLO Yetland Hyd Primary Indic Y Surface Y High W Y Saturat Water | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: cators (minimum of o e Water (A1) /ater Table (A2) | not assessed. T | check all that apply) | 313) (C1) | based on the sta <u>Secondary</u> Surfac Spars Draina | anding water, presence of hydric soi |
| Remarks: tanding wate nd presence YDROLO Vetland Hyc Primary Indic Vetland Hyc Satura V Satura Vater 1 C3) | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) | not assessed. T | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl | 313) (C1) e (C2) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots |
| Remarks: tanding wate and presence YDROLO Yetland Hyd < | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) | not assessed. T | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres | 313) (C1) e (C2) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots |
| Remarks: tanding wate and presence YDROLO Vetland Hyd Vetland Hyd Ymary Indic Y Surface Y Saturat | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: cators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) | not assessed. T | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) | 813) (C1) e (C2) on Living Roots | based on the sta <u>Secondary</u> Surfac Spars Draina Oxidiz (C3) (where Crayfi | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) |
| Remarks: tanding wate and presence YDROLO Yetland Hyc < | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) /at or Crust (B4) | not assessed. T | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir | 313) (C1) e (C2) on Living Roots | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) |
| Remarks: tanding wate and presence YDROLO YUROLO Vetland Hyc Yumary Indic Y Surface Y High W Satural Water Xumary Yumary Yumary < | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) /at or Crust (B4) eposits (B5) | not assessed. T | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) | 813) (C1) e (C2) on Living Roots ron (C4) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) |
| Remarks: tanding wate and presence YDROLO Vetland Hyd Vetland Hyd Primary India Y DROLO Vetland Hyd Surface High W Satural Water C3) Sedime Iron De Iron De Inunda | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) tion Visible on Aerial | not assessed. T station. ne is required; | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain | 313) (C1) e (C2) on Living Roots on (C4) rks) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) |
| Remarks: tanding wate nd presence YDROLO Vetland Hyd Vetland Hyd Vetland Hyd Satural G Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C Satural C S Sedime C Satural C S Sedime | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Marks (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) | not assessed. T station. ne is required; | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) | 313) (C1) e (C2) on Living Roots on (C4) rks) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) |
| Remarks: itanding water itanding water itanding water YDROLO YDROLO Vetland Hyde Primary Indic Y Brimary Indic Y Bright Y B | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: | not assessed. The second secon | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain Frost-Heave Hummocks | 313) (C1) e (C2) on Living Roots on (C4) rks) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) |
| Remarks: Standing water A presence YDROLO Wetland Hyo Primary Indic Surface Water C3) Sedime Algal M Iron De Inunda Water- Surface Water | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Marks (B1) eposits (B3) Marks (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) vations: er Present? Y | not assessed. tation. <u>ne is required;</u> I Imagery (B7) es | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain Frost-Heave Hummocks Depth (inches): | 313) (C1) e (C2) on Living Roots on (C4) rks) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) |
| Remarks: tanding wate nd presence YDROLO Vetland Hyd YDROLO Vetland Hyd Satural Satural Satural Satural Algal M Iron De Inunda Water- Surface Wate Vater Table | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) /at or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: er Present? Ye | not assessed. The second secon | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain Frost-Heave Hummocks Depth (inches): 2" Depth (inches): | 813) (C1) e (C2) on Living Roots fron (C4) rks) s (D7) (LRR F) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) Neutral Test (D5) |
| Remarks: itanding water itanding water itanding water YDROLO YDROLO Vetland Hyde Primary Indic Y Brimary Indic Y Bright Y B | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: :ators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) /at or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: er Present? Ye resent? Ye | not assessed. tation. <u>ne is required;</u> I Imagery (B7) es | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain Frost-Heave Hummocks Depth (inches): | 813) (C1) e (C2) on Living Roots fron (C4) rks) s (D7) (LRR F) | based on the sta | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) |
| Remarks: tanding water nd presence YDROLO Vetland Hyd Primary Indic Surface High W Saturat Saturat Orift De Algal M Iron De Inunda Water- Surface Water Saturation Princludes cap | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: er Present? Ye Present? Ye | not assessed. tation. ne is required; I Imagery (B7) es 🖌 No es 🖌 No es 🖌 No | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remain Frost-Heave Hummocks Depth (inches): 2" Depth (inches): | 813) (C1) e (C2) on Living Roots ron (C4) rks) s (D7) (LRR F) Wetla | based on the sta <u>Secondary</u> Surfac Spars Draina Oxidiz (C3) (where Crayfi Satura Geom FAC-I and Hydrology F | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) Neutral Test (D5) |
| Remarks: tanding wate and presence YDROLO Vetland Hyc YDROLO Vetland Hyc Yormary Indic Ymmary Indic Yormary Inditing | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: er Present? Ye Present? Ye | not assessed. tation. ne is required; I Imagery (B7) es 🖌 No es 🖌 No es 🖌 No | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remainstructure) Frost-Heave Hummocks Depth (inches): Depth (inches): Depth (inches): | 813) (C1) e (C2) on Living Roots ron (C4) rks) s (D7) (LRR F) Wetla | based on the sta <u>Secondary</u> Surfac Spars Draina Oxidiz (C3) (where Crayfi Satura Geom FAC-I and Hydrology F | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) Neutral Test (D5) |
| Remarks: tanding water tanding water YDROLO Vetland Hyc Vetland Hyc Vetland Hyc Varimary Indic Varimary Indic | ches): er. Soil profile was n e of hydrophytic vege GY drology Indicators: eators (minimum of o e Water (A1) /ater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) tion Visible on Aerial Stained Leaves (B9) /ations: er Present? Ye Present? Ye | not assessed. tation. ne is required; I Imagery (B7) es 🖌 No es 🖌 No es 🖌 No | check all that apply) Salt Crust (B11) Aquatic Invertebrates (E Hydrogen Sulfide Odor Dry-Season Water Tabl Oxidized Rhizospheres (where not tilled) Presence of Reduced Ir Thin Muck Surface (C7) Other (Explain in Remainstructure) Frost-Heave Hummocks Depth (inches): Depth (inches): Depth (inches): | 813) (C1) e (C2) on Living Roots ron (C4) rks) s (D7) (LRR F) Wetla | based on the sta <u>Secondary</u> Surfac Spars Draina Oxidiz (C3) (where Crayfi Satura Geom FAC-I and Hydrology F | Indicators (minimum of two required ce Soil Cracks (B6) ely Vegetated Concave Surface (B8 age Patterns (B10) zed Rhizospheres on Living Roots tilled) ish Burrows (C8) ation Visible on Aerial Imagery (C9) norphic Position (D2) Neutral Test (D5) |

WETLAND DETERMINATION DATA FORM – Great Plains Region

| Project/Site: WRF 48-in Pipeline | City/County: Collin County | Sampling Date: <u>12/12/2018</u> |
|--|--|--|
| Applicant/Owner: North Texas Municipal Water District | State: TX | Sampling Point: <u>6</u> |
| Investigator(s): SDG, CGH | Section, Township, Range: <u>N/A</u> | |
| Landform (hillslope, terrace, etc.): <u>Toe of Slope</u> | Local relief (concave, convex, none): <u>Co</u> | oncave Slope (%): <u>3</u> |
| Subregion (LRR): LRR J Lat: 33.007 | Long: <u>-</u> 96.458 | Datum: NAD83 |
| Soil Map Unit Name: Tinn clay, 0 to 1 percent slopes, frequer | ntly flooded NWI class | ification: Freshwater Emergent Wetland |
| | tly disturbed? Are "Normal Circumstand problematic? (If needed, explain any a | nswers in Remarks.) |
| Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No | Is the Sampled Area within a Wetland? Yes | ✓ No |
| Remarks: | | |
| Emergent Wetland, Photos 83-86 | | |

VEGETATION – Use scientific names of plants.

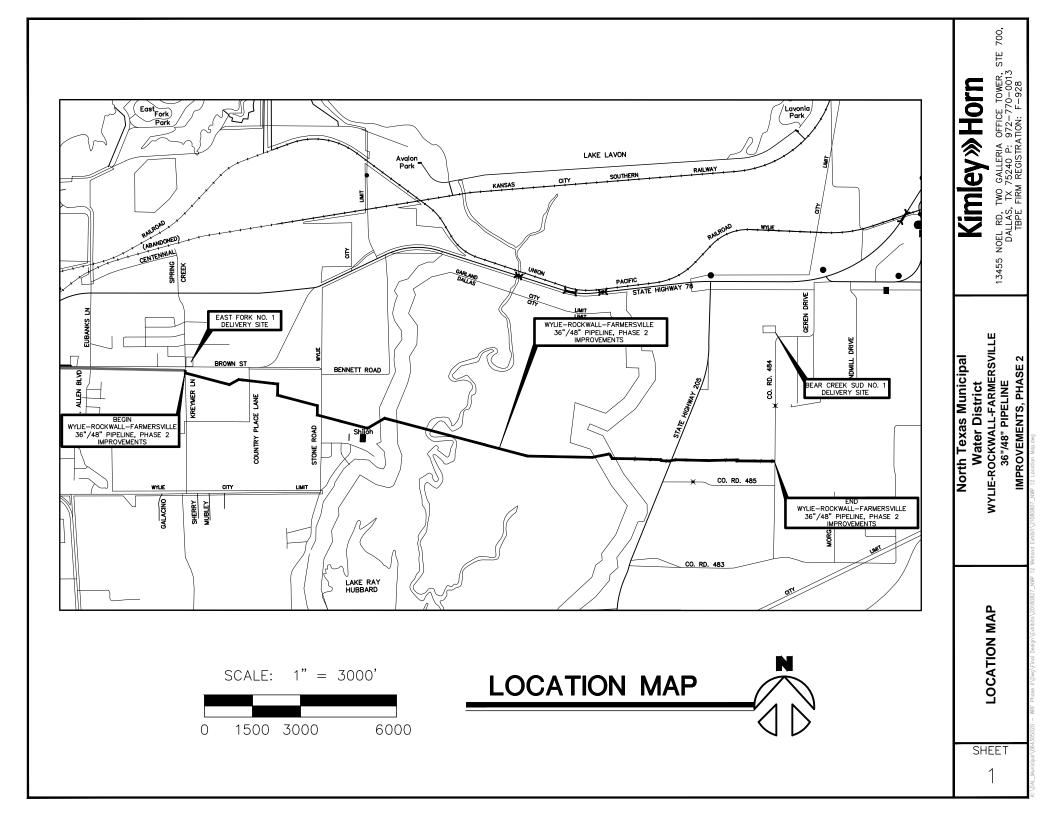
| | Absolute | Domina | nt Indicator | Dominance Test worksheet: |
|---|----------|------------|------------------|---|
| Tree Stratum (Plot size: <u>30</u> ') | % Cover | Species | <u>s? Status</u> | Number of Dominant Species |
| 1 | | | | That Are OBL, FACW, or FAC (A) (A) |
| 2 | · | | | (excluding FAC-): <u>4</u> (A) |
| 3 | · | | | Total Number of Dominant |
| 4 | · | | | Species Across All Strata: <u>4</u> (B) |
| 5 | | | | Percent of Dominant Species |
| | 0 | = Total | | That Are OBL, FACW, or FAC: <u>100%</u> (A/B) |
| Sapling/Shrub Stratum (Plot size: 15') | | | | December of the law works have to |
| 1. Salix nigra | 10 | Yes | FACW | Prevalence Index worksheet: |
| 2. Ambrosia trifida | 10 | Yes | FAC | Total % Cover of: Multiply by: |
| 3 | | | | OBL species $\frac{30}{72}$ x 1 = $\frac{30}{112}$ |
| 4 | | | | FACW species $\frac{70}{x^2} = \frac{140}{x^2}$ |
| 5 | | | | FAC species 20 x 3 = 60 |
| 0 | ~~ | = Total | Cover | FACU species x 4 = |
| Herb Stratum (Plot size: 5') | | | COVEI | UPL species x 5 = |
| 1. Andropogon glomeratus | 60 | Yes | FACW | Column Totals: <u>120</u> (A) <u>230</u> (B) |
| 2. Typha latifolia | 20 | Yes | OBL | |
| 3. Xanthium strumarium | 10 | No | FAC | Prevalence Index = B/A = <u>1.92</u> |
| 4 Eleocharis spp. | 10 | No | OBL | Hydrophytic Vegetation Indicators: |
| 5 | · | | | 1 - Rapid Test for Hydrophytic Vegetation |
| | | | | ✓ 2 - Dominance Test is >50% |
| 6 | | | | ✓ 3 - Prevalence Index is ≤3.0 ¹ |
| 7 | | | | 4 - Morphological Adaptations ¹ (Provide supporting |
| 8 | | | | data in Remarks or on a separate sheet) |
| 9 | | . <u> </u> | | Problematic Hydrophytic Vegetation ¹ (Explain) |
| 10 | 100 | | | |
| | 100 | = Total | Cover | ¹ Indicators of hydric soil and wetland hydrology must |
| Woody Vine Stratum (Plot size:15') | | | | be present, unless disturbed or problematic. |
| 1 | · | | | |
| 2 | | | | Hydrophytic |
| % Bare Ground in Herb Stratum <u>0%</u> | 0 | _= Total | Cover | Vegetation Present? Yes No |
| Remarks: (Include photo numbers here or on a separate s | sheet.) | | | 1 |
| | | | | |
| Hydrophytic vegetation was observed. | | | | |

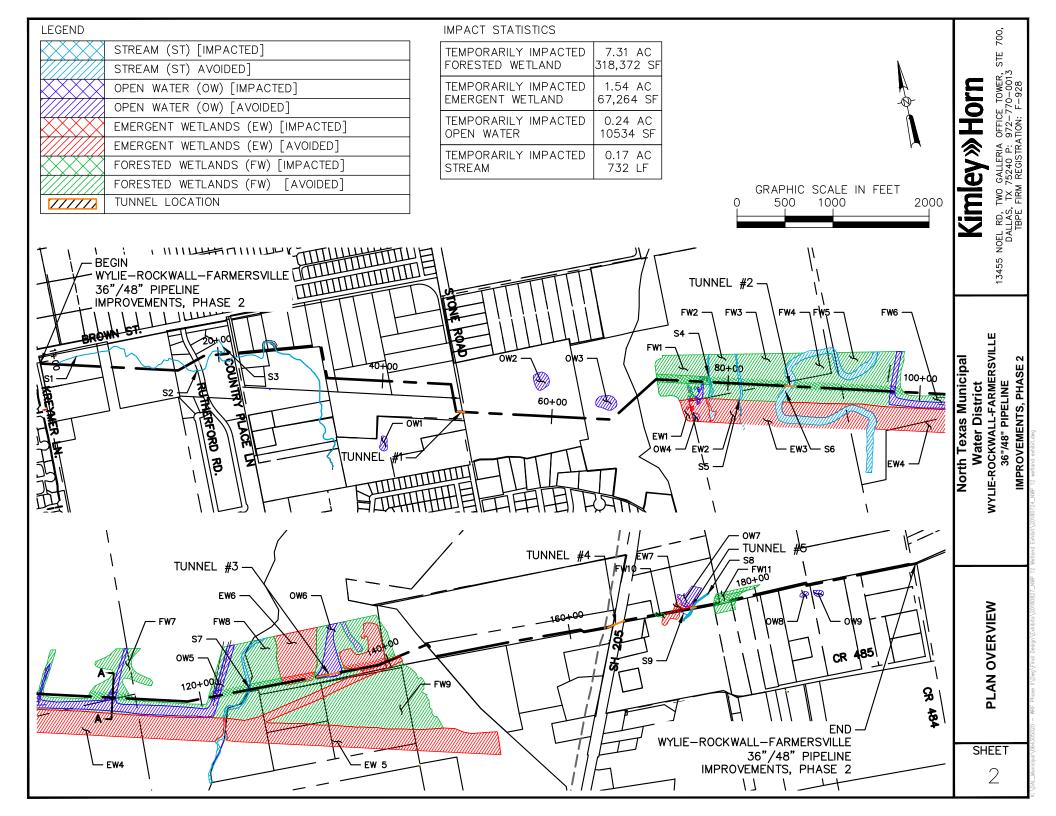
SOIL

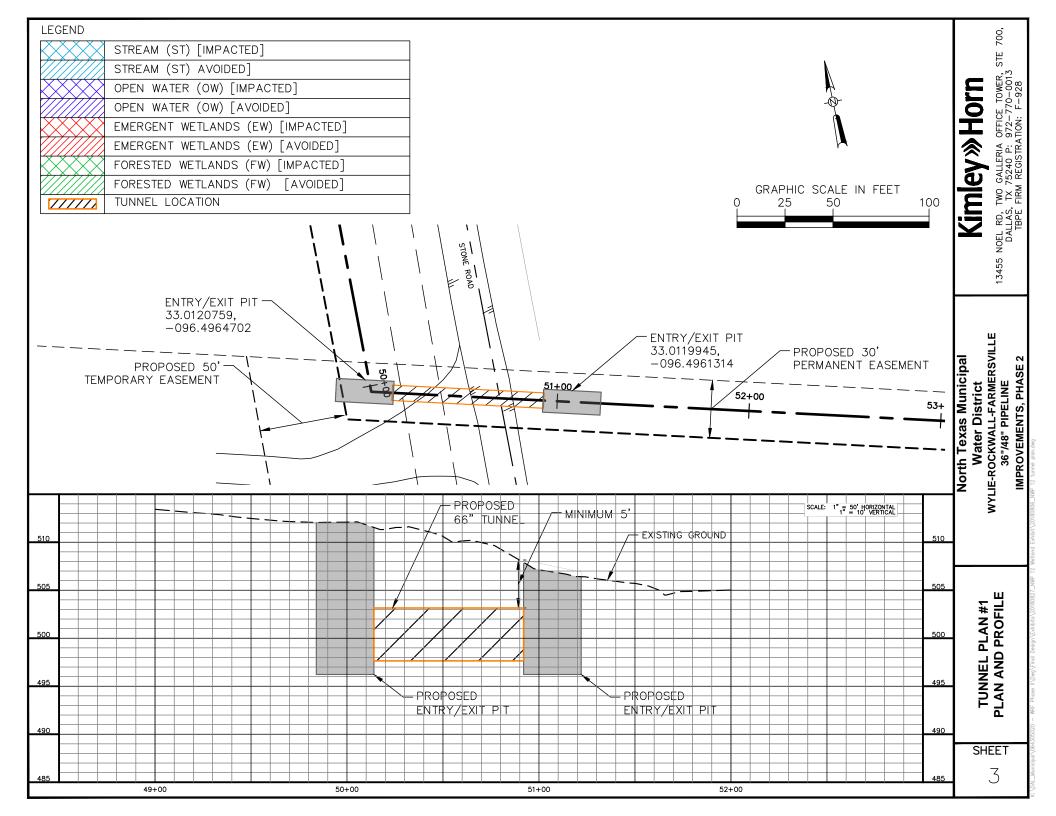
| Depth | Matrix | | Redox Features | | |
|---|---|--|---|---|---|
| (inches) | Color (moist) | <u>%</u> C | olor (moist) % Type ¹ Loc | c ² Texture | Remarks |
| | | · | | | |
| | | | | | |
| | | · · | | | |
| | | · | | | |
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| | · | · | | | |
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| | | | | | |
| | | | | | |
| | | letion, RM=Red | uced Matrix, CS=Covered or Coated San | Id Grains. Loc | ation: PL=Pore Lining, M=Matrix. for Problematic Hydric Soils ³ : |
| <u></u> | Indicators: | | | | |
| | ol (A1) | | Sandy Gleyed Matrix (S4) | | Muck (A9) (LRRI, J) |
| | Epipedon (A2) | | Sandy Redox (S5) | | Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | Stripped Matrix (S6) | | Surface (S7) (LRR G) |
| | gen Sulfide (A4) | | Loamy Mucky Mineral (F1) | - | Plains Depressions (F16) |
| | ed Layers (A5) (LRF | | Loamy Gleyed Matrix (F2) | | l outside of MLRA 72 & 73) |
| | /luck (A9) (LRR F, G | | Depleted Matrix (F3) | | ed Vertic (F18) |
| | ed Below Dark Surfa | ace (A11) | Redox Dark Surface (F6) | | arent Material (TF2) |
| | Dark Surface (A12) | | Depleted Dark Surface (F7) | | Explain in Remarks) |
| | Mucky Mineral (S1) | | Redox Depressions (F8) | | tors of hydrophytic vegetation and |
| | Mucky Peat or Pea | | · <u> </u> | , | l hydrology must be present, |
| | Aucky Peat or Peat (| | (MLRA 72 & 73 of LRR H) | unless | disturbed or problematic. |
| estrictive | | | | | |
| | Layer (if observed): | | | | |
| | Layer (if observed): | | | | |
| Туре: | | | | Hydric Soil | Present? Yes 🖌 No 📃 |
| Туре: | | | | Hydric Soil | Present? Yes 🖌 No 📃 |
| Type: Depth (in Remarks: | ches): | | he soil station is assumed to have hydric | | |
| Type: Depth (in Remarks: itanding wat | ches): | not assessed. T | he soil station is assumed to have hydric | | |
| Type: Depth (in Remarks: tanding wat | ches): er. Soil profile was i | not assessed. T | he soil station is assumed to have hydric | | |
| Type: Depth (in emarks: anding wat | ches): er. Soil profile was i | not assessed. T | he soil station is assumed to have hydric | | |
| Type: Depth (in emarks: anding wat | ches): er. Soil profile was i e of hydrophytic vege | not assessed. T | he soil station is assumed to have hydric | | |
| Type: Depth (in emarks: anding wat d presence | ches): er. Soil profile was i e of hydrophytic vege | not assessed. T etation. | he soil station is assumed to have hydric | | |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: | not assessed. T etation. | | soils based on the s | standing water, presence of hydric so |
| Type: Depth (in emarks: anding wat d presence //DROLO /etland Hy rimary India | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c | not assessed. T etation. | check all that apply) | soils based on the s | standing water, presence of hydric soi |
| Type: Depth (in emarks: anding wat do presence /DROLO /etland Hy rimary India | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c | not assessed. T etation. | check all that apply) | soils based on the s | standing water, presence of hydric soi ry Indicators (minimum of two required |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary India Surfac | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) | soils based on the s | standing water, presence of hydric so ry Indicators (minimum of two required ace Soil Cracks (B6) rsely Vegetated Concave Surface (B8 |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary India Surfac | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c | not assessed. T etation. | check all that apply) | soils based on the s | standing water, presence of hydric soi ry Indicators (minimum of two required |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary India Surfac Surfac High V Satura Water | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) | soils based on the s | standing water, presence of hydric so ry Indicators (minimum of two required ace Soil Cracks (B6) rsely Vegetated Concave Surface (B8 |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary Indio /etland Hy rimary Indio /etland Hy Surfac / High V Satura 30 Water 33 | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) tion (A3) Marks (B1) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) | Seconda | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary Indio /etland Hy rimary Indio /etland Hy Surfac / High V Satura | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) ition (A3) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) | Seconda | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) |
| Type: Depth (in emarks: anding wat do presence //DROLO //etland Hy rimary Indio //etland Hy rimary Indio // Surfac // High V Satura // Satura // Sedim | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) tion (A3) Marks (B1) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) | Seconda | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots |
| Type: Depth (in emarks: anding wat do presence /DROLO /etland Hy rimary India / Surfac / High V / Satura Water (3) Sedim Drift D | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R | Seconda Surf Spa Coots (C3) Surf Coots (C3) Surf Cratic Source Surf Spa Surf Spa Surf Spa Surf Cratic Cratic Surf Cratic Surf Cratic Surf Surf Cratic Surf Surf Surf Surf Surf Surf Surf Surf | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) |
| Type: Depth (in emarks: anding wat do presence /DROLO /etland Hy rimary India Velland Hy rimary India Velland Hy Satura Water C3) Sedim Drift D Algal N | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) | not assessed. T etation. | Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) | soils based on the s Seconda Surf Spa V Drai Oxio Coots (C3) (whe Y Cray Satu | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) |
| Type: Depth (in emarks: anding wat do presence //DROLO //etland Hy rimary India // Surfac // High V // Satura Water C3) Sedim Drift D Algal N | ches): er. Soil profile was in the of hydrophytic vege GY drology Indicators: cators (minimum of co e Water (A1) Vater Table (A2) tition (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) | not assessed. T etation. one is required; c [[[[[| Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) | soils based on the s Seconda Surf Spa V Drai Oxio Scots (C3) (whe V Crai V Satu V Geo | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
| Type: Depth (in emarks: anding wat d presence /DROLO /etland Hy rimary India V Surfac V Satura Water C3) Sedim Drift D Algal M Iron D Inunda | ches): er. Soil profile was in a of hydrophytic vega GY drology Indicators: cators (minimum of content e Water (A1) Vater Table (A2) tition (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria | not assessed. T etation. one is required; c [[[[[[[[[[[[[[[[[[[| check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) | soils based on the soils based on the sole sole based on the sole sole sole sole sole sole sole sol | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) |
| Type: Depth (in emarks: anding wat do presence //DROLO /etland Hy rimary Indio /etland Hy rimary Indio /etland Hy Surfac / High V Satura Water C3) Sedim Drift D Algal M Iron Do Inunda | ches): er. Soil profile was i e of hydrophytic vege GY drology Indicators: cators (minimum of c e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria -Stained Leaves (B9) | not assessed. T etation. one is required; c [[[[[[[[[[[[[[[[[[[| Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) | soils based on the soils based on the sole sole based on the sole sole sole sole sole sole sole sol | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
| Type: Depth (in emarks: anding wat do presence /DROLO /etland Hy rimary India Velland Hy rimary India Velland Hy Satura Water C3) Sedim Drift D Algal M Iron Du Inunda | ches): er. Soil profile was in the of hydrophytic veget GY drology Indicators: cators (minimum of con- e Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria -Stained Leaves (B9 vations: | not assessed. T etation. one is required; c [[[[[[]]] | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR | soils based on the soils based on the sole sole based on the sole sole sole sole sole sole sole sol | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
| Type: Depth (in Remarks: tanding wat nd presence YDROLO Yetland Hy Primary India Surfac Y Surfac Y Surfac Y High V Satura Water C3) Sedim Drift D Algal M Iron D Inunda Surface Wat | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co e Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria -Stained Leaves (B9 vations: er Present? Y | not assessed. T etation. | Sheck all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): | soils based on the soils based on the sole sole based on the sole sole sole sole sole sole sole sol | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
| Type: Depth (in Remarks: tanding wat nd presence YDROLO Vetland Hy Primary India Vetland Hy Vater C3) Sedim Drift D Algal N Iron D Inunda | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co e Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria -Stained Leaves (B9 vations: er Present? Y | not assessed. T etation. one is required; c [[[[[[]]] | Sheck all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): Depth (inches): | soils based on the soils based on the sole sole based on the sole sole sole sole sole sole sole sol | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
| Type: Depth (in Remarks: tanding wat nd presence YDROLO Vetland Hy Primary India V Surfac V High V Satura Water C3) Sedim Drift D Algal M Iron D Inunda Surface Wat | ches): er. Soil profile was in a of hydrophytic vega GY drology Indicators: cators (minimum of co re Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) ation Visible on Aeria Stained Leaves (B9 vations: er Present? Y Present? Y | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): 0 Depth (inches): | soils based on the seconda | standing water, presence of hydric soi ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) pmorphic Position (D2) |
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| Type: Depth (in temarks: tanding wat dopresence //DROLO //etland Hy rimary India // Surfac // High V // Satura // Water // Satura // Water // Sedim // Iron Do Inunda // Iron Do Inunda // Water // Inunda // Jagal N // Iron Do Inunda // Jagal N // Iron Do // Inunda // Jagal N | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co re Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) titon Visible on Aeria -Stained Leaves (B9 vations: er Present? Y Present? Y present? Y | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): Depth (inches): Depth (inches): | soils based on the s Seconda Surf Spa U Drai Oxio Soots (C3) (whe Crai Satu Crai Satu FAC R F) Wetland Hydrology | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) omorphic Position (D2) C-Neutral Test (D5) |
| Type: Depth (in remarks: anding wat dopresence /DROLO /etland Hy rimary India Surfac Surfac Surfac Satura Water Satura Nalgal M Iron Du Inunda Water ield Obser urface Wat /ater Table aturation P ncludes ca | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co re Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) titon Visible on Aeria -Stained Leaves (B9 vations: er Present? Y Present? Y present? Y | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): Depth (inches): Depth (inches): | soils based on the s Seconda Surf Spa U Drai Oxio Soots (C3) (whe Crai Satu Crai Satu FAC R F) Wetland Hydrology | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) omorphic Position (D2) C-Neutral Test (D5) |
| Type: Depth (in emarks: anding wat do presence (DROLO /etland Hy rimary India Surfac Y High V Satura Water 3) Sedim Drift D Algal N Iron Du Inunda Water- ield Obser urface Wat /ater Table aturation P hocludes cap escribe Re | ches): er. Soil profile was in e of hydrophytic vege GY drology Indicators: cators (minimum of co re Water (A1) Vater Table (A2) titon (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) eposits (B5) titon Visible on Aeria -Stained Leaves (B9 vations: er Present? Y Present? Y present? Y | not assessed. T etation. | check all that apply) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Dry-Season Water Table (C2) Oxidized Rhizospheres on Living R (where not tilled) Presence of Reduced Iron (C4) Thin Muck Surface (C7) Other (Explain in Remarks) Frost-Heave Hummocks (D7) (LRR Depth (inches): Depth (inches): Depth (inches): | soils based on the s Seconda Surf Spa U Drai Oxio Soots (C3) (whe Crai Satu Crai Satu FAC R F) Wetland Hydrology | standing water, presence of hydric so ry Indicators (minimum of two required face Soil Cracks (B6) rsely Vegetated Concave Surface (B8 inage Patterns (B10) dized Rhizospheres on Living Roots re tilled) yfish Burrows (C8) uration Visible on Aerial Imagery (C9) omorphic Position (D2) C-Neutral Test (D5) |

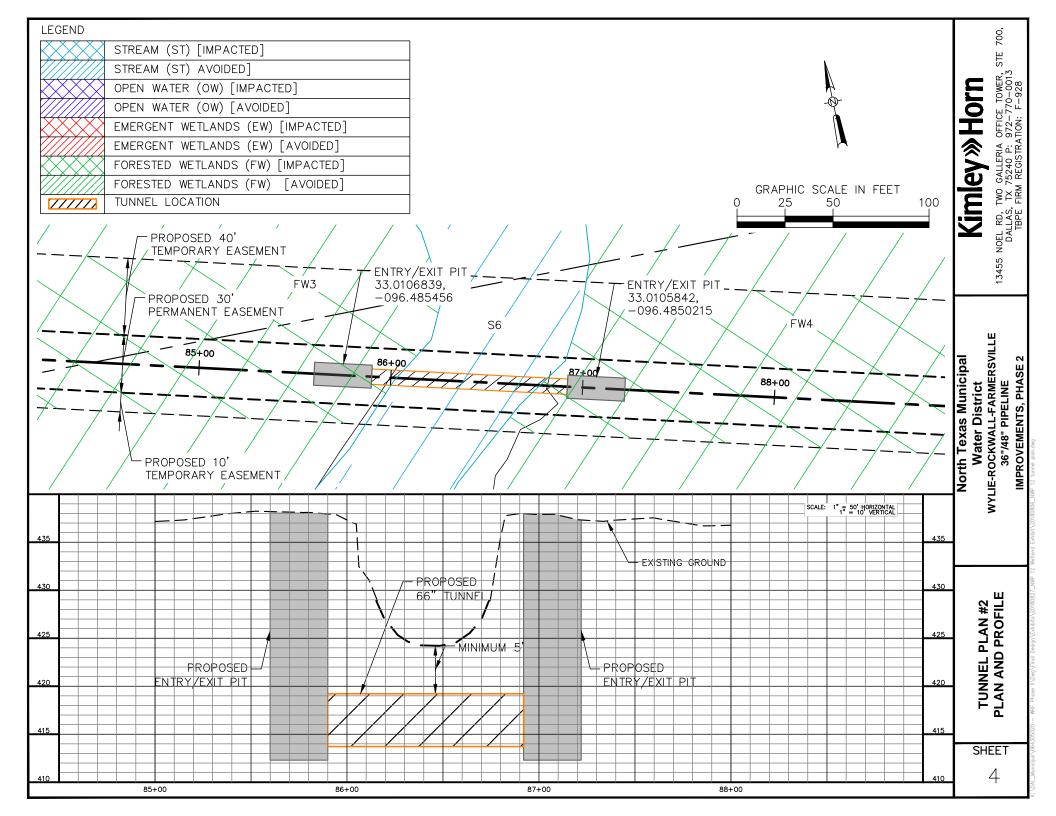
Attachment D

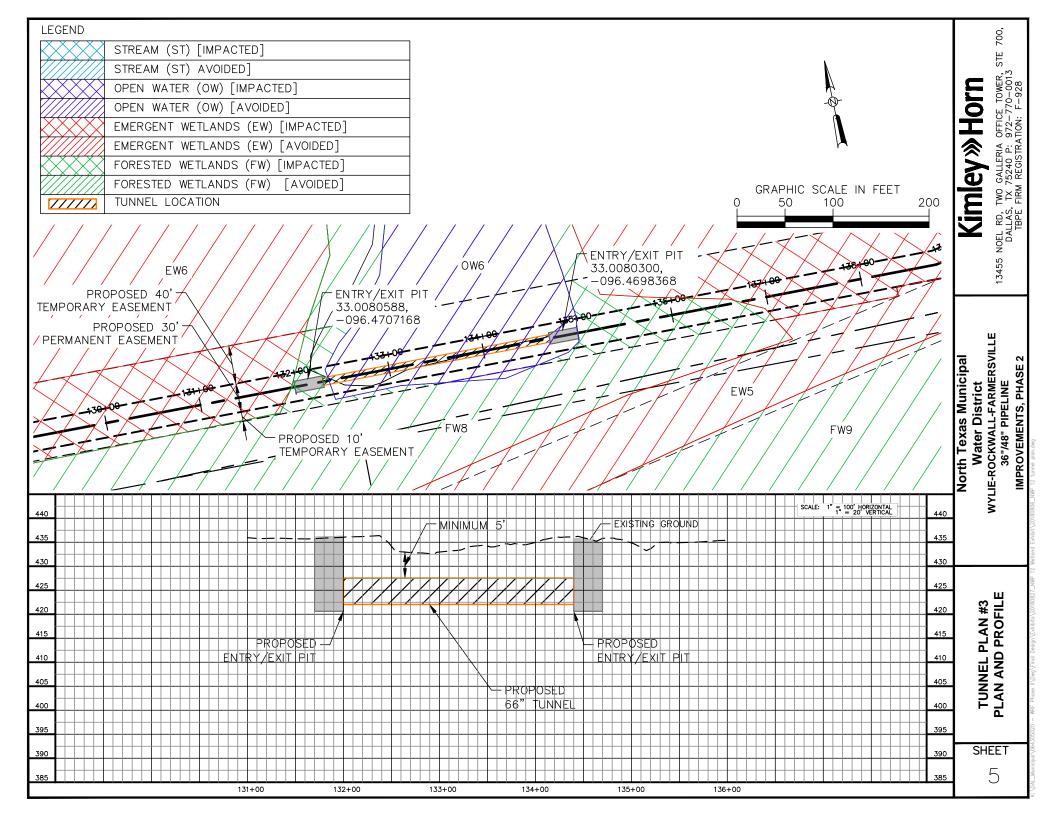
IMPACTS MAPS AND PLANS

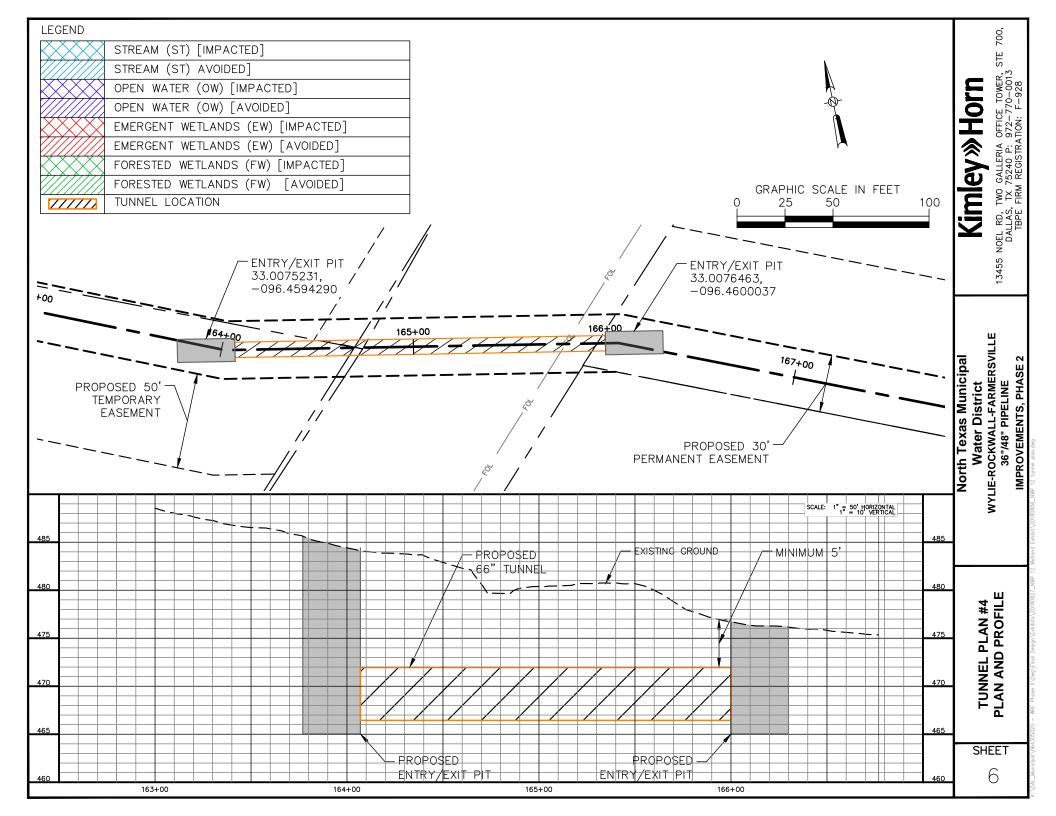


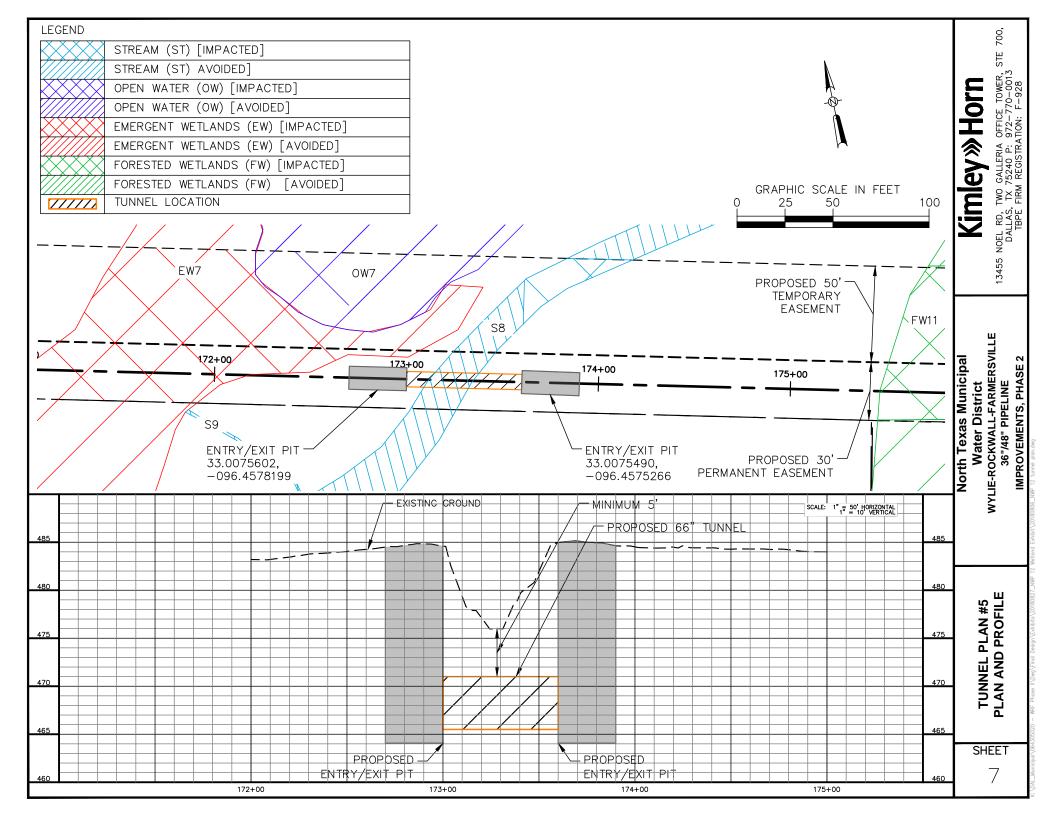


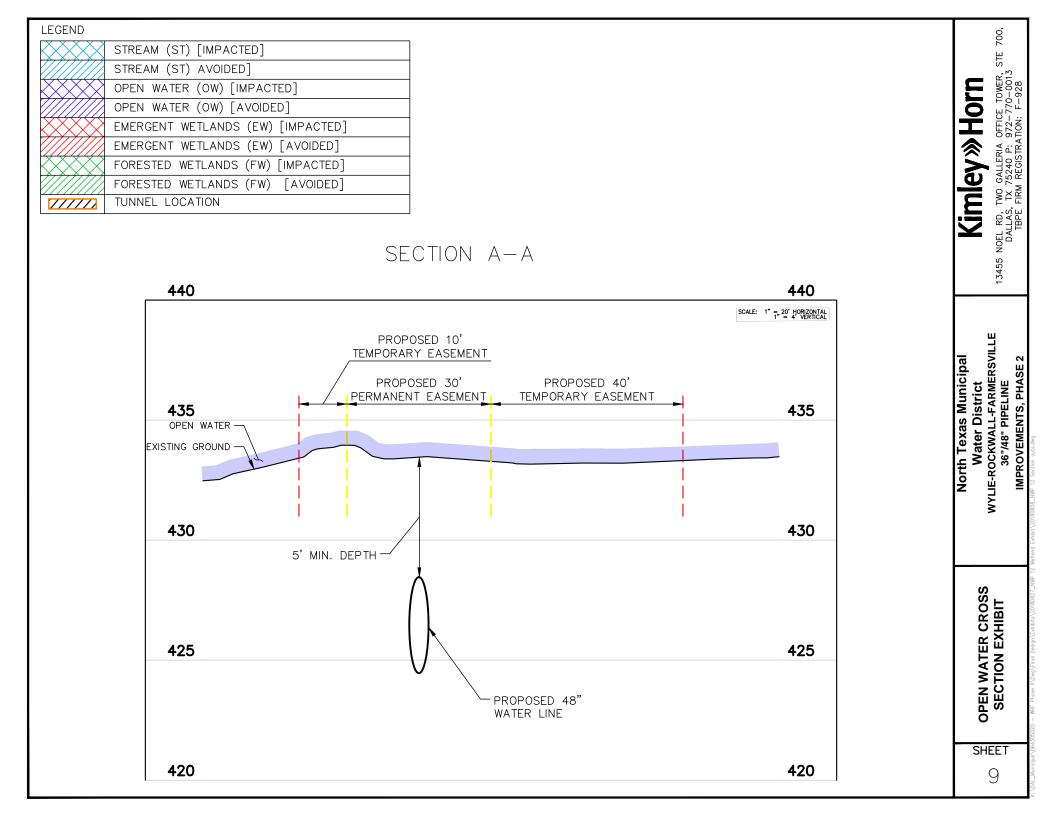












Attachment E

MITIGATION PLAN

Kimley »Horn

Compensatory Mitigation Plan

Project Information

| Project Name: | Wylie-Rockwall-Farmersville 48-Inch Pipeline |
|-------------------|---|
| Applicant: | North Texas Municipal Water District |
| USACE File No.: | SWF-2018-00201 |
| Project Location: | Btwn. Kreymer Lane in Wylie and County Road 484 in Lavon, Collin County, TX |
| Watershed: | East Fork Trinity Watershed (HUC 12030106) |
| County: | Collin County |

Compensatory Mitigation

The proposed project includes open-cut trenching and boring. The East Fork Trinity River (S6) and S8 will be avoided by boring beneath. Impacts to all other features will be limited to the minimum width of construction and permanent easement as necessary for the project. The project will minimize impacts to wetlands and will return wetland areas to pre-construction contours and conditions, so these areas can continue to function as wetlands following construction completion. It is anticipated that compensatory mitigation for the impacts to the jurisdictional aquatic resources will be accomplished by purchasing the appropriate number of credits from the Bunker Sands Mitigation Bank (BSMB). The project site is located within BSMB's primary service area.

The East Fork Trinity River (S6) and S8 will be avoided by boring beneath. The proposed project would result in open-cut trenching through seven streams resulting in temporary impacts measuring approximately 732.34 linear feet and 0.17 acre. The proposed project would result in open-cut trenching through four open water features resulting in temporary impacts measuring approximately 0.24 acre. These features will be restored to pre-construction contours and conditions upon project completion. Therefore, no mitigation is proposed for streams or open water features.

The proposed project would result in impacts to nine forested wetlands (7.31 acres) and three emergent wetlands (1.54 acres) as a result of open-cut trenching. Following completion of construction activities, impacted wetlands will be restored to pre-construction contours and conditions. Emergent wetlands that will be impacted by the project will continue to function as emergent wetlands following completion of construction activities. Therefore, no mitigation is proposed for the temporary impacts to emergent Forested wetlands that will be impacted by the project will function as emergent wetlands wetlands. following completion of construction activities; however, they will no longer be considered forested wetlands based on tree clearing being required for construction activities. Based on this, the Applicant is proposing to mitigate for the loss of function from a conversion from forested wetlands to emergent wetlands. In order to quantify the required mitigation amount for a loss of function, Kimley-Horn performed a TXRAM analysis on the forested wetlands to be impacted and on the existing emergent wetlands to be impacted. Conditions observed within the forested wetlands were consistent throughout all of the forested wetlands identified. Conditions observed within the emergent wetlands were consistent throughout all of the emergent wetlands identified. It is anticipated that the areas to be converted to emergent wetlands following project completion would be similar to the existing emergent wetlands within the study area. Therefore, we propose purchasing mitigation credits for the difference in the TXRAM

Kimley »Horn

scores between the forested wetlands and emergent wetlands. As a result of our TXRAM analysis, the forested wetlands within the study area scored 66. Based on this score, it is our professional opinion that the forested wetlands are of medium quality. As a result of our TXRAM analysis, the emergent wetlands within the study area scored 55. Based on this score, it is our professional opinion that the emergent wetlands are of medium quality. The TXRAM data sheets and scoring sheets are attached for reference. Based on these results, the Applicant proposes to purchase credits to compensate for 7.31 acres of impact to forested wetlands with a TXRAM score of 11 (difference between forested wetlands and emergent wetlands). The Applicant proposes to purchase 7.31 credits from the BSMB based on the score of 11 equating to low quality (1.0 ration multiplier).

The table below depicts the proposed number of mitigation bank credits required of the BSMB determined by the impacted aquatic resource type, the amount of impacts, and the appropriate credit determination method for each mitigation bank based on our TXRAM analysis. Mitigation bank credits will compensate for unavoidable impacts to forested wetlands which will revert to emergent wetlands following project completion.

| | Number | of Credits | for Wetlan | d Impacts | | | |
|---------------------------------|-----------------------|------------|-----------------------|-------------------------|---------|---------------------|---------------------|
| Aquatic Resource | TXRAM Raw Score | Quality | Acres of Impact | TXRAM Score Delta | Quality | Ratio Multiplier | Required Credits |
| Forested Wetlands (pre-project) | 66 | Medium | 7.31 ac | 11 | Low | 1.0 | 7.31 |
| Emergent Wetlands (post- | 55 | Medium | n/a | | | | |

The Applicant proposes to purchase 7.31 credits from the BSMB to compensate for the loss of function from forested wetlands (pre-construction) to emergent wetlands (post-construction).

For construction activities in wetlands, the top 6 to 12 inches of the trench will be sidecast and replaced upon completion of the installation of the water line. The trench will not be backfilled in a manner as to drain Waters of the U.S. Heavy equipment working in wetlands will be placed on mats, or other measures will be taken to minimize soil disturbance.

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TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: 🗷 Fill/Ir | npact (🗷 Linear 🗌 Non-linear) 🔲 M | litigation/Conservation |
|--|------------------------------|---|-------------------------|
| Wetland ID/Name: FWs WAA No.: 1 | | 12/12/2018 Evaluator(s): S | • |
| | | Delineation Performed: | |
| Aerial Photo Date and Source: TNRIS 2015 | | 2-15, 24-27, 86 Represent | |
| Notes: Forested wetland generally bordering | g easements | | |
| | | | |
| LANDSCAPE | | | |
| Aquatic Context - Confirm in office review. See figu | res in section 2.3.1.1 for | examples. | |
| Notes on any barriers or alterations that prevent connect | tion: None | | |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (including r | number for other considerations): | 7Score: <u>4</u> |
| Buffer – Evaluate to 500 feet from WAA boundary. C | Confirm in office review. S | See figures in section 2.3.1.2 for | examples. |
| Buffer Type/Description | Score (See Narratives) | Percentage | Subtotal |
| 1. Forested Wetland | 4 | 10% | 0.4 |
| 2. Emergent Wetland | 3 | 50% | 1.5 |
| 3. Open Water | 4 | 10% | 0.4 |
| 4. Perennial Stream 5. Agricultural Field | 4 | 5% 20% | 0.2 |
| | I | 2070 | Score: <u>2.7</u> |
| HYDROLOGY | | | Score |
| Water Source – Degree of natural or unnatural/artific Natural: Precipitation Groundwater Overband Unnatural/Manipulated: Impoundment Outfall Impoundment | < flow/stream discharge 🗵 | Overland flow 🗌 Beaver activity | |
| | | | |
| Watershed: Development Irrigated agriculture | | ant 🖾 impoundment 📋 Other: | |
| Degree of artificial influence/control: Complete X H | - | | - 2 |
| Wetland created/restored/enhanced: Sustainable/rep | | | Score: 2 |
| Hydroperiod – Variability and recent alteration of th | | a magnitude or inundation/satu | ration. |
| Evaluate the hydroperiod including natural variation: | | | |
| Direct evidence of alteration: Natural: Log-jam | | | |
| Human: Diversions Ditches Levees | | | |
| Riverine only: Recent channel in-stability/dis-eq | | , | |
| Indirect evidence of alteration: Wetland plant stress | | | |
| Upland species encroachment: | | | |
| Change/Alteration of hydroperiod: None Due to r | | | |
| Degree hydroperiod of wetland created/restored/enhane | | | |
| Lacustrine fringe on human impoundment: X High vari | • - • - | | |
| Hydrologic Flow – Movement of water to or from su | | | |
| Flow: \boxtimes Inlets: $\underline{4}$ \boxtimes Outlets: $\underline{4}$ \square Signs of v | | | |
| Restrictions: 🗌 Levee 🗌 Berm/dam 🗌 Diversion 🗵 | Other: Influenced by r | eservoir | |
| High flowthrough: 🛛 Floodplain 🗌 Drift deposits 🗶 D | rainage patterns 🔲 Sedin | nent deposits 🗌 Other: | |
| Low flowthrough: 🗌 High landscape position 🗵 Stagn | ant water 🔲 Closed conto | urs 🗌 Other: | Score: <u>3</u> |
| SOILS | | | |
| Organic Matter – Use data and indicators from wetla High (organic soil or indicator A1, A2, A3) | and determination data fo | rm(s) based on applicable regions and the second | onal supplement. |
| Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | F1 in GP or A6, A7, A9, S | 7, F13 in AGCP) | |
| I Low (indicated by thin organic or organic-mineral lay | er) 🗌 None observable in | surface layer as described herein | Score: 2 |

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| Sedimentation – Deposition of excess sediment due to human actions. Confirm in office review for landscape. Landscape with stress that could lead to excess sedimentation? X Yes No Landscape position: | |
|---|--|
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment dep | position: <u>25</u> |
| Sand deposits: <u>%</u> of area, average thickness Silt/Clay deposits: <u>25</u> % of area, <u><1-inch</u> average thickness | erage thickness |
| Lacustrine fringe only: 🗌 Upper end of impoundment 🔲 Degrades wetland 🗵 Contributes to wetland processes | Score: <u>3</u> |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. | |
| Type (Check those applicable and circle R for recent or P for past): 🗌 Farming R/P 📋 Logging R/P 🛄 Mining R/P 🔲 I | Filling R/P |
| Grading R/P Dredging R/P Off-road vehicles R/P Other R/P: | |
| Percent of WAA with recent soil modification: 0 % Degree of modification: 🗌 High 🔲 Low | |
| Indicators of past modification: 🗌 High bulk density 🗋 Low organic matter 🗋 Lack of soil structure 🗋 Lack of horizons | s 🔲 Hardpan |
| Dramatic change in texture/color Heterogeneous mixture Other: | · · · · · · · · · · · · · · · · · · · |
| Indicators of recovery: 🗌 Organic matter 🔲 Structure 🗌 Horizons 🗌 Mottling 🗌 Hydric soil 🔲 Other: | |
| Percent of WAA with past modification:% Recovery: _ Complete _ High _ Moderate _ Low 🗵 None | Score: <u>4</u> |
| PHYSICAL STRUCTURE | |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each eleva | tion gradient. |
| Elevation gradients (EG): 2 Evidence: I Plant assemblages I Level of saturation/inundation I Path of water | flow 🗵 Slope |
| Micro-topography: 20 % of WAA (By EG: |) |
| Types: 🗵 Depressions 🗌 Pools 🗋 Burrows 🖾 Swales 🗋 Wind-thrown tree holes 🗋 Mounds 🗋 Gilgai 🗋 Islands | i |
| □ Variable shorelines □ Partially buried debris □ Debris jams □ Plant hummocks/roots □ Other: | Score: <u>3</u> |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. | |
| WAA: 🗵 In seasonal floodplain 🗵 Contiguous to other wetland | |
| Horizontal variability: High Moderate Low None | Score: <u>1</u> |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetla | |
| Label of habitat types qualifying as present in WAA: water marks, swale, snags Total: 3 | |
| | Score: _ |
| BIOTIC STRUCTURE | |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). | |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: $\Box \ge 4$ $\boxtimes 3$ $\Box 2$ $\Box 1$ $\Box 0$ | Score: <u>3</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s).Number of plant strata: ≥ 4 $\boxtimes 3$ $\supseteq 2$ $\square 1$ $\square 0$ Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in | Score: <u>3</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 $\otimes 3$ 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 | Score: <u>3</u> a stratum. Score: <u>2</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example. | Score: <u>3</u> a stratum. Score: <u>2</u> mples. |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example. Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 | Score: <u>3</u> a stratum. Score: <u>2</u> mples. Score: <u>4</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of % | Score: <u>3</u> a stratum. Score: <u>2</u> nples. Score: <u>4</u> plant zones. |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest | Score: <u>3</u> a stratum. Score: <u>2</u> mples. Score: <u>4</u> plant zones. Score: <u>1</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section | Score: 3 a stratum. Score: 2 mples. Score: 4 plant zones. Score: 1 ection 2.3.5.5. |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):50 % of WAA Moderate overlap (2 strata overlapping): | Score: <u>3</u> a stratum. Score: <u>2</u> mples. Score: <u>4</u> plant zones. Score: <u>1</u> ection 2.3.5.5. % of WAA |
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| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data form(s) to counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of % Degree of horizontal/plan view interspersion: High Moderate Low None Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (2 strata overlapping): % Herbaceous species/dense litter overlap (only in portion where there are no other strata overlapping): % 0 % Total percentage of WAA with some form of overlap (if more than one present): 50 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hat the total cover of e | Score: 3 a stratum. Score: 2 mples. Score: 4 plant zones. Score: 1 score: 1 % of WAA f WAA Score: 3 ardwood forest Score: 2 |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data form(s) to count species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):50 % of WAA Moderate overlap (2 strata overlapping):% or Total percentage of WAA with some form of overlap (if more than one present):50 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hard for the cover of emergent and submergent plants: □ > 75% □ 51–75% ⊠ 26–50% □ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Loggi | Score: 3 a stratum. Score: 2 mples. Score: 4 plant zones. Score: 1 ection 2.3.5.5. % of WAA f WAA Score: 3 ardwood forest Score: 2 |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 5 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determine the degree of interspersion of Degree of horizontal/plan view interspersion: High Moderate Low Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see thigh overlap (≥ 3 strata overlapping): | Score: 3 a stratum. Score: 2 mples. Score: 4 plant zones. Score: 1 ection 2.3.5.5. % of WAA f WAA Score: 3 ardwood forest Score: 2 |
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TXRAM WETLAND FINAL SCORING SHEET

| Project/Site Name/No.: WRF | 48-in Pipeline | _ Project Type: 🗵 Fill/Im | pact (🗷 Linear 🗌 Non-linear) 🔲 | Mitigation/Conservation |
|-------------------------------|----------------|---------------------------|--------------------------------|-------------------------|
| Wetland ID/Name: FWs | WAA No.: 1 | _ Size: D | Date: 12/12/2018 Evaluator | (s): SDG, CGH |
| Wetland Type: Forested | Ecoregion: Bla | ckland Prairie | Delineation Performed: | Previously X Currently |
| Aerial Photo Date and Source: | TNRIS 2015 | Site Photos: | 12-15, 24-27, 86 Repres | entative: 🛛 Yes 🗌 No |

Notes: Forested wetland generally bordering easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score |
|--|---|---|-----------------------------------|--------------------|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 12.563 |
| Lanuscape | Buffer | 2.7 | x 15 | 12.505 |
| | Water source | 2 | | |
| Hydrology | Hydroperiod | 2 | Sum of metric scores / 12 x 30 | 17.5 |
| | Hydrologic flow | 3 | x 00 | |
| | Organic matter | 2 | | |
| Soils | Sedimentation | 3 | Sum of metric scores / 12 x 15 | 11.25 |
| | Soil modification | 4 | x 10 | |
| | Topographic complexity | 3 | | |
| Physical Structure | Edge complexity | 1 | Sum of metric scores / 12 x 20 | 12.083 |
| | Physical habitat richness | 1 | ×20 | |
| | Plant strata | 3 | | |
| | Species richness | 2 | | |
| | Non-native/invasive infestation | 4 | | |
| Biotic Structure | Interspersion | 1 | Sum of metric scores / 28 x 20 | 12.857 |
| | Strata overlap | 3 | × 20 | |
| | Herbaceous cover | 2 | | |
| | Vegetation alterations | 3 | | |
| | | | | |
| | | | overall TXRAM wetland score | 66.253 |
| | nique resources = overall TXRAM v ke designated a "Wetland of Interna ter tupelo swamp | | | - |
| Additional points for li Dominated by nati Dominated by hard | mited habitats = overall TXRAM we ve trees greater than 24-inch diame d mast (i.e., acorns and nuts) produc | ter at breast height cing native species i | n the tree strata | - |
| Sum of overal | TXRAM wetland score and addition | nal points = total ov | erall TXRAM wetland score | 66 |

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Representative Site Photograph:





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TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: 🗷 Fill/In | npact (🗷 Linear 🔲 Non-linear) 🔲 Mitig | gation/Conservation |
|--|--|---------------------------------------|---------------------|
| Wetland ID/Name: EWs WAA No.: 1 | Size: Date: | 12/12/2018 Evaluator(s): SD | G, CGH |
| Wetland Type: Emergent Ecoregion: Bla | ackland Prairie | Delineation Performed: | viously 🗵 Currently |
| | | 5-19, 20-23, 83-86 Representa | |
| ^{Notes:} Emergent wetland, generally along e | asements | | |
| LANDSCAPE | | | |
| Aquatic Context – Confirm in office review. See figu | ires in section 2.3.1.1 for e | examples. | |
| Notes on any barriers or alterations that prevent connect | ction: None | | |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (including n | umber for other considerations): 7 | Score: <u>4</u> |
| Buffer – Evaluate to 500 feet from WAA boundary. C | Confirm in office review. S | ee figures in section 2.3.1.2 for e | kamples. |
| Buffer Type/Description | Score (See Narratives) | Percentage | Subtotal |
| 1. Forested Wetland | 4 | 60% | 2.4 |
| 2. Open Water | 4 | 5% | 0.2 |
| 3. Perennial Stream | 4 | 5% | 0.2 |
| 4. Agricultural Field | 1 | 20% | 0.2 |
| 5. Emergent Wetland | 3 | 10% | 0.3 |
| HYDROLOGY | | | Score: <u>3.3</u> |
| Water Source – Degree of natural or unnatural/artific Natural: Precipitation Groundwater Overbank Unnatural/Manipulated: Impoundment Outfall Watershed: Development Irrigated agriculture | k flow/stream discharge ⊠] Irrigation/pumping ⊠ Oth] Wastewater treatment pla ligh □ Low □ None | Overland flow | ease from reservoir |
| Wetland created/restored/enhanced: Sustainable/rep | | | Score: <u>2</u> |
| Hydroperiod – Variability and recent alteration of the | seasonal/temporary | a magnitude of inundation/satura | tion. |
| | | | |
| Direct evidence of alteration: Natural: Log-jam | | | |
| Human: 🗌 Diversions 🗌 Ditches 🗌 Levees 🔲 | | | |
| Riverine only: 🗌 Recent channel in-stability/dis-eq | uilibrium (Degradation o | r 🗌 Aggradation) | |
| Indirect evidence of alteration: Wetland plant stress | : | _ 🗌 Plant morphology: | |
| Upland species encroachment: | Plant Community | : Soil: | |
| Change/Alteration of hydroperiod: None Due to r Degree hydroperiod of wetland created/restored/enhance | | | |
| Lacustrine fringe on human impoundment: X High varia | | | Score: 2 |
| Hydrologic Flow – Movement of water to or from su | | | |
| Flow: Inlets: <u>4</u> Outlets: <u>4</u> Signs of v | | | |
| Restrictions: Levee Berm/dam Diversion 🗵 | Other: Influenced by re | eservoir | |
| High flowthrough: 🛛 Floodplain 🗌 Drift deposits 🗶 D | | | |
| Low flowthrough: High landscape position 🗵 Stagn | | · · · · · · · · · · · · · · · · · · · | 0 |
| SOILS | | | |
| Organic Matter – Use data and indicators from wetla | and determination data fo | rm(s) based on applicable region | al supplement. |
| High (organic soil or indicator A1, A2, A3) | | | |
| Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | F1 in GP or A6, A7, A9, S7 | ′, F13 in AGCP) | 4 |
| Low (indicated by thin organic or organic-mineral lay | er) 🗵 None observable in | surface layer as described herein | Score: <u>1</u> |

Low (indicated by thin organic or organic-mineral layer) 🗵 None observable in surface layer as described herein

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| Sedimentation – Deposition of excess sediment due to human actions. Confirm in office review for landscape. Landscape with stress that could lead to excess sedimentation? X Yes No Landscape position: High X Low |
|--|
| |
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment deposition: 25 |
| Sand deposits:% of area, average thickness |
| Lacustrine fringe only: Upper end of impoundment Degrades wetland Contributes to wetland processes Score: 3 |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. |
| Type (Check those applicable and circle R for recent or P for past): 🗌 Farming R/P 🔲 Logging R/P 🗌 Mining R/P 🗌 Filling R/P |
| Grading R/P Dredging R/P Off-road vehicles R/P Other R/P: |
| Percent of WAA with recent soil modification:% Degree of modification: 🗌 High 🗵 Low |
| Indicators of past modification: 🗌 High bulk density 🛛 Low organic matter 🖾 Lack of soil structure 🖾 Lack of horizons 🗌 Hardpan |
| Dramatic change in texture/color 🗌 Heterogeneous mixture 🛛 Other: Change in vegetation from surrounding area |
| Indicators of recovery: Organic matter Structure Horizons Mottling Hydric soil Other: |
| Percent of WAA with past modification: 75 % Recovery: Complete High X Moderate Low None Score: 2 |
| PHYSICAL STRUCTURE |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each elevation gradient. |
| Elevation gradients (EG): 2 Evidence: I Plant assemblages I Level of saturation/inundation I Path of water flow I Slope |
| Micro-topography: 0 % of WAA (By EG:) |
| Types: 🗌 Depressions 🗵 Pools 🗌 Burrows 🗋 Swales 🗋 Wind-thrown tree holes 🗍 Mounds 🗍 Gilgai 🗋 Islands |
| □ Variable shorelines □ Partially buried debris □ Debris jams □ Plant hummocks/roots □ Other: Score: 2 |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. |
| WAA: 🗵 In seasonal floodplain 🗵 Contiguous to other wetland |
| |
| Horizontal variability: High Moderate Low None Score: 1 |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. Label of habitat types qualifying as present in WAA: Thick herbaceous cover Total: 1 Score: 1 |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. Label of habitat types qualifying as present in WAA: Thick herbaceous cover Total: 1 Score: 1 BIOTIC STRUCTURE Total: 1 Score: 1 Score: 1 |
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| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. Label of habitat types qualifying as present in WAA: Thick herbaceous cover Total: 1 Score: 1 BIOTIC STRUCTURE Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: 2 1 0 Score: 1 |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. Label of habitat types qualifying as present in WAA: Thick herbaceous cover Total: 1 Score: 1 BIOTIC STRUCTURE Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 ⊠ 1 □ 0 Score: 1 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a stratum. |
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Version 2.0 – Final TXRAM WETLAND FINAL SCORING SHEET

| Project/Site Name/No.: WRF | Project Type: [| Project Type: 🗷 Fill/Impact (🗷 Linear 🗌 Non-linear) 🗌 Mitigation/Conservation | | | |
|-------------------------------|-----------------|---|-------------|---------------------|-----------------------------|
| Wetland ID/Name: EWs | WAA No.: 1 | Size: | Date: | 12/12/2018 E | valuator(s): SDG, CGH |
| Wetland Type: Emergent | Ecoregion: | Blackland Pra | irie | Delineation Perform | ned: Previously Currently |
| Aerial Photo Date and Source: | TNRIS 2015 | Site | Photos: 16- | -19, 20-23, 83-86 | Representative: X Yes No |

Notes: Emergent wetland, generally along easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score |
|--|---------------------------------|--------------|-----------------------------------|--------------------|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 13.688 |
| | Buffer | 3.3 | x 15 | |
| Hydrology | Water source | 2 | Sum of metric scores / 12 x 30 | 17.5 |
| | Hydroperiod | 2 | | |
| | Hydrologic flow | 3 | | |
| Soils | Organic matter | 1 | | 7.5 |
| | Sedimentation | 3 | Sum of metric scores / 12 x 15 | |
| | Soil modification | 2 | | |
| Physical Structure | Topographic complexity | 2 | | 6.667 |
| | Edge complexity | 1 | Sum of metric scores / 12 x 20 | |
| | Physical habitat richness | 1 | | |
| Biotic Structure | Plant strata | 1 | Sum of metric scores / 28 x 20 | 9.286 |
| | Species richness | 2 | | |
| | Non-native/invasive infestation | 2 | | |
| | Interspersion | 1 | | |
| | Strata overlap | 1 | | |
| | Herbaceous cover | 4 | | |
| | Vegetation alterations | 2 | | |
| | | | | |
| | 54.641 | | | |
| Additional points for u Area of Caddo Lak Bald cypress – wa Pitcher plant bog Spring | - | | | |
| Additional points for li Dominated by native Dominated by hard | - | | | |
| Sum of overall | 55 | | | |

Representative Site Photograph:





Attachment F

USFWS IPAC SPECIES LIST

Birds

| NAME | STATUS |
|--|------------|
| Least Tern Sterna antillarum | Endangered |
| Population: interior pop. | |
| No critical habitat has been designated for this species. | |
| This species only needs to be considered under the following conditions: | |
| Wind Energy Projects | |
| Species profile: <u>https://ecos.fws.gov/ecp/species/8505</u> | |
| Piping Plover Charadrius melodus | Threatened |
| Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except | |
| those areas where listed as endangered. | |
| There is final critical habitat for this species. Your location is outside the critical habitat. | |
| This species only needs to be considered under the following conditions: | |
| Wind Energy Projects | |
| Species profile: <u>https://ecos.fws.gov/ecp/species/6039</u> | |
| Pad Vnat Caliduia aguatus muta | Threatened |
| Red Knot Calidris canutus rufa | Threatened |
| No critical habitat has been designated for this species. | |
| This species only needs to be considered under the following conditions: | |
| Wind Energy Projects | |
| Species profile: <u>https://ecos.fws.gov/ecp/species/1864</u> | |
| Whooping Crane Grus americana | Endangered |
| Population: Wherever found, except where listed as an experimental population | C |
| There is final critical habitat for this species. Your location is outside the critical habitat. | |
| Species profile: https://ecos.fws.gov/ecp/species/758 | |
| | |
| | |

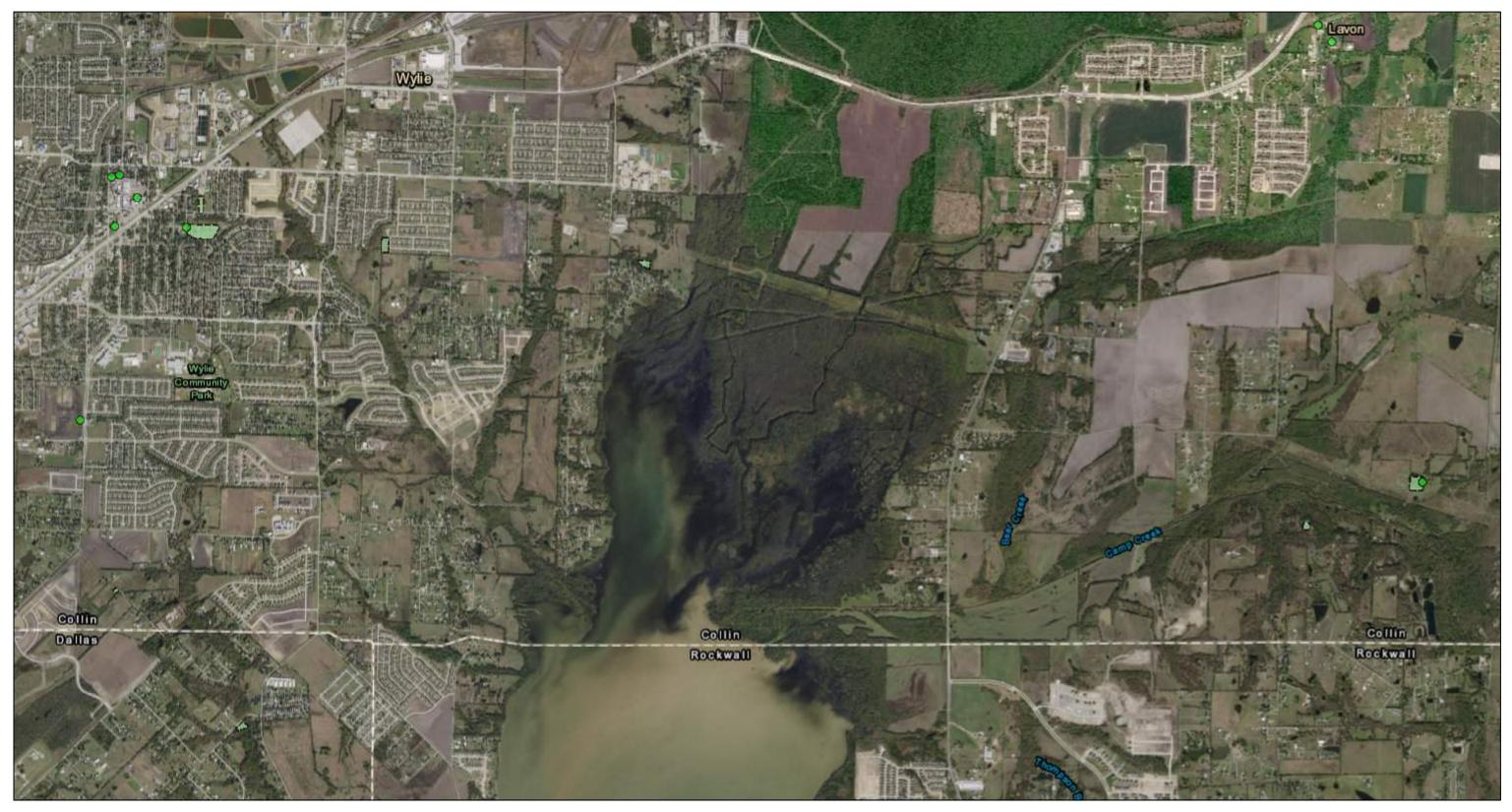
Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

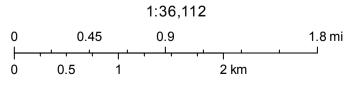
Attachment G

THC HISTORIC SITES ATLAS MAP

Texas Historic Sites Atlas



January 17, 2019



Copyright 2010, Texas Historical Commission Esri, HERE, Garmin, $\ensuremath{\mathbb{C}}$ OpenStreetMap contributors, and the GIS user community Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

THC provides this information with the understanding that it is not guaranteed to be accurate, correct or complete. Texas Historical Commission ©

Attachment H

AGENT AUTHORIZATION



Regional. Reliable. Everyday.

AGENT AUTHORIZATION

Travis Markham, P.E. Conveyance Program Manager North Texas Municipal Water District 505 E. Brown Street P.O. Box 2408 Wylie, Texas 75098

USACE PM - Ms. Jamie Larkin

RE: Nationwide Permit 12 Pre-Construction Notification Wylie-Rockwall-Farmersville 36/48-Inch Pipeline Improvements, Phase 2 11.94 Acres of Undeveloped Land 2800 SH 78 Lavon, Collin County, Texas

November 27, 2018

Regulatory Division (CESWF-DE-R) U.S. Army Corps of Engineers Fort Worth District 819 Taylor Street, Room 3A37 Fort Worth, Texas 76102-0300

Attention: Mr. Stephen L. Brooks, Chief, Regulatory Division

Re: Waters of the U.S. and Related Consulting and Permitting

To Whom It May Concern:

I hereby designate and authorize Kimley-Horn and Associates, Inc. to act in my/our behalf as my/our agent solely for the purpose of processing of Section 404 permits and Section 401 Water Quality Certifications applications and to furnish upon request supplemental information in support of applications, etc. from this day forward until successful completion of the permitting process or revocation.

Authorized this the <u>27th</u> day of <u>November</u>, <u>2018</u>

Travis Markham

Name

1/2

Signature

Regional Service Through Unity...Meeting Our Region's Needs Today and Tomorrow

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Kimley »Horn

October 21, 2019

Mr. Joseph Shelnutt Regulatory Biologist Regulatory Division U.S. Army Corps of Engineers – Fort Worth District 819 Taylor Street, Room 3A37 Fort Worth, Texas 76102-00300

RE: SWF-2018-00201 Wylie-Rockwall-Farmersville 48-Inch Pipeline Additional Information Wylie, Collin County, Texas

Dear Mr. Shelnutt:

Kimley-Horn and Associates, Inc. (Kimley-Horn) has prepared this letter and supporting documentation on behalf of the North Texas Municipal Water District (NTMWD) (the Applicant) to provide additional information requested by you in an email dated February 21, 2019 and information discussed during a site visit held on October 1, 2019 which will aid in the review of the proposed project. The requested information and our responses are provided below.

1. <u>Request:</u> Texas Historical Commission (THC) concurrence with an acceptable cultural resources survey report is required. Please provide USACE with such report for evaluation.

<u>Response:</u> Kimley-Horn engaged Stone Point Services, LLC to perform the cultural resources survey and to coordinate with the THC. Prior to performing the survey in the field, Kimley-Horn received confirmation from Mr. Jimmy Barrera with the USACE that he did not need to see the scope of the survey that was reviewed by the THC prior to the survey being performed. A copy of the cultural resources survey report was submitted to the THC for review on October 1, 2019. At the October 1, 2019 site visit Mr. Barrera stated he only needed to see correspondence from the THC when it is received to show compliance with the Antiquities Code of Texas. The THC responded on October 17, 2019 stating:

- No historic properties are present or affected by the project as proposed. However, if
 historic properties are discovered or unanticipated effects on historic properties are
 found, work should cease in the immediate area; work can continue where no historic
 properties are present.
- THC/SHPO unable to complete review at this time based on insufficient documentation. A supplemental review must be submitted, and the 30-day review period will begin upon receipt of adequate documentation. Deep archeological prospection is required for this project. Please conduct backhoe trenching on the project to search for deeply buried archeological sites and integrate this study into a revised report.

Kimley »Horn

The Applicant is working to have the appropriate additional survey work performed and will continue to consult with the THC. Kimley-Horn will provide documentation to the USACE once received from the THC.

 <u>Request</u>: Location Map (Sheet 1) indicates that there is a larger plan of development associated with the proposed project. Please explain how the proposed Phase 2 project would be considered single and complete, and provide information on all phases of the overall project so that a comprehensive cumulative impacts analysis can be performed if indicated.

Response: As discussed during the October 1, 2019 site visit, the proposed project is not part of a larger plan of development. The project lies entirely within Collin County and is not part of a larger planned multi-county water distribution system.

3. <u>Request:</u> A site visit is required to verify the submitted jurisdictional determination and TXRAM scores. Please coordinate with USACE to finalize a mutual date for the site visit and areas of interest. Also please be prepared to excavate soil test pits and carry out other data verification in the field.

Response: At the October 1, 2019 site visit with the USACE, we discussed the TXRAM scores we had previously submitted. Kimley-Horn performed another site visit on October 15, 2019 to reassess conditions at the site. Please reference below for specific updated project information:

- Updated TXRAM sheets are attached for your review.
- While performing the site visit with the USACE, the USACE determined that the feature previously identified as Open Water 5 (OW5) on the delineation maps should be classified as a forested wetland. This is now depicted as FW4 on the attached revised aquatic resources delineation maps. Because the open water is no longer separating FW4, FW6, FW7, and FW8, these wetlands were combined and labeled as FW4. Further, it was discussed while looking at the area identified as EW6 that some areas would likely not be classified as wetlands based on recent site visits and data gathering. It was explained that at the time of the aquatic resources delineation, these areas were not accessible because of flooding from water releasing from Lake Lavon occurring on properties where access would have been provided to these areas. At the site visit on October 15, 2019, Kimley-Horn determined that the areas previously identified as FW8, EW6, and some of EW5 do not exhibit all three wetland criteria. Therefore, the boundaries and acreages of wetlands in this area has changed. Revised Aquatic Resources Delineation maps are attached for your review. The maps show the locations of soil stations, the locations of TXRAM data points, and the limits of wetlands (and other aquatic resources) within the project easement (including temporary easement areas). Wetland determination data forms and site photographs supporting the changes are attached for your review. Revised impacts maps are also attached for your review.
- 4. <u>Request:</u> Please provide a table of all proposed single and complete crossings of waters of the United States to include the method of crossing (open-cut trenching, bore, etc.). For example,

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Sheet 8 illustrates many aquatic resources that appear to be components of one single and complete crossing. Please also provide a cross-referenced set of aerials with the single and complete crossings depicted.

<u>Response</u>: A revised table of single and complete crossings is attached for your review. Kimley-Horn understands the USACE has determined that each aquatic resource crossing is not going to be considered a single and complete crossing in the Trinity River floodplain. The table details temporary impacts to the aquatic resources throughout the alignment. Please reference the attached aquatic resources delineation maps to cross-reference the data provided in the attached table of single and complete crossings.

5. <u>Request:</u> Please find attached the current ORM upload tables. Once the JD and impacts are approved by USACE, please fill out this spreadsheet as completely as possible and return it. Please note that these tables are frequently updated by USACE HQ.

<u>Response:</u> Kimley-Horn will provide the completed ORM upload tables following approval of the JD and impacts by the USACE.

6. <u>Request:</u> Please be aware that matts are considered temporary fill in waters of the United States and should be accounted for in the updated information.

<u>Response:</u> All temporary impacts, including the potential use of matts are accounted for within the easement boundaries (temporary construction and permanent are included). Entry and exit pits for tunneling activities beneath some aquatic resources are depicted on the attached impacts maps.

7. Request: The compensatory mitigation plan within the submittal is not acceptable. The comparison of existing "medium quality" emergent and forested wetland types within the proposed project area is inappropriate. The submitted TXRAM analysis of both wetland types is appropriate. However, the assumption that all impacted forested wetland areas would eventually achieve the emergent wetland reference site score of 55 is flawed. The correct approach should be to: 1) score the forested wetlands areas; 2) score what the permanently maintained corridor could achieve (this would not be the reference score); 3) use the delta between these two scores to calculate credits for the permanently maintained areas; 4) for the temporary workspace areas, describe how adversely impacted forested wetlands would be treated so that the ecological trajectory of these areas would recover to the referenced forested wetland score (a restoration plan that addresses soil compaction from equipment, soil treatment for plantings, a native plant/tree species list for planting, and how such areas would be monitored). In your updated compensatory mitigation plan please show how all credits were calculated. Please keep in mind that once compensatory mitigation is triggered at a single and complete crossing, all permanent adverse impacts to all jurisdictional aquatic resource types at such a crossing must be included and addressed in the compensatory mitigation plan.

Response: While performing the October 1, 2019 site visit with the USACE, we visited the overhead powerline easement to evaluate and assess the emergent wetlands present within that

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corridor (identified previously as EW4). The USACE agreed that the TXRAM scores for the existing emergent wetlands within the existing overhead powerline easement to the south of the pipeline easement would be sufficient for projecting the anticipated TXRAM scores that the post-construction pipeline easement would achieve. As stated above (3), revised TXRAM scores have been prepared and the data/scoring sheets are attached. Based on the TXRAM score difference between pre-project and post-project calculated for each impacted wetland, the project would require the purchase of 0.68 credits. The Applicant proposes to purchase credits from the Red Oak Umbrella Mitigation Bank. The impact site is located in Red Oak Umbrella Mitigation Bank's secondary service area (1.5 multiplier); therefore, the total credits required will be 1.02 credits. A revised mitigation plan is attached for your review.

Please let us know if you need additional information to aid in your review and processing of this project. Please contact me by phone at (469) 914-8717 or by email at <u>carland.holstead@kimley-horn.com</u>.

Sincerely,

Carland S. Halstead

Carland G. Holstead, PWS

| Attachments: | Attachment A: | Revised TXRAM Data Sheets |
|--------------|---------------|--|
| | Attachment B: | Revised Aquatic Resources Delineation Maps |
| | Attachment C: | Wetland Determination Data Forms |
| | Attachment D: | Site Photographs |
| | Attachment E: | Revised Impacts Maps |
| | Attachment F: | Table of Single and Complete Crossings |
| | Attachment G: | Revised Mitigation Plan |

Attachment A

REVISED TXRAM DATA SHEETS

TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: | ব Fill/Impact (১ | 🛚 Linear 🔲 Non-linea | r) | |
|---|------------------------|------------------|----------------------|-----------------------------|--|
| Wetland ID/Name: A WAA No.: 1 | | | | r(s): SDG, MREA | |
| Wetland Type: Forested Ecoregion: Bla | ackland Prairie | | Delineation Performe | d: 🗌 Previously 🗵 Currently | |
| Aerial Photo Date and Source: TNRIS 2015 | Site Phot | os: 21-24 | R | Representative: 🛛 Yes 🗌 No | |
| Notes: Green Ash dominated forested wetla | nd generally bo | rdering ea | sements | | |
| LANDSCAPE | | | | | |
| Aquatic Context – Confirm in office review. See figu | | .1 for examp | les. | | |
| Notes on any barriers or alterations that prevent connect | | | | | |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (inclu | iding number | for other considerat | ions): / Score: 4 | |
| Buffer – Evaluate to 500 feet from WAA boundary. C | | - | ures in section 2.3. | 1.2 for examples. | |
| Buffer Type/Description | Score (See Narrat | ives) | Percentage | Subtotal | |
| 1. Forested Wetland | 4 | | 50% | 2 | |
| 2. Emergent Wetland | 3 | | 20% | 0.6 | |
| 3. Perennial Stream | 4 | | 10% | 0.4 | |
| 4. Agricultural Field 5. | 0 | | 20% | 0.0 | |
| ·. | | | | Score: <u>3.0</u> | |
| HYDROLOGY | | | | | |
| Water Source – Degree of natural or unnatural/artific Natural: Precipitation Groundwater Overbank | k flow/stream dischar | ge 🗵 Overla | and flow 🗌 Beaver | activity 🗌 Other: | |
| Unnatural/Manipulated: 🗌 Impoundment 🗌 Outfall | | | | | |
| Watershed: X Development X Irrigated agriculture | | - | Impoundment [] O | ther: | |
| Degree of artificial influence/control: Complete X H | igh 🗌 Low 🗌 Non | e | | 0 | |
| Wetland created/restored/enhanced: Sustainable/rep | | | | Score: <u>2</u> | |
| Hydroperiod – Variability and recent alteration of the | | | nitude of inundatio | n/saturation. | |
| Evaluate the hydroperiod including natural variation: seasonal/temporary | | | | | |
| Direct evidence of alteration: Natural: Log-jam Channel migration Other: | | | | | |
| Human: Diversions Ditches Levees I Impoundments Other: Release of water from reservoir | | | | | |
| Riverine only: 🗌 Recent channel in-stability/dis-equilibrium (🗌 Degradation or 🗌 Aggradation) | | | | | |
| Indirect evidence of alteration: Wetland plant stress | | | | | |
| Upland species encroachment: | 🗌 Plant Com | munity: | | Soil: | |
| Change/Alteration of hydroperiod: | | | | - / | |
| Degree hydroperiod of wetland created/restored/enhance | ced replicates natura | l patterns: m | oderate (seaso | nal) | |
| Lacustrine fringe on human impoundment: X High varia | | | • | | |
| Hydrologic Flow – Movement of water to or from su | | | | | |
| Flow: Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: \underline{4} Inlets: \underline{4} Inlets: $\underline{4}$ Inlets: \underline{4} | | | | | |
| Restrictions: 🗌 Levee 🔲 Berm/dam 🗌 Diversion 🗵 | Other: Influenced | by reserv | oir | | |
| High flowthrough: X Floodplain X Drift deposits X D | rainage patterns 🗌 | Sediment de | posits 🗌 Other: | | |
| Low flowthrough: 🗌 High landscape position 🗵 Stagn | ant water 🔲 Closed | contours | Other: | Score: <u>3</u> | |
| SOILS | | | | | |
| Organic Matter – Use data and indicators from wetla High (organic soil or indicator A1, A2, A3) | and determination c | lata form(s) l | based on applicable | e regional supplement. | |
| D Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | F1 in GP or A6, A7, | A9, S7, F13 i | in AGCP) | | |
| X Low (indicated by thin organic or organic-mineral lay | er) 🗌 None observ | able in surfac | e layer as described | herein Score: 2 | |

| Version 2.0 – Final | Ve | rsion | 2.0 | – Fina | / |
|---------------------|----|-------|-----|--------|---|
|---------------------|----|-------|-----|--------|---|

| Sedimentation – Deposition of excess sediment due to human actions. Confirm in office review for landscape. | |
|--|---|
| Landscape with stress that could lead to excess sedimentation? X Yes No |] High 🗵 Low |
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment de | position: 25 |
| Sand deposits: <u>%</u> of area, <u>average thickness</u> Silt/Clay deposits: <u>25</u> % of area, <u>*1-inch</u> average thickness | erage thickness |
| Lacustrine fringe only: 🗌 Upper end of impoundment 🔲 Degrades wetland 🗵 Contributes to wetland processes | Score: <u>3</u> |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. | |
| Type (Check those applicable and circle R for recent or P for past): Tarming R/P Logging R/P Mining R/P | Filling R/P |
| Grading R/P Dredging R/P Off-road vehicles R/P Other R/P: | |
| Percent of WAA with recent soil modification: 0 % Degree of modification: \Box High \Box Low | |
| Indicators of past modification: 🗌 High bulk density 🗌 Low organic matter 🔲 Lack of soil structure 🗌 Lack of horizon | s 🔲 Hardpan |
| □ Dramatic change in texture/color □ Heterogeneous mixture □ Other: | |
| Indicators of recovery: Organic matter Structure Horizons Mottling Hydric soil Other: | · · · · · · · · · · · · · · · · · · · |
| Percent of WAA with past modification: 0 % Recovery: 🗌 Complete 🗌 High 🗌 Moderate 🔲 Low 🗵 None | Score: <u>4</u> |
| PHYSICAL STRUCTURE | |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each eleva | ation gradient. |
| Elevation gradients (EG): 2 Evidence: I Plant assemblages I Level of saturation/inundation I Path of water | r flow 🔀 Slope |
| Micro-topography: 20 % of WAA (By EG: |) |
| Types: 🗵 Depressions 🗌 Pools 🗋 Burrows 🕱 Swales 🗋 Wind-thrown tree holes 🗋 Mounds 🗋 Gilgai 🗋 Islands | ; |
| □ Variable shorelines □ Partially buried debris I Debris jams □ Plant hummocks/roots □ Other: | Score: <u>3</u> |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. | |
| WAA: In seasonal floodplain I Contiguous to other wetland | |
| Horizontal variability: High Moderate Low None Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetla | Score: <u>1</u> |
| Label of habitat types qualifying as present in WAA: <u>secondary channel, swale, snags, brush/debris, den, plant hummocks, water marks</u> Total: 7 | Score: 3 |
| | Score |
| BIOTIC STRUCTURE Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). | |
| | · · · · · · · · · · · · · · · · · · · |
| | • |
| Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ | Score: 3 |
| Number of plant strata: $\square \ge 4 \boxtimes 3 \square 2 \square 1 \square 0$ Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in | Score: <u>3</u> a stratum. |
| Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 | Score: <u>3</u> a stratum. Score: <u>3</u> |
| Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): $\underline{7}$ Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples of the section 2.3.5.3 for exam | Score: <u>3</u> a stratum. Score: <u>3</u> |
| Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example | Score: <u>3</u> a stratum. Score: <u>3</u> mples. Score: <u>4</u> |
| Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 Score: 1 Score: 2.3.5.5. |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of Herbaceous species/dense litter overlap (only in portion where there are no other strata overlapping):% of | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 score: 1 score: 2.3.5.5. % of WAA |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% or Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 score: 1 2 ction 2.3.5.5. % of WAA % of WAA Score: 4 4 |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of % Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest % Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):% 75 % of WAA Herbaceous species/dense litter overlap (only in portion where there are no other strata overlapping):% % | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 Score: 1 Score: 2.3.5.5. % of WAA of WAA Score: 4 ardwood forest |
| Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exart Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of % Degree of horizontal/plan view interspersion: High Moderate Low None Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see % High overlap (≥ 3 strata overlapping): 75 % of WAA Moderate overlap (2 strata overlapping): % Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland h Total cover of emergent and submergent plants: >75% 51–75% 26–50% ≤ 25% | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 score: 1 2 ction 2.3.5.5. % of WAA % of WAA Score: 4 4 |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exart Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% or Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hardwoad hardwoad hardwoad for extrat cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 Score: 1 % of WAA Score: 4 Score: 4 Score: 4 Score: 1 |
| Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exart Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of % Degree of horizontal/plan view interspersion: High Moderate Low None Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see % High overlap (≥ 3 strata overlapping): 75 % of WAA Moderate overlap (2 strata overlapping): % Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland h Total cover of emergent and submergent plants: >75% 51–75% 26–50% ≤ 25% | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 Score: 1 % of WAA Score: 4 Score: 4 Score: 4 Score: 1 |
| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exart Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in see High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% or Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hardwoad hardwoad hardwoad for extrat cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 ction 2.3.5.5. % of WAA Score: 4 score: 4 ardwood forest Score: 1 mples. % of WAA |
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| Number of plant strata: □ ≥ 4 ⊠ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in Number of species across all strata and determination data forms (not counting a species more than once): 7 Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exart Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in sec High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% or Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland h Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Loggir □ Cutting R/P □ Feral hog rooting R/P □ Woody debris removal R/P □ Other R/P: | Score: 3 a stratum. Score: 3 mples. Score: 4 plant zones. Score: 1 Score: 1 % of WAA Score: 4 score: 4 mg R/P I R/P |

| Project/Site Name/No.: WR | F 48-in Pipeline | Project Type: 🗙 Fill/Im | npact (🗙 I | Linear 🔲 Non-linear) 🔲 Mitigation/Conservation |
|------------------------------|------------------|-------------------------|------------|--|
| Wetland ID/Name: A | WAA No.: 1 | Size: [| Date: 10 | /15/2019 Evaluator(s): SDG, MREA |
| Wetland Type: Forested | Ecoregion: BI | ackland Prairie | D | elineation Performed: Previously Currently |
| Aerial Photo Date and Source | TNRIS 2015 | Site Photos: | 21-24 | Representative: 🛛 Yes 🗌 No |

Notes: Green Ash dominated forested wetland generally bordering easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score | |
|--------------------------|--|------------------------------|---|--------------------|--|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 13.125 | |
| Lanuscape | Buffer | 3 | x 15 | 15.125 | |
| | Water source | 2 | 0 (); (40 | | |
| Hydrology | Hydroperiod | 2 | Sum of metric scores / 12 x 30 | 17.5 | |
| | Hydrologic flow | 3 | | | |
| | Organic matter | 2 | | | |
| Soils | Sedimentation | 3 | Sum of metric scores / 12 x 15 | 11.25 | |
| | Soil modification | 4 | x 15 Sum of metric scores / 12 x 20 | | |
| | Topographic complexity | 3 | | | |
| Physical Structure | Edge complexity | 1 | | 11.667 | |
| | Physical habitat richness | 3 | × 20 | | |
| | Plant strata | 3 | | 14.286 | |
| | Species richness | 3 | | | |
| | Non-native/invasive infestation | 4 | | | |
| Biotic Structure | Interspersion | 1 | Sum of metric scores / 28 x 20 | | |
| | Strata overlap | 4 | x 20 | | |
| | Herbaceous cover | 1 | | | |
| | Vegetation alterations | 4 | | | |
| | | | | | |
| | Sum of core | e element scores = c | overall TXRAM wetland score | 67.828 | |
| | nique resources = overall TXRAM w te designated a "Wetland of Internat ter tupelo swamp | | | - | |
| Additional points for li | mited habitats = overall TXRAM wet ve trees greater than 24-inch diame d mast (i.e., acorns and nuts) produc | ter at breast height | | - | |
| Sum of overall | TXRAM wetland score and addition | nal points = total ov | erall TXRAM wetland score | 68 | |

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Representative Site Photograph:





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TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: 🗙 F | ill/Impact (🗷 Linear 🔲 Non-lir | near) 🔲 Mitigation/Conservation | | |
|---|---|--------------------------------|---------------------------------|--|--|
| Wetland ID/Name: A WAA No.: 1 | | ate: 10/15/2019 Evalu | | | |
| | ackland Prairie | Delineation Perform | med: 🗌 Previously 🗵 Currently | | |
| | | 21-24 | | | |
| Notes: Green Ash dominated forested wetla | nd generally bord | ering easements | | | |
| LANDSCAPE | | | | | |
| Aquatic Context - Confirm in office review. See figu | ires in section 2.3.1.1 | for examples. | | | |
| Notes on any barriers or alterations that prevent connect | ction: None | | | | |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (includi | ng number for other conside | rations): Score: _4 | | |
| Buffer – Evaluate to 500 feet from WAA boundary. C | Confirm in office review | v. See figures in section 2 | .3.1.2 for examples. | | |
| Buffer Type/Description | Score (See Narrative | s) Percentage | Subtotal | | |
| 1. Forested Wetland | 4 | 50% | 2 | | |
| 2. Emergent Wetland | 3 | 20% | 0.6 | | |
| 3. Perennial Stream | 4 | 10% | 0.4 | | |
| 4. Agricultural Field 5. | 0 | 20% | 0.0 | | |
| 5. | | | Score: 3.0 | | |
| HYDROLOGY | | | Score: <u></u> | | |
| Water Source – Degree of natural or unnatural/artific Natural: Precipitation Groundwater Overbank Unnatural/Manipulated: Impoundment Outfall Watershed: Development Inrigated agriculture | k flow/stream discharge] Irrigation/pumping ⊠ | Overland flow Beav | er activity | | |
| | | | | | |
| Degree of artificial influence/control: Complete X H | - | | - 2 | | |
| Wetland created/restored/enhanced: Sustainable/replicates natural Controlled Score: 2 Hydroperiod – Variability and recent alteration of the duration, frequency, and magnitude of inundation/saturation. | | | | | |
| | | | tion/saturation. | | |
| Evaluate the hydroperiod including natural variation: seasonal/temporary | | | | | |
| Direct evidence of alteration: Natural: Log-jam Channel migration Other: | | | | | |
| Riverine only: Recent channel in-stability/dis-equilibrium (Degradation or Aggradation) | | | | | |
| Indirect evidence of alteration: Wetland plant stress | | | | | |
| Upland species encroachment: | | | | | |
| Change/Alteration of hydroperiod: None Due to r | | | | | |
| Degree hydroperiod of wetland created/restored/enhance | | | • • | | |
| Lacustrine fringe on human impoundment: X High vari | | | 0 | | |
| Hydrologic Flow – Movement of water to or from su | | | | | |
| Flow: Inlets: <u>4</u> Signs of v | | | | | |
| Restrictions: Levee Berm/dam Diversion 🗵 | | | | | |
| High flowthrough: 🛛 Floodplain 🗵 Drift deposits 🗵 D | | | | | |
| Low flowthrough: 🗌 High landscape position 🗵 Stagn | ant water 🔲 Closed co | ntours 🗌 Other: | Score: <u>3</u> | | |
| SOILS | | | | | |
| Organic Matter – Use data and indicators from wetla High (organic soil or indicator A1, A2, A3) | and determination dat | a form(s) based on applica | able regional supplement. | | |
| Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | F1 in GP or A6, A7, A9 | , S7, F13 in AGCP) | | | |
| Even (indicated by thin organic or organic-mineral lay | | , | ed herein Score: 2 | | |

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| Landscape with stress that could lead to excess sedimentation? X Yes No Landscape position: Hig | |
|---|--|
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment deposit | |
| Sand deposits:% of area, average thickness Silt/Clay deposits: 25% of area, | e thickness |
| Lacustrine fringe only: Upper end of impoundment Degrades wetland Contributes to wetland processes Sco | ore: <u>3</u> |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. | |
| Type (Check those applicable and circle R for recent or P for past): T Farming R/P Logging R/P Mining R/P Filling | ng R/P |
| □ Grading R/P □ Dredging R/P □ Off-road vehicles R/P □ Other R/P: | |
| Percent of WAA with recent soil modification: 0 % Degree of modification: 🗌 High 🔲 Low | |
| Indicators of past modification: 🗌 High bulk density 🗌 Low organic matter 🗌 Lack of soil structure 🔲 Lack of horizons 🗌 | Hardpan |
| □ Dramatic change in texture/color □ Heterogeneous mixture □ Other: | |
| Indicators of recovery: Organic matter Structure Horizons Mottling Hydric soil Other: | |
| Percent of WAA with past modification: 0% Recovery: 🗌 Complete 🗌 High 🗌 Moderate 🗌 Low 🗵 None 🛛 Sco | ore: <u>4</u> |
| PHYSICAL STRUCTURE | |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each elevation | |
| Elevation gradients (EG): 2 Evidence: I Plant assemblages I Level of saturation/inundation I Path of water flow | v 🗙 Slope |
| Micro-topography: 20_% of WAA (By EG: |) |
| Types: 🗵 Depressions 🗌 Pools 🗋 Burrows 🕱 Swales 🗋 Wind-thrown tree holes 🗋 Mounds 🗋 Gilgai 🗋 Islands | |
| □ Variable shorelines □ Partially buried debris 🗵 Debris jams □ Plant hummocks/roots □ Other: Sco | ore: <u>3</u> |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. | |
| WAA: In seasonal floodplain IC Contiguous to other wetland | |
| | ore: <u>1</u> |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland types Label of habitat types qualifying as present in WAA: | <i>цре.</i> З |
| | |
| | ore: |
| BIOTIC STRUCTURE | ore: <u> </u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). | |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ Score | ore: <u>3</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ⊠ ≥ 4 □ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a stratement. | ore: <u>3</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): 7 | ore: <u>3</u> <i>tratum.</i> ore: <u>3</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples | ore: <u>3</u> tratum. ore: <u>3</u> es. |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples | ore: <u>3</u> <i>tratum.</i> ore: <u>3</u> es. ore: <u>4</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: $\square \ge 4$ \square \square \square Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): $\boxed{7}$ Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data forms: $\boxed{0}$ % Score | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low □ None □ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Score | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a structure of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low □ Bottomland hardwood forest Score 7 7 Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Score | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: Image: Imag | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> on 2.3.5.5. _% of WAA |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a state Number of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples: Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.3 for examples: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0% Score Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ≥ None □ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WA Total percentage of WAA with some form of overlap (if more than one present):76 w of WAA Score | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> on 2.3.5.5. _% of WAA AA ore: <u>4</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: X ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a stress. Number of species across all strata and determination data form(s) to count species more than once): 7 Score Number of species across all strata and determination data forms (not counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Score Average total relative cover of non-native/invasive species across all strata and determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ⊠ None □ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Score High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WA Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Score Herbaceous Cover – Estimate for entire WAA. In South Central Plans or East Central Texas Plains: □ Bottomland hardword | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> on 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: □ ≥ 4 □ 3 □ 2 □ 1 □ 0 Scc Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a stress number of species across all strata and determination data forms (not counting a species more than once): 7 Scc Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0% Scc Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low □ None □ Bottomland hardwood forest Scc Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WAA Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Scc Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hardw Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% □ ≤ 25% Scc | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> on 2.3.5.5. _% of WAA AA ore: <u>4</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Scc Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a st Number of species across all strata and determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.3 for examples Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Scc Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: ☐ High ☐ Moderate ☐ Low ⊠ None ☐ Bottomland hardwood forest Scc Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Scc High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WAA Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Scc Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: ☐ Bottomland hardw Total cover of emergent and submergent plants: ☐ > 75% ☐ 51–75% ☐ 26–50% ⊠ ≤ 25% Scc Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for pas | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> on 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a struct Number of species across all strata and determination data forms (not counting a species more than once): 7 score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Score Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: ☐ High ☐ Moderate ☐ Low ∑ None ☐ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section 4.5 % of WAA High overlap (≥ 3 strata overlapping): | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> or 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> /P |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 3 2 1 0 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a str Number of species across all strata and determination data forms (not counting a species more than once): 7 Scc Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example: Average total relative cover of non-native/invasive species across all strata and determination data form(s). See tables in section 2.3.5.4 for example: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % scc Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: ☐ High ☐ Moderate ☐ Low ≥ None ☐ Bottomland hardwood forest Scc Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section High overlap (2 strata overlapping): | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> or 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> /P |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a st Number of species across all strata and determination data form(s) to counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Score Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ≥ None □ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Score High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WAA Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA score Score Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hardwod Total percentage of WAA with some form of overlap (if more than one present): | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> or 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> /P |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 □ 3 □ 2 □ 1 □ 0 Sco Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a st Number of species across all strata and determination data form(s) to counting a species more than once): 7 Sco Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Sco Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ☑ None □ Bottomland hardwood forest Sco Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Sco Strata Overlap (≥ 3 strata overlapping): | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> or 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> /P |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: ≥ 4 □ 3 □ 2 □ 1 □ 0 Score Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a st Number of species across all strata and determination data form(s) to counting a species more than once): 7 Score Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for example: Average total relative cover of non-native/invasive species across all strata and determination data forms: 0 % Score Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant Degree of horizontal/plan view interspersion: □ High □ Moderate □ Low ≥ None □ Bottomland hardwood forest Score Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section Score High overlap (≥ 3 strata overlapping):75 % of WAA Moderate overlap (2 strata overlapping):% of WAA Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA score Score Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: □ Bottomland hardwod Total percentage of WAA with some form of overlap (if more than one present): | ore: <u>3</u> tratum. ore: <u>3</u> es. ore: <u>4</u> nt zones. ore: <u>1</u> or 2.3.5.5. _% of WAA AA ore: <u>4</u> vood forest ore: <u>1</u> /P |

Version 2.0 – Final TXRAM WETLAND FINAL SCORING SHEET

| Project/Site Name/No.: WR | F 48-in Pipeline | _ Project Type: 🗙 Fill/ | /Impact ([| 🗙 Linear 🔲 Non | -linear) 🗌 Mitigation/ | Conservation |
|------------------------------|------------------|-------------------------|---------------------|--------------------|------------------------|--------------|
| Wetland ID/Name: <u>A</u> | WAA No.: 1 | Size: | Date: | 10/15/2019 | Evaluator(s): SDO |), MREA |
| Wetland Type: Forested | Ecoregion: Bla | ckland Prairie | | _ Delineation Perf | formed: 🗌 Previously | Currently |
| Aerial Photo Date and Source | TNRIS 2015 | Site Photo | _{os:} 21-2 | 24 | Representative: |] Yes 🗌 No |

Notes: Green Ash dominated forested wetland generally bordering easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score | |
|--|---|----------------------|-----------------------------------|--------------------|--|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 13.125 | |
| Lanuscape | Buffer | 3 | x 15 | 13.125 | |
| | Water source | 2 | Our of motion of a second (40) | | |
| Hydrology | Hydroperiod | 2 | Sum of metric scores / 12 x 30 | 17.5 | |
| | Hydrologic flow | 3 | | | |
| | Organic matter | 2 | | | |
| Soils | Sedimentation | 3 | Sum of metric scores / 12 x 15 | 11.25 | |
| | Soil modification | 4 | | | |
| | Topographic complexity | 3 | | | |
| Physical Structure | Edge complexity | 1 | Sum of metric scores / 12 x 20 | 11.667 | |
| | Physical habitat richness | 3 | ×20 | | |
| | Plant strata | 3 | | 14.286 | |
| | Species richness | 3 | | | |
| | Non-native/invasive infestation | 4 | | | |
| Biotic Structure | Interspersion | 1 | Sum of metric scores / 28 x 20 | | |
| | Strata overlap | 4 | | | |
| | Herbaceous cover | 1 | | | |
| | Vegetation alterations | 4 | | | |
| | | | | | |
| | Sum of core | e element scores = o | verall TXRAM wetland score | 67.828 | |
| Additional points for u Area of Caddo Lak Bald cypress – wa Pitcher plant bog Spring | - | | | | |
| Additional points for li | mited habitats = overall TXRAM we ve trees greater than 24-inch diame d mast (i.e., acorns and nuts) produc | ter at breast height | | - | |
| | TXRAM wetland score and addition | | | 68 | |

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Representative Site Photograph:

[Insert Photograph]

TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: 🗙 F | ill/Impact (🗷 Linear 🔲 Non-lir | near) 🔲 Mitigation/Conservation |
|---|---|--------------------------------|---------------------------------|
| Wetland ID/Name: A WAA No.: 1 | | ate: 10/15/2019 Evalu | |
| | ackland Prairie | Delineation Perform | med: 🗌 Previously 🗵 Currently |
| | | 21-24 | |
| Notes: Green Ash dominated forested wetla | nd generally bord | ering easements | |
| LANDSCAPE | | | |
| Aquatic Context - Confirm in office review. See figu | ires in section 2.3.1.1 | for examples. | |
| Notes on any barriers or alterations that prevent connect | ction: None | | |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (includi | ng number for other conside | rations): Score: _4 |
| Buffer – Evaluate to 500 feet from WAA boundary. C | Confirm in office review | v. See figures in section 2 | .3.1.2 for examples. |
| Buffer Type/Description | Score (See Narrative | s) Percentage | Subtotal |
| 1. Forested Wetland | 4 | 50% | 2 |
| 2. Emergent Wetland | 3 | 20% | 0.6 |
| 3. Perennial Stream | 4 | 10% | 0.4 |
| 4. Agricultural Field 5. | 0 | 20% | 0.0 |
| 5. | | | Score: 3.0 |
| HYDROLOGY | | | Score: <u></u> |
| Water Source – Degree of natural or unnatural/artific Natural: Precipitation Groundwater Overbank Unnatural/Manipulated: Impoundment Outfall Watershed: Development Inrigated agriculture | k flow/stream discharge] Irrigation/pumping ⊠ | Overland flow Beav | er activity |
| | | | |
| Degree of artificial influence/control: Complete X H | - | | - 2 |
| Wetland created/restored/enhanced: Sustainable/rep | | | Score: 2 |
| Hydroperiod – Variability and recent alteration of th | | | tion/saturation. |
| Evaluate the hydroperiod including natural variation: | | | |
| Direct evidence of alteration: Natural: Log-jam Human: Diversions Ditches Levees | | | om reservoir |
| Riverine only: Recent channel in-stability/dis-eq | | | |
| Indirect evidence of alteration: Wetland plant stress | | | |
| Upland species encroachment: | | | |
| Change/Alteration of hydroperiod: None Due to r | | | |
| Degree hydroperiod of wetland created/restored/enhance | | | • • |
| Lacustrine fringe on human impoundment: X High vari | | | 0 |
| Hydrologic Flow – Movement of water to or from su | | | |
| Flow: Inlets: <u>4</u> Signs of v | | | |
| Restrictions: Levee Berm/dam Diversion 🗵 | | | |
| High flowthrough: 🛛 Floodplain 🗵 Drift deposits 🗵 D | | | |
| Low flowthrough: 🗌 High landscape position 🗵 Stagn | ant water 🔲 Closed co | ntours 🗌 Other: | Score: <u>3</u> |
| SOILS | | | |
| Organic Matter – Use data and indicators from wetla High (organic soil or indicator A1, A2, A3) | and determination dat | a form(s) based on applica | able regional supplement. |
| Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | F1 in GP or A6, A7, A9 | , S7, F13 in AGCP) | |
| Even (indicated by thin organic or organic-mineral lay | | , | ed herein Score: 2 |

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| Sedimentation – Deposition of excess sediment due to human actions. Confirm in office review for landscape. | |
|---|--|
| Landscape with stress that could lead to excess sedimentation? X Yes No | |
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment dep | |
| Sand deposits:% of area, average thickness X Silt/Clay deposits: 25_% of area, $<1-inch$ ave | rage thickness |
| | Score: <u>3</u> |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. | |
| Type (Check those applicable and circle R for recent or P for past): Type (Check those applicable and circle R for recent or P for past): Farming R/P Logging R/P Mining R/P | illing R/P |
| □ Grading R/P □ Dredging R/P □ Off-road vehicles R/P □ Other R/P: | |
| Percent of WAA with recent soil modification:% Degree of modification: _ High _ Low | |
| Indicators of past modification: 🗌 High bulk density 🗌 Low organic matter 🔲 Lack of soil structure 🔲 Lack of horizons | 🛛 🗌 Hardpan |
| □ Dramatic change in texture/color □ Heterogeneous mixture □ Other: | |
| Indicators of recovery: Organic matter Structure Horizons Mottling Hydric soil Other: | |
| Percent of WAA with past modification:% Recovery: 🗌 Complete 🗌 High 🗌 Moderate 🔲 Low 🗵 None | Score: <u>4</u> |
| PHYSICAL STRUCTURE | |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each elevat | - |
| Elevation gradients (EG): 2 Evidence: Evidence: Plant assemblages Elevel of saturation/inundation Elevel of water | flow 🛛 Slope |
| Micro-topography: 20_% of WAA (By EG: |) |
| Types: 🛛 Depressions 🗌 Pools 🗋 Burrows 🗶 Swales 🗋 Wind-thrown tree holes 🗋 Mounds 🗋 Gilgai 🗋 Islands | _ |
| 🗌 Variable shorelines 🗌 Partially buried debris 🛛 Debris jams 🗌 Plant hummocks/roots 🗌 Other: | Score: <u>3</u> |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. | |
| WAA: In seasonal floodplain I Contiguous to other wetland I Edge vertical structure variation: | Score: 1 |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland | nd type. |
| Label of habitat types qualifying as present in WAA: <u>secondary channel, swale, snags, brush/debris, den, plant hummocks, water marks</u> Total: 7 | Score: 3 |
| BIOTIC STRUCTURE | |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). | |
| Number of plant strata: $\square \ge 4 \square 3 \square 2 \square 1 \square 0$ | Score: <u>3</u> |
| Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in | - |
| Number of species across all strata and determination data forms (not counting a species more than once): 7 | |
| Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for exam | - |
| | Score: <u>4</u> |
| Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of | |
| Degree of horizontal/plan view interspersion: High Moderate Low None Bottomland hardwood forest | |
| Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in set High overlap (≥ 3 strata overlapping): 75 % of WAA Moderate overlap (2 strata overlapping): | |
| | |
| | WAA |
| Total percentage of WAA with some form of overlap (if more than one present):75 % of WAA Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Destomland has been been been been been been been bee | |
| | |
| | ardwood forest |
| Total cover of emergent and submergent plants: $\square > 75\%$ \square 51–75% \square 26–50% $\bowtie \le 25\%$ | |
| Total cover of emergent and submergent plants: $\Box > 75\%$ $\Box 51-75\%$ $\Box 26-50\%$ $\boxtimes \le 25\%$ Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. | ardwood forest Score: 1 |
| Total cover of emergent and submergent plants: $\Box > 75\%$ $\Box 51-75\%$ $\Box 26-50\%$ $\boxtimes \le 25\%$ Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past.Type (Check those applicable and circle R for recent or P for past): \Box Disking R/P \Box Mowing/shredding R/P \Box Logging | ardwood forest Score: 1 g R/P |
| Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Logging □ Cutting R/P □ Trampling R/P □ Herbicide treatment R/P □ Herbivory R/P □ Disease R/P □ Chemical spill | ardwood forest Score: 1 g R/P |
| Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Logging □ Cutting R/P □ Trampling R/P □ Herbicide treatment R/P □ Herbivory R/P □ Disease R/P □ Chemical spill □ Pollution R/P □ Feral hog rooting R/P □ Woody debris removal R/P □ Other R/P: | ardwood forest Score: 1 g R/P |
| Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Logging □ Cutting R/P □ Trampling R/P □ Herbicide treatment R/P □ Herbivory R/P □ Disease R/P □ Chemical spill □ Pollution R/P □ Feral hog rooting R/P □ Woody debris removal R/P □ Other R/P: Percent of WAA with recent vegetation alteration: 0 % Severity of alteration: □ High □ Low | ardwood forest Score: 1 g R/P R/P |
| Total cover of emergent and submergent plants: □ > 75% □ 51–75% □ 26–50% ⊠ ≤ 25% Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): □ Disking R/P □ Mowing/shredding R/P □ Logging □ Cutting R/P □ Trampling R/P □ Herbicide treatment R/P □ Herbivory R/P □ Disease R/P □ Chemical spill □ Pollution R/P □ Feral hog rooting R/P □ Woody debris removal R/P □ Other R/P: Percent of WAA with recent vegetation alteration: 0 % Severity of alteration: □ High □ Low Percent of WAA with past vegetation alteration: 0 % Degree of recovery: □ Complete □ High □ Moderate □ Log | ardwood forest Score: 1 g R/P R/P |

Version 2.0 – Final WFTLAND FINAL SCORING SHEET

| TARAW WEILAND FINAL SCORING SHEET | | | | | | |
|-----------------------------------|------------------|-----------------------|----------------------|--|--|--|
| Project/Site Name/No.: WRF | - 48-in Pipeline | Project Type: 🗙 Fill/ | Impact (🗙 I | Linear 🔲 Non-linear) 🗌 Mitigation/Conservation | | |
| Wetland ID/Name: A | WAA No.: 1 | Size: | Date: 10 | 0/15/2019 Evaluator(s): SDG, MREA | | |
| Wetland Type: Forested | Ecoregion: | Blackland Prairie | D | Delineation Performed: Previously Currently | | |
| Aerial Photo Date and Source: | TNRIS 2015 | Site Photo | _{os:} 21-24 | Letter Representative: ☐ Yes ☐ No | | |

Notes: Green Ash dominated forested wetland generally bordering easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score | |
|---------------------------|--|------------------------------|-----------------------------------|--------------------|--|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 13.125 | |
| Lanuscape | Buffer | 3 | x 15 | 15.125 | |
| | Water source | 2 | Our of motion of a second (10) | | |
| Hydrology | Hydroperiod | 2 | Sum of metric scores / 12 x 30 | 17.5 | |
| | Hydrologic flow | 3 | | | |
| | Organic matter | 2 | | | |
| Soils | Sedimentation | 3 | Sum of metric scores / 12 x 15 | 11.25 | |
| | Soil modification | 4 | | | |
| | Topographic complexity | 3 | | 11.667 | |
| Physical Structure | Edge complexity | 1 | Sum of metric scores / 12 x 20 | | |
| | Physical habitat richness | 3 | × 20 | | |
| | Plant strata | 3 | | 14.286 | |
| | Species richness | 3 | | | |
| | Non-native/invasive infestation | 4 | | | |
| Biotic Structure | Interspersion | 1 | Sum of metric scores / 28 x 20 | | |
| | Strata overlap | 4 | × 20 | | |
| | Herbaceous cover | 1 | | | |
| | Vegetation alterations | 4 | | | |
| | | | | | |
| | | | overall TXRAM wetland score | 67.828 | |
| | nique resources = overall TXRAM w te designated a "Wetland of Internat ter tupelo swamp | | | - | |
| Additional points for lin | mited habitats = overall TXRAM wet ve trees greater than 24-inch diame d mast (i.e., acorns and nuts) produc | ter at breast height | | - | |
| Sum of overall | TXRAM wetland score and addition | nal points = total ov | erall TXRAM wetland score | 68 | |

Representative Site Photograph:





•

TXRAM WETLAND DATA SHEET

| Project/Site Name/No.: WRF 48-in Pipeline | Project Type: 🗵 | Fill/Impact (|] Linear 🔲 Non-line | ar) 🔲 Mitigation/Conservation |
|---|----------------------------|------------------------|----------------------|-------------------------------|
| Wetland ID/Name: <u>A</u> WAA No.: <u>1</u> | | | | tor(s): SDG, MREA |
| | ackland Prairie | | Delineation Perform | ed: 🗌 Previously 🗵 Currently |
| | Site Photos | | | Representative: 🗌 Yes 🗌 No |
| Notes: Green Ash dominated forested wetla | nd generally boro | dering eas | sements | |
| | | | | |
| LANDSCAPE | | | | |
| Aquatic Context – Confirm in office review. See figu | Mana | for exampl | es. | |
| Notes on any barriers or alterations that prevent connect | | | | 7 4 |
| Aquatic resources within 1,000 feet of WAA to which we | etland connects (includ | ling number | for other considera | ations): / Score: _4 |
| Buffer – Evaluate to 500 feet from WAA boundary. | | - | res in section 2.3 | .1.2 for examples. |
| Buffer Type/Description | Score (See Narrativ | es) | Percentage | Subtotal |
| 1. Forested Wetland | 4 | | 50% | 2 |
| 2. Emergent Wetland | 3 | | 20% | 0.6 |
| 3. Perennial Stream | 4 | | 10% | 0.4 |
| 4. Agricultural Field 5. | 0 | | 20% | 0.0 |
| 5. | | | | Score: 3.0 |
| HYDROLOGY | | | | Score: <u>0.0</u> |
| Water Source – Degree of natural or unnatural/artifi | | | | |
| Natural: Precipitation Groundwater X Overban | - | | | · |
| Unnatural/Manipulated: 🗌 Impoundment 🔲 Outfall | Irrigation/pumping | Other artific | cial influence or co | introl: |
| Watershed: X Development X Irrigated agriculture |] Wastewater treatme | nt plant 🗵 I | mpoundment 🔲 🤇 | Other: |
| Degree of artificial influence/control: Complete X H | ligh 🗌 Low 🗌 None | | | |
| Wetland created/restored/enhanced: Sustainable/re | olicates natural 🗵 Co | ntrolled | | Score: 2 |
| Hydroperiod – Variability and recent alteration of th | e duration, frequency | /, and magn | itude of inundation | |
| Evaluate the hydroperiod including natural variation: | seasonal/tempor | ary | | |
| Direct evidence of alteration: Natural: Log-jam | Channel migration |] Other: | | |
| Human: 🗌 Diversions 🗌 Ditches 🔲 Levees 🗌 | Impoundments 🗵 Oth | _{ner:} Releas | se of water from | m reservoir |
| Riverine only: 🗌 Recent channel in-stability/dis-eq | | | | |
| Indirect evidence of alteration: Wetland plant stress | | | | |
| Upland species encroachment: | 🗌 Plant Comm | unity: | |] Soil: |
| Change/Alteration of hydroperiod: | | | | • / |
| Degree hydroperiod of wetland created/restored/enhane | ced replicates natural p | patterns: mo | oderate (seaso | |
| Lacustrine fringe on human impoundment: X High vari | , | , | ξ, | |
| Hydrologic Flow – Movement of water to or from su | | | | |
| Flow: \blacksquare Inlets: $\underline{4}$ \blacksquare Outlets: $\underline{4}$ \square Signs of v | | | | |
| Restrictions: 🗌 Levee 🗌 Berm/dam 🗌 Diversion 🗵 | Other: Influenced I | by reserve | bir | |
| High flowthrough: 🛛 Floodplain 🗌 Drift deposits 🗵 D |) Prainage patterns 🔲 S | Sediment dep | osits 🗌 Other: _ | |
| Low flowthrough: 🗌 High landscape position 🗵 Stagn | ant water 🔲 Closed o | ontours 🗌 | Other: | Score: <u>3</u> |
| SOILS | | | | |
| Organic Matter – Use data and indicators from wetle | and determination da | ta form(s) b | ased on applicab | le regional supplement. |
| | | 0 67 540 : | | |
| Moderate (indicator A9, S1, F1 in AW or A9, S1, S2, | | | | |
| Low (indicated by thin organic or organic-mineral lay | 'er) 🖄 None observat | pie in surface | e layer as describe | d herein Score: 2 |

Low (indicated by thin organic or organic-mineral layer) 🗵 None observable in surface layer as described herein

| Version 2.0 – Final | |
|--|----------|
| Sedimentation – Deposition of excess sediment due to human actions. Confirm in office review for landscape. | |
| Landscape with stress that could lead to excess sedimentation? X Yes No | |
| Magnitude of recent runoff/flooding events: X High Low Percent of WAA with excess sediment deposition: 25 | |
| Sand deposits:% of area, average thickness Silt/Clay deposits: 25_% of area, < average thickness | |
| Lacustrine fringe only: Upper end of impoundment Degrades wetland Contributes to wetland processes Score: 3 | |
| Soil Modification – Physical changes by human activities. Confirm in office review for past. | |
| Type (Check those applicable and circle R for recent or P for past): Tarming R/P Logging R/P Mining R/P Filling R/P | |
| □ Grading R/P □ Dredging R/P □ Off-road vehicles R/P ⊠ Other R/P: | |
| Percent of WAA with recent soil modification: 0% Degree of modification: 🗌 High 🗵 Low | |
| Indicators of past modification: 🗌 High bulk density 🗵 Low organic matter 🗵 Lack of soil structure 🗵 Lack of horizons 🗌 Hardpa | In |
| □ Dramatic change in texture/color □ Heterogeneous mixture ⊠ Other: | |
| Indicators of recovery: 🗌 Organic matter 🔲 Structure 🗌 Horizons 🗵 Mottling 🗵 Hydric soil 🔲 Other: | |
| Percent of WAA with past modification: 0 % Recovery: Complete High X Moderate Low None Score: 4 | |
| PHYSICAL STRUCTURE | |
| Topographic Complexity – See figures in section 2.3.4.1. Record % micro-topography and % WAA for each elevation gradier | ıt. |
| Elevation gradients (EG): 2 Evidence: I Plant assemblages I Level of saturation/inundation I Path of water flow I Slo | pe |
| Micro-topography: 20 % of WAA (By EG: |) |
| Types: 🗌 Depressions 🗵 Pools 🗋 Burrows 🗋 Swales 🗋 Wind-thrown tree holes 🗋 Mounds 🗋 Gilgai 🗋 Islands | |
| □ Variable shorelines □ Partially buried debris □ Debris jams □ Plant hummocks/roots □ Other: Score: 3 | |
| Edge Complexity – Confirm in office review. See figure in section 2.3.4.2 to evaluate wetland boundary. | |
| WAA: 🗵 In seasonal floodplain 🗵 Contiguous to other wetland | |
| Horizontal variability: High Moderate Low None Score: 1 | |
| Physical Habitat Richness – See definitions and table in section 2.3.4.3 for habitat types applicable to each wetland type. | |
| Label of habitat types qualifying as present in WAA: <u>secondary channel, swale, snags, brush/debris, den, plant hummocks, water marks</u> Total: <u>7</u> Score: <u>3</u> | |
| BIOTIC STRUCTURE | |
| Plant Strata – Use applicable wetland delineation regional supplement and data from determination data form(s). Number of plant strata: $\Box \ge 4$ $\Box 3$ $\Box 2$ $\Box 1$ $\Box 0$ Score: 3 | |
| Number of plant strata: ≥ 4 3 2 1 0 Score: 3 Species Richness – Use data from determination data form(s) to count species with 5% or more relative cover in a stratum. Score: 3 | |
| | |
| Number of species across all strata and determination data forms (not counting a species more than once): <u>7</u> Score: <u>3</u> Non-Native/Invasive Infestation – Use data from determination data form(s). See tables in section 2.3.5.3 for examples. | |
| Average total relative cover of non-native/invasive species across all strata and determination data forms: <u>0</u> % Score: <u>4</u> | |
| Interspersion – Confirm in office review. Use figure in section 2.3.5.4 to determine the degree of interspersion of plant zones | |
| Degree of horizontal/plan view interspersion: 🗌 High 🗌 Moderate 🗌 Low 🗵 None 🗌 Bottomland hardwood forest 🛛 Score: 1 | |
| Strata Overlap – Use strata defined in plant strata metric using applicable regional supplement. See figures in section 2.3.5. | 5. |
| High overlap (≥ 3 strata overlapping):% of WAA Moderate overlap (2 strata overlapping):% of WA | AΑ |
| | |
| Herbaceous species/dense litter overlap (only in portion where there are no other strata overlapping):% of WAA | |
| Herbaceous species/dense litter overlap (only in portion where there are no other strata overlapping):% of WAA Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Score: 4 | |
| |) est |
| Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Score: 4 | est |
| Total percentage of WAA with some form of overlap (if more than one present): 75% of WAA Score: 4 Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hardwood fore | est |
| Total percentage of WAA with some form of overlap (if more than one present): | est |
| Total percentage of WAA with some form of overlap (if more than one present): 75% of WAA Score: 4 Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hardwood fore Total cover of emergent and submergent plants: > 75% 51–75% 26–50% ≤ 25% Score: 1 Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Score: 1 | est |
| Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Score: 4 Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hardwood fore Total cover of emergent and submergent plants: > 75% 51–75% 26–50% ≤ 25% Score: 1 Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): Disking R/P Mowing/shredding R/P Logging R/P | est |
| Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Score: 4 Herbaceous Cover - Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hardwood fore Total cover of emergent and submergent plants: > 75% 51–75% 26–50% ≤ 25% Score: 1 Vegetation Alterations - Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): Disking R/P Mowing/shredding R/P Logging R/P Cutting R/P Trampling R/P Herbicide treatment R/P Herbivory R/P Disease R/P Chemical spill R/P Pollution R/P Feral hog rooting R/P Woody debris removal R/P Other R/P Percent of WAA with recent vegetation alteration: 0 % Severity of alteration: High | est |
| Total percentage of WAA with some form of overlap (if more than one present): 75 % of WAA Score: 4 Herbaceous Cover – Estimate for entire WAA. In South Central Plains or East Central Texas Plains: Bottomland hardwood fore Total cover of emergent and submergent plants: > 75% 51–75% 26–50% ≤ 25% Score: 1 Vegetation Alterations – Unnatural (human-caused) stressors. Confirm in office review for past. Type (Check those applicable and circle R for recent or P for past): Disking R/P Mowing/shredding R/P Logging R/P Cutting R/P Trampling R/P Herbicide treatment R/P Herbivory R/P Disease R/P Chemical spill R/P Pollution R/P Feral hog rooting R/P Woody debris removal R/P Other RP Chemical spill R/P | est |

| TXRAM WETL | AND FINAL | SCORING | SHEET |
|------------|-----------|---------|-------|
| | | | |

| Project/Site Name/No.: WRF | 48-in Pipeline | Project Type: 🗵 Fill/Im | pact (🗙 Linear 🗌 | Non-linear) Mitigation/Conservation |
|-------------------------------|----------------|-------------------------|------------------|--------------------------------------|
| Wetland ID/Name: A | WAA No.: 1 | Size: D | Date: 10/15/20 | 19 Evaluator(s): SDG, MREA |
| Wetland Type: Forested | Ecoregion: Bla | ackland Prairie | Delineation | Performed: Previously X Currently |
| Aerial Photo Date and Source: | TNRIS 2015 | Site Photos: | 21-24 | Representative: 🗌 Yes 🗌 No |

Notes: Green Ash dominated forested wetland generally bordering easements

| Core Element | Metric | Metric Score | Core Element Score Calculation | Core Element Score |
|---------------------------|---|------------------------------|-----------------------------------|--------------------|
| Landscape | Aquatic Context | 4 | Sum of metric scores / 8 | 13.125 |
| Lanuscape | Buffer | 3 | x 15 | 15.125 |
| | Water source | 2 | | |
| Hydrology | Hydroperiod | 2 | Sum of metric scores / 12 x 30 | 17.5 |
| | Hydrologic flow | 3 | | |
| | Organic matter | 2 | | |
| Soils | Sedimentation | 3 | Sum of metric scores / 12 x 15 | 11.25 |
| | Soil modification | 4 | | |
| | Topographic complexity | 3 | | |
| Physical Structure | Edge complexity | 1 | Sum of metric scores / 12 x 20 | 11.667 |
| | Physical habitat richness | 3 | ×20 | |
| | Plant strata | 3 | | 14.286 |
| | Species richness | 3 | | |
| | Non-native/invasive infestation | 4 | | |
| Biotic Structure | Interspersion | 1 | Sum of metric scores / 28 x 20 | |
| | Strata overlap | 4 | ×20 | |
| | Herbaceous cover | 1 | | |
| | Vegetation alterations | 4 | | |
| | | | | |
| | Sum of core | e element scores = c | overall TXRAM wetland score | 67.828 |
| | nique resources = overall TXRAM v te designated a "Wetland of Internat ter tupelo swamp | | | - |
| Additional points for lin | mited habitats = overall TXRAM we ve trees greater than 24-inch diame d mast (i.e., acorns and nuts) produc | ter at breast height | | - |
| Sum of overall | TXRAM wetland score and addition | nal points = total ov | erall TXRAM wetland score | 68 |

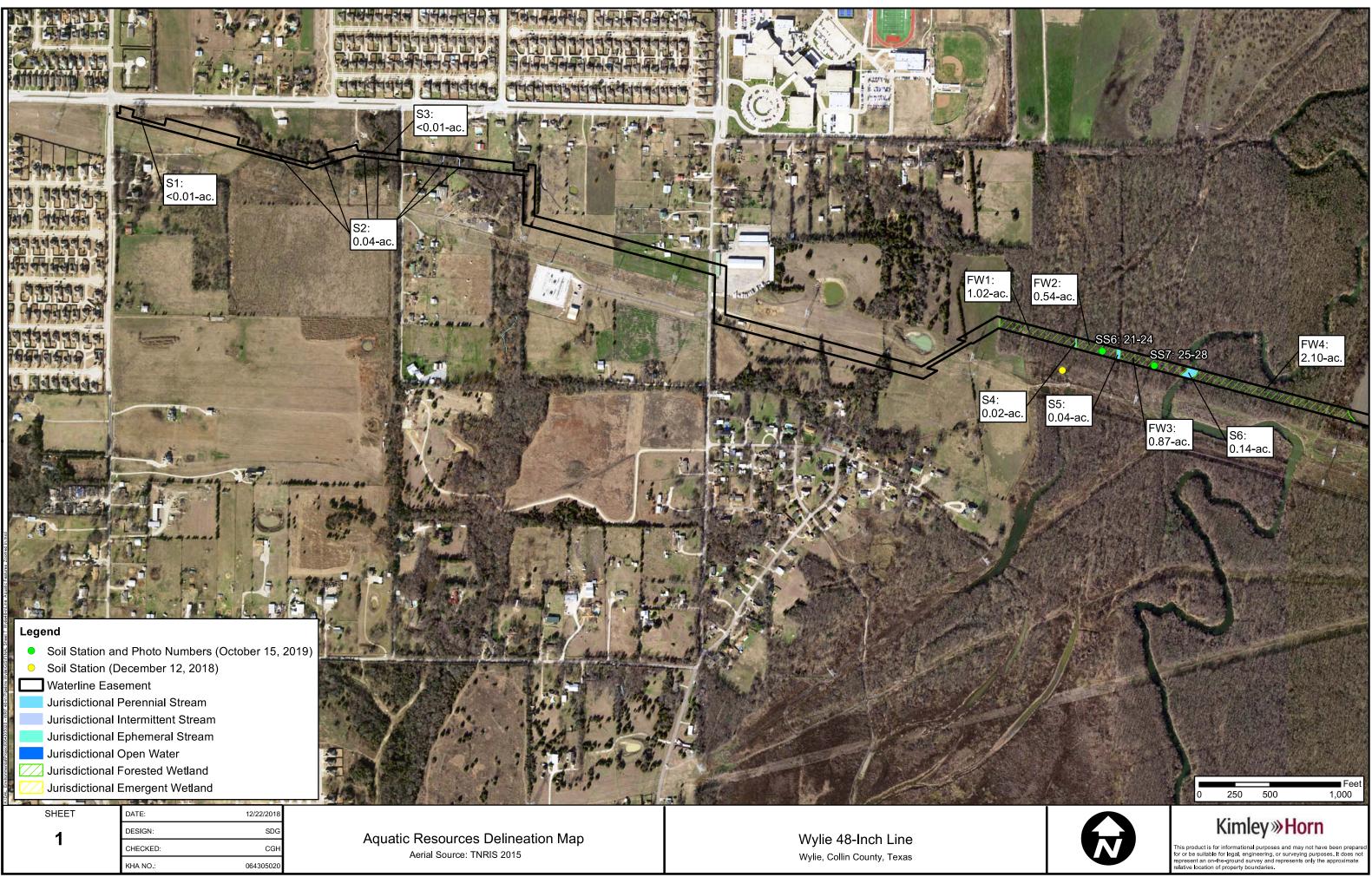
Representative Site Photograph:



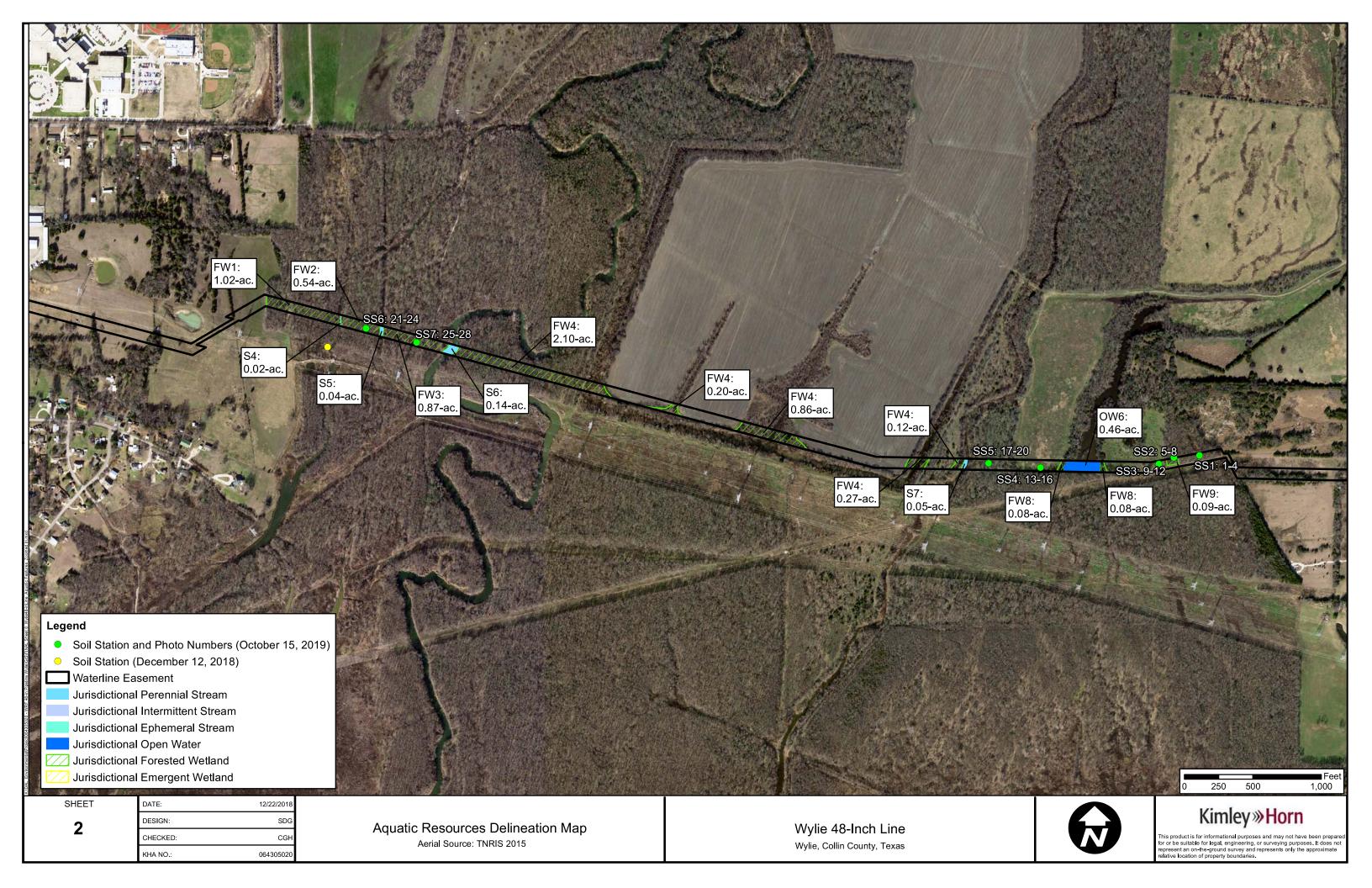


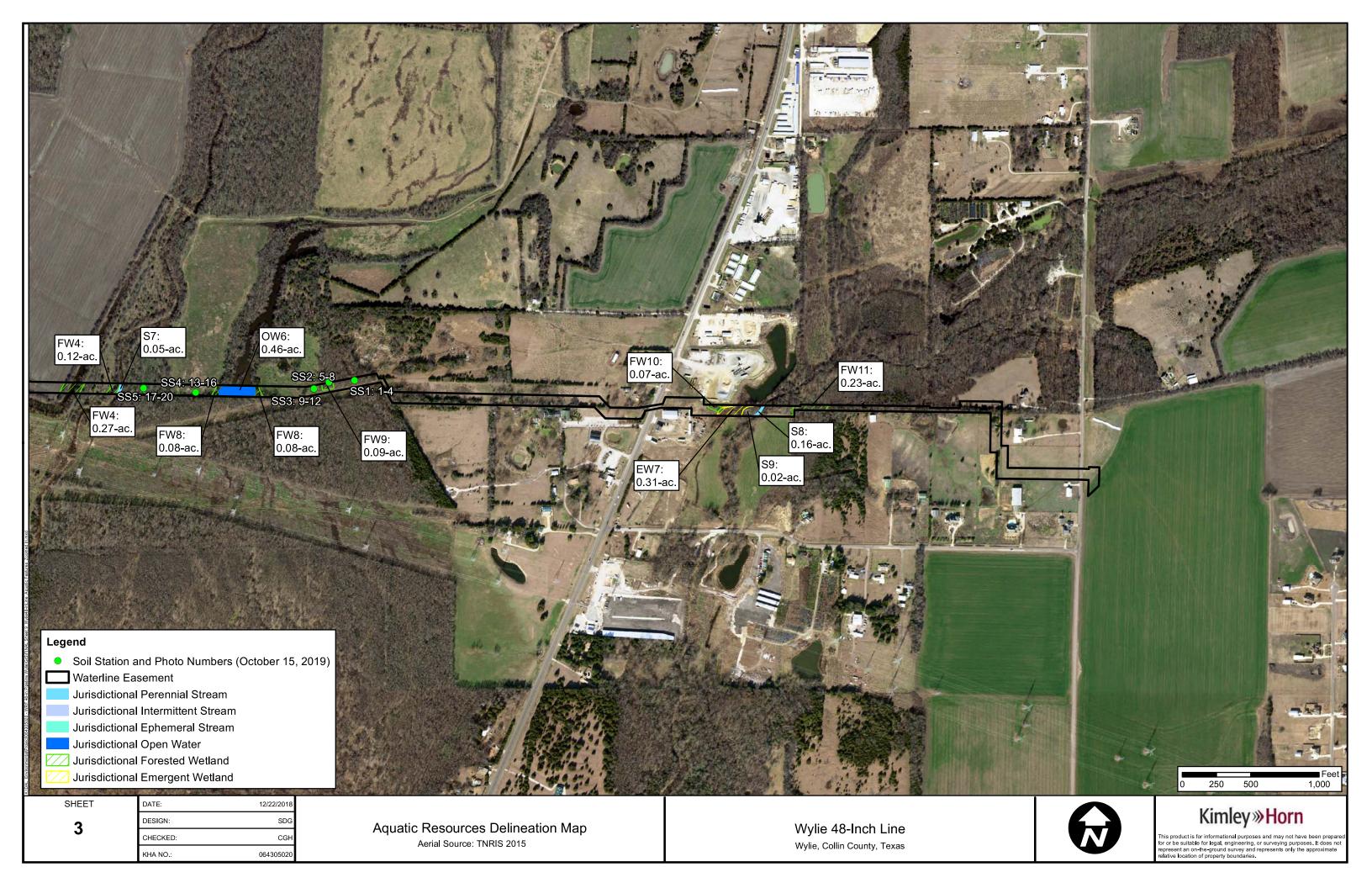
Attachment B

REVISED AQUATIC RESOURCES DELINEATION MAPS



| - 1 | DATE: | 12/22/2018 | |
|-----|----------|------------|--|
| | DESIGN: | SDG | |
| | CHECKED: | CGH | |
| | KHA NO.: | 064305020 | |





Attachment C

WETLAND DETERMINATION DATA FORMS

| Project/Site: WRF 48-in Pipeline | 0 | City/Coun | ty: Collin Cou | unty | _ Sampling Date: 10 | /15/2019 |
|---|----------------------|----------------------|--------------------------------|---|------------------------------------|------------|
| Applicant/Owner: North Texas Municipal Water District | | | | State: Texas | _ Sampling Point: <u>1</u> | |
| Investigator(s): SDG, MREA | Section, T | ownship, Ran | ge: <u>N/A</u> | | | |
| Landform (hillslope, terrace, etc.): | | | | | Slope | (%): <1 |
| | | | | 46740 | | |
| Soil Map Unit Name: Houston Black clay, 1 to 3 perce | | | | | | |
| Are climatic / hydrologic conditions on the site typical for this | time of yea | ar? Yes | V No | (If no, explain in F | Remarks.) | |
| Are Vegetation Soil, or Hydrologys | ignificantly | disturbe | d? Are "I | Normal Circumstances" p | present? Yes | No |
| Are Vegetation Soil, or Hydrology r | | | | eded, explain any answe | | |
| SUMMARY OF FINDINGS – Attach site map | | | | ocations, transects | s, important feat | ures, etc. |
| Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: | | | the Sampled ithin a Wetlar | | No 🖌 | |
| Forested Upland. P | hoto | DS: | 1-4 | | | |
| VEGETATION – Use scientific names of plants. | | | | | | |
| | Absolute | | ant Indicator | Dominance Test wor | ksheet: | |
| <u>Tree Stratum</u> (Plot size: <u>30'</u>) <u>1</u> <i>Ulmus americana</i> | <u>% Cover</u> 30 | <u>Specie</u> Yes | <u>s?</u> <u>Status</u> FAC | Number of Dominant S That Are OBL, FACW, | | |
| 2. Ulmus crassifolia | 20 | Yes | FAC | (excluding FAC-): | 8 <u>8</u> | (A) |
| 3. Celtis laevigata | 20 | Yes | FAC | Total Number of Domi | nant | |
| 4. Zanthoxylum clava-herculis | 5 | No | FACU | Species Across All Str | 10 | (B) |
| 5 | | | | Percent of Dominant S | | |
| | 75 | _= Total | Cover | That Are OBL, FACW, | or FAC: <u>80</u> | (A/B) |
| Sapling/Shrub Stratum (Plot size: <u>15</u> ') 1. Ulmus americana | 15 | Yes | FAC | Prevalence Index wo | rksheet: | |
| 2. Celtis laevigata | 15 | Yes | FAC | Total % Cover of: | Multiply b | ý: |
| 3 | | | | OBL species | | |
| 4 | | | | FACW species | | |
| 5 | | | | FAC species | | |
| | 30 | _ = Tota | l Cover | FACU species | | |
| $\frac{\text{Herb Stratum}}{T} (\text{Plot size:} 5')$ | 10 | Vee | | UPL species | | |
| 1. <u>Toxicodendron radicans</u> | <u>10</u> 10 | Yes | FACU | Column Totals: | (A) | (B) |
| 2. <u>Carex blanda</u> 3. Symphoricarpos orbiculatus | 10 | Yes Yes | FAC FACU | Prevalence Index | x = B/A = | |
| | | | | Hydrophytic Vegetati | | |
| 4 | | | | 1 - Rapid Test for | · Hydrophytic Vegetati | on |
| 5 | | | | 2 - Dominance Te | est is >50% | |
| 6 | | | | 3 - Prevalence Ind | dex is ≤3.0 ¹ | |
| 7 | | | | 4 - Morphological | Adaptations ¹ (Provide | supporting |
| 8 | | | | data in Remark | ks or on a separate sh | eet) |
| 9 | | | | Problematic Hydro | ophytic Vegetation ¹ (E | Explain) |
| 10 | 30 | - Toto | l Cover | | - (| |
| Woody Vine Stratum (Plot size:15') | | 101a | | ¹ Indicators of hydric so | | |
| <u>1. Nekemias arborea</u> | 5 | Yes | FAC | be present, unless dist | urbed or problematic. | |
| 2. Smilax rotundifolia | 5 | Yes | FAC | Hydrophytic | | |
| % Bare Ground in Herb Stratum <u>70</u> | 10 | _= Total | | Vegetation | es 🖌 No 🗌 | |
| Remarks: (Include photo numbers here or on a separate s | heet.) | | | 1 | | |

Hydrophytic vegetation was dominant, but all dominant species were facultative or fac wet.

| | ription: (Describ | e to the de | pth needed to docum | | | or confir | m the absenc | e of indicators.) |
|------------------------|---|-------------|-------------------------|----------|------------------------------------|------------------|----------------------|--|
| Depth (inches) | Matrix Color (moist) | % | Color (moist) | Featur | <u>es</u> Type ¹ | Loc ² | Texture | Demerke |
| <u>(inches)</u> 0-6 | 10YR3/1 | 100 | | % | iype | LOC | Clay | Remarks |
| 6-8 | 10YR3/1 | 98 | 7.5YR3/4 | 2 | | PL | Clay | faint/sparse redox |
| 0-0 | 101 K3/1 | 90 | 7.51K3/4 | 2 | <u> </u> | | Clay | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | I=Reduced Matrix, CS | | | od Sand G | raine ² L | ocation: PL=Pore Lining, M=Matrix. |
| Hydric Soil I | | | | | | eu Sanu G | | rs for Problematic Hydric Soils ³ : |
| Histoso | | | Sa | ndy Gle | yed Matrix | (S4) | | n Muck (A9) (LRRI, J) |
| Histic E | Epipedon (A2) | | Sa | ndy Red | dox (S5) | | | ast Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | | latrix (S6) | | | k Surface (S7) (LRR G) |
| | gen Sulfide (A4) ed Layers (A5) (LR | | | | cky Minera eyed Matrix | · · · | | h Plains Depressions (F16) RH outside of MLRA 72 & 73) |
| | luck (A9) (LRR F, | | | • | /atrix (F3) | (12) | · · · | luced Vertic (F18) |
| | ed Below Dark Sur | | | | k Surface | (F6) | | Parent Material (TF2) |
| | Dark Surface (A12) | | | • | Dark Surfa | · · · | | r (Explain in Remarks) |
| | Mucky Mineral (S1 | , | | | pressions (| , , | | cators of hydrophytic vegetation and |
| | Mucky Peat or Pe lucky Peat or Peat | . , . | · · · | - | s Depress & 73 of LR | , , | | nd hydrology must be present, s disturbed or problematic. |
| | _ayer (if observed | | ., (| | | , | | |
| Type: Co | | - | _ | | | | | |
| Depth (ind | ches): <u>8</u> | | _ | | | | Hydric So | oil Present? Yes 🖌 No 🔄 |
| Remarks: | | | | | | | | |
| Hydric soil ind | dicators were obse | rved. | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| HYDROLO | GY | | | | | | | |
| Wetland Hyd | drology Indicators | s: | | | | | | |
| Primary Indic | ators (minimum of | one is requ | ired; check all that ap | oly) | | | Secon | dary Indicators (minimum of two required) |
| Surfac | e Water (A1) | | Salt Crust | (B11) | | | S | urface Soil Cracks (B6) |
| High W | /ater Table (A2) | | Aquatic In | vertebra | tes (B13) | | s s | parsely Vegetated Concave Surface (B8) |
| Satura | tion (A3) | | Hydrogen | | | | | rainage Patterns (B10) |
| (C3) Water | Marks (B1) | | Dry-Seaso | n Wate | r Table (C2 | 2) | 0 | oxidized Rhizospheres on Living Roots |
| <u> </u> | ent Deposits (B2) | | Oxidized F | Rhizosof | neres on l | iving Root | s (C3) (wi | here tilled) |
| | eposits (B3) | | (where not | | | | · · · · | rayfish Burrows (C8) |
| | lat or Crust (B4) | | Presence | | ced Iron (C | 24) | | aturation Visible on Aerial Imagery (C9) |

| Drift Deposits (B3) | | (where not tilled) | Crayfish Burrows (C8) |
|--|-----------------------|--|---|
| Algal Mat or Crust (B4 |) | Presence of Reduced Iron (C4) | Saturation Visible on Aerial Imagery (C9) |
| Iron Deposits (B5) | | Thin Muck Surface (C7) | Geomorphic Position (D2) |
| Inundation Visible on A | Aerial Imagery (B7) | Other (Explain in Remarks) | FAC-Neutral Test (D5) |
| Water-Stained Leaves | (B9) | Frost-Heave Hummocks (D7) (L | RR F) |
| Field Observations: | | | |
| Surface Water Present? | Yes No | ✔ Depth (inches): | |
| Water Table Present? | Yes No | ✔ Depth (inches): | |
| Saturation Present? (includes capillary fringe) | Yes No | ✔ Depth (inches): | Wetland Hydrology Present? Yes No 🗸 |
| Describe Recorded Data (str | eam gauge, monitoring | g well, aerial photos, previous inspec | ctions), if available: |
| | | | |
| Remarks: | | | |
| Wetland hydrology indicators | were not observed. | | |
| | | | |

| Project/Site: WRF 48-in Pipeline | C | City/County | _{y:} Collin Co | Sampling Date: 10/15/2019 | | | |
|---|---------------------|---|--------------------------|---|--|--|--|
| Applicant/Owner: North Texas Municipal Water Distrie | ct | State: <u>TX</u> Sampling Point: <u>2</u> | | | | | |
| Investigator(s): SDG, MREA | s | _ Section, Township, Range: <u>N/A</u> | | | | | |
| Landform (hillslope, terrace, etc.): Flat | | Local rel | lief (concave, | convex, none): none | Slope (%): >1 | | |
| Subregion (LRR): LRR J Lat: <u>33.00824</u> | | | _ Long: -96 | .46801 | Datum: NAD83 | | |
| Soil Map Unit Name: <u>Tf - Tinn clay, 0 to 1 percent slop</u> | oes, frequ | ently flo | oded | NWI classificati | on: Freshwater Emergent Wetland | | |
| Are climatic / hydrologic conditions on the site typical for this | time of yea | ar? Yes | No | (If no, explain in R | Remarks.) | | |
| Are Vegetation Soil, or Hydrologys | ignificantly | disturbed | ? Are "I | Normal Circumstances" p | present? Yes 🔽 No | | |
| Are Vegetation Soil, or Hydrology n | | | | eded, explain any answe | | | |
| SUMMARY OF FINDINGS – Attach site map | | | | | | | |
| · · · | | | | | -, p | | |
| Hydrophytic Vegetation Present? Yes V No | | ls t | the Sampled | Area | | | |
| Hydric Soil Present? Yes V No Wetland Hydrology Present? Yes V No | | wit | hin a Wetlar | nd? Yes 🚩 | No | | |
| Remarks: | | | | | | | |
| Forested Wetland, Photos 5-8 | | | | | | | |
| | | | | | | | |
| VEGETATION – Use scientific names of plants. | | | | | | | |
| Tree Stratum (Plot size: 30') | Absolute % Cover | | nt Indicator ? Status | Dominance Test worl | | | |
| 1. Fraxinus pennsylvanica | 50 | Yes | FAC | Number of Dominant S That Are OBL, FACW, | or FAC | | |
| 2. Ulmus americana | 10 | No | FAC | (excluding FAC-): | <u>3</u> (A) | | |
| 3. <u>Celtis laevigata</u> | 10 | No | FAC | Total Number of Domin | nant | | |
| 4 | | | | Species Across All Stra | ata: <u>3</u> (B) | | |
| 5 | | | | Percent of Dominant S | | | |
| Capling/Chruh Stratum (Distaire) 15' | 70 | _= Total (| Cover | That Are OBL, FACW, | or FAC: <u>100%</u> (A/B) | | |
| <u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>) 1. <i>Fraxinus pennsylvanica</i> | 10 | Yes | FAC | Prevalence Index wo | rksheet: | | |
| 2. Ulmus crassifolia | 10 | Yes | FAC | Total % Cover of: | Multiply by: | | |
| 3 | | | | | x 1 = | | |
| 4 | | | | | x 2 = | | |
| 5 | | | | | x 3 = | | |
| | 20 | _ = Total | Cover | | x 4 = | | |
| <u>Herb Stratum</u> (Plot size: <u>5'</u>) 1 | | | | UPL species | (A) (B) | | |
| 2 | | | | | (0) | | |
| 3 | | | | | <pre>< = B/A =</pre> | | |
| 4 | | | | Hydrophytic Vegetati | | | |
| 5 | | | | 1 - Rapid Test for 2 - Dominance Te | Hydrophytic Vegetation | | |
| 6 | | | | 3 - Prevalence Inc | | | |
| 7 | | | | | Adaptations ¹ (Provide supporting | | |
| 8 | | | | data in Remark | is or on a separate sheet) | | |
| 9 | | | | Problematic Hydro | ophytic Vegetation ¹ (Explain) | | |
| 10 | 0 | | | | | | |
| Woody Vine Stratum (Plot size:15') | <u> </u> | _ = Total | Cover | | il and wetland hydrology must | | |
| 1 | | | | be present, unless dist | urbed or problematic. | | |
| 2 | | | | Hydrophytic | | | |
| % Bare Ground in Herb Stratum 100 | • | _= Total (| | Vegetation Present? Ye | es 🖌 No 📃 | | |
| Remarks: (Include photo numbers here or on a separate s | heet.) | | | | | | |
| | | | | | | | |
| Hydrophytic vegetation was observed. | | | | | | | |

SOIL

Sampling Point: 2

|)epth | Matrix | % | | <u>K Features</u> | T vm - 1 | Loc ² | Texture | Remarks |
|--|--|-----------------|------------------------|--|----------------------------------|------------------|--|---|
| <u>nches)</u>)-12 | <u>Color (moist)</u> 2.5Y 3/1 | | Color (moist) 5Y6/8 | | Type ¹ | | · | Remarks |
| -12 | 2.51 3/1 | 95 2. | 510/0 | <u> </u> | <u> </u> | PL | Clay | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | · | | | | |
| | | · | | · | | · | | |
| | | · | | · | | | | |
| | | · | | · | | | · | |
| | oncentration, D=Dep | oletion, RM=Re | duced Matrix, CS | =Covered o | r Coate | d Sand G | | on: PL=Pore Lining, M=Matrix. |
| - | ndicators: | | | | | | | Problematic Hydric Soils ³ : |
| Histoso | . , | | | ndy Gleyed | | (S4) | | ck (A9) (LRRI, J) |
| - | Epipedon (A2) | | I 1 | ndy Redox | • • | | | airie Redox (A16) (LRR F, G, H) |
| | Histic (A3) jen Sulfide (A4) | | I 1 | ipped Matrix amy Mucky | ` ' | (E1) | | face (S7) (LRR G) ns Depressions (F16) |
| | ed Layers (A5) (LRR | 2 F) | | amy Gleyed | | | - | utside of MLRA 72 & 73) |
| - | luck (A9) (LRR F, G | | | pleted Matri | | (12) | | Vertic (F18) |
| | ed Below Dark Surfa | | | dox Dark Si | . , | F6) | | ent Material (TF2) |
| - | Dark Surface (A12) | | | pleted Dark | | , | | plain in Remarks) |
| | Mucky Mineral (S1) | | Re | dox Depres | sions (F | 8) | | s of hydrophytic vegetation and |
| - · | Mucky Peat or Peat | | н) 🗌 ні | gh Plains De | epressio | ons (F16) | | /drology must be present, |
| | lucky Peat or Peat (| | (ML | RA 72 & 73 | of LR | R H) | unless dis | turbed or problematic. |
| strictive L | _ayer (if observed): | : | | | | | | |
| Гуре: | | | | | | | | |
| Depth (inc | ches): | | | | | | Hydric Soil Pre | esent? Yes 🚩 No 📃 |
| narks: | | | | | | | | |
| ric soils w iy small ro | vere observed. | | | | | | | |
| iy smail to | JOIS | | | | | | | |
| | | | | | | | | |
| ROLO | GY | | | | | | | |
| tland Hyd | drology Indicators: | | | | | | | |
| mary Indic | ators (minimum of c | one is required | check all that ap | ply) | | | Secondary I | ndicators (minimum of two require |
| _ | e Water (A1) | | Salt Crust | (B11) | | | Surfac | e Soil Cracks (B6) |
| Surface | /ater Table (A2) | | Aquatic In | vertebrates | (B13) | | 🖌 Sparse | ely Vegetated Concave Surface (E |
| | | | | | | | | |
| High W | tion (A3) | | Hydrogen | Sulfide Odo | or (C1) | | Draina | ge Patterns (B10) |
| High W Saturati Water N | | | | Sulfide Odo on Water Tal | |) | | ge Patterns (B10) ed Rhizospheres on Living Roots |
| High W Saturati Water M | tion (A3) Marks (B1) | | Dry-Seaso | on Water Ta | ble (C2) | | Oxidize | ed Rhizospheres on Living Roots |
| ☐ High W ☐ Saturati] Water №)] Sedime | tion (A3) Marks (B1) ent Deposits (B2) | | Dry-Seaso | on Water Ta Rhizosphere | ble (C2) | | Oxidize | ed Rhizospheres on Living Roots |
| High W Saturati Water M Sedime | tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) | | Dry-Seaso | on Water Ta Rhizosphere tilled) | ble (C2) s on Liv | ving Roots | Oxidize s (C3) (where Crayfis | ed Rhizospheres on Living Roots tilled) sh Burrows (C8) |
| High W Saturati Water M Sedime Drift De Algal M | tion (A3) Marks (B1) ent Deposits (B2) | | Dry-Seaso | on Water Ta Rhizosphere | ble (C2) s on Liv Iron (C4 | ving Roots | s (C3) (where Crayfis Satura | ed Rhizospheres on Living Roots |

| | Saturation Visible on Aerial Imagery (C9) |
|---|---|
| Iron Deposits (B5) Thin Muck Surface (C7) | Geomorphic Position (D2) |
| Inundation Visible on Aerial Imagery (B7) D Other (Explain in Remarks) | FAC-Neutral Test (D5) |
| Water-Stained Leaves (B9) Frost-Heave Hummocks (D7) (L | RR F) |
| Field Observations: | |
| Surface Water Present? Yes No 🖌 Depth (inches): | |
| Water Table Present? Yes No 🖌 Depth (inches): | |
| Saturation Present? Yes No Yes Depth (inches): | Wetland Hydrology Present? Yes 🔽 No |
| Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspec | ctions), if available: |
| | |
| Remarks: | |
| Wetland hydrology was observed. | |
| would hydrology was observed. | |
| | |

| Project/Site: WRF 48-in Pipeline | : Collin Cou | inty | Sampling Date: 10/ | 15/2019 | | |
|--|------------------|--|----------------------------|---|------------------------------------|------------|
| Applicant/Owner: North Texas Municipal Water District | | State: <u>Texas</u> Sampling Point: <u>3</u> | | | | |
| Investigator(s): SDG, MREA | wnship, Rar | nge: N/A | | | | |
| | | | | , convex, none): <u>none</u> | Slope | (%): <1 |
| Subregion (LRR): LRR J Lat: 33.00810 | | | | .46839 | Datum: NAD83 | |
| Soil Map Unit Name: <u>Trinity clay</u> , 0 to 1 percent slopes, occa | asionally floo | oded | | NWI classificati | on: none | |
| Are climatic / hydrologic conditions on the site typical for this | s time of yea | ar? Yes | ✓ No | (If no, explain in R | (emarks.) | |
| Are Vegetation Soil, or Hydrologys | significantly | disturbed | ? Are" | Normal Circumstances" p | oresent? Yes | No |
| Are Vegetation Soil , or Hydrology | | | | eded, explain any answe | | |
| SUMMARY OF FINDINGS – Attach site map | showing | sampli | | | | ures, etc. |
| Hydrophytic Vegetation Present? Yes Ves No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No | | | he Sampled hin a Wetlar | | No 🖌 | |
| Upland. Photos: 9-1 | 2 | | | | | |
| VEGETATION – Use scientific names of plants. | | | | | | |
| Tree Stratum (Plot size: <u>30'</u>) | Absolute % Cover | | nt Indicator ? Status | Dominance Test work | | |
| <u>1. Ulmus crassifolia</u> | <u>10</u> | Yes | FAC | Number of Dominant S That Are OBL, FACW, | or FAC | |
| 2 | | | | (excluding FAC-): | 5 | (A) |
| 3 | | | | Total Number of Domir | nant _ | |
| 4 | · | | | Species Across All Stra | ata: <u>5</u> | (B) |
| 5 | | | | Percent of Dominant S | | |
| Sapling/Shrub Stratum (Plot size: 15') | 10 | _= Total (| Cover | That Are OBL, FACW, | or FAC: 100 | (A/B) |
| 1. Ulmus crassifolia | 5 | Yes | FAC | Prevalence Index wor | rksheet: | |
| 2 | | | | | Multiply by | |
| 3 | . <u> </u> | | | OBL species | | |
| 4 | | | | FACW species | | |
| 5 | | | | FAC species | | |
| | 5 | _ = Total | Cover | FACU species | | |
| Herb Stratum (Plot size: 5') | 90 | Yes | FAC | UPL species | | |
| 1. <u>Elymus virginicus</u> 2. Ambrosia trifida | 30 | Yes | FAC | Column Totals: | (A) | (B) |
| 2. Ambrosa inglaa 3. Iva annua | 15 | No | FAC | Prevalence Index | <pre>< = B/A =</pre> | |
| <u>Amphiachyris dracunculoides</u> | 5 | No | UPL | Hydrophytic Vegetati | on Indicators: | |
| | · | | UFL | | Hydrophytic Vegetatio | on |
| 5 | | | | 2 - Dominance Te | | |
| 6 | | | | 3 - Prevalence Inc | lex is ≤3.0 ¹ | |
| 7 | | | | 4 - Morphological | Adaptations ¹ (Provide | supporting |
| 8 | | | | data in Remark | s or on a separate sh | eet) |
| 9 | | | | Problematic Hydro | ophytic Vegetation ¹ (E | xplain) |
| 10 | 140 | - T - t-' | | , | | . , |
| | 1-10 | _ = Total | Cover | ¹ Indicators of hydric so | il and wetland hydrold | ogy must |
| <u>Woody Vine Stratum</u> (Plot size: <u>15'</u>) 1. Cardiospermum halicacabum | 10 | Yes | FAC | be present, unless dist | | ., |
| 2. | | | | Hydrophytic | | |
| 2 % Bare Ground in Herb Stratum | 10 | _= Total (| Cover | Vegetation Present? Ye | es 🖌 No 📃 | |
| Remarks: (Include photo numbers here or on a separate s | sheet.) | | | | | |

Hydrophytic vegetation was dominant, but all dominant species are facultative.

| | | to the depth need | | | | or confir | rm the absence of indicators.) |
|--|--------------------------------|---|---|---|---|--|---|
| Depth (inches) | <u>Matrix</u> Color (moist) | % Colo | <u>Redo:</u> r (moist) | <u>x Features</u> % | Type ¹ | Loc ² | Texture Remarks |
| <u>(incries)</u> 0-8 | 2.5Y 3/1 | 100 | | 70 | <u> </u> | LUC | Clay |
| Hydric Soil Histos Histos Black Hydrog Stratifi 1 cm M Deplet Thick Sandy 2.5 cm 5 cm M Restrictive Type: 8 | | G, H) ace (A11) at (S2) (LRR G, H) (S3) (LRR F) | Sa Sa Stu Lo Lo De Re Re Hi | andy Gleye andy Redo ripped Mar amy Muck amy Gleye epleted Mar edox Dark epleted Dark edox Depro gh Plains _RA 72 & | ed Matrix ox (S5) trix (S6) ky Minera ed Matrix atrix (F3) Surface (ark Surfac essions (I Depressio | (S4) I (F1) (F2) F6) e (F7) ⁵ 8) pons (F16) | Indicators for Problematic Hydric Soils ³ : 1 cm Muck (A9) (LRRI, J) Coast Prairie Redox (A16) (LRR F, G, H) Dark Surface (S7) (LRR G) High Plains Depressions (F16) (LRRH outside of MLRA 72 & 73) Reduced Vertic (F18) Red Parent Material (TF2) Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and |
| | dicators were not ob | oserved. | | | | | |
| HYDROLO | - | | | | | | |
| Wetland Hy | drology Indicators | : | | | | | |

| Primary Indicators (minimum of one is required; check all that apply) | Secondary Indicators (minimum of two required) |
|--|---|
| Surface Water (A1) Salt Crust (B11) | Surface Soil Cracks (B6) |
| High Water Table (A2) Aquatic Invertebrates (B13) | Sparsely Vegetated Concave Surface (B8) |
| Saturation (A3) Hydrogen Sulfide Odor (C1) | Drainage Patterns (B10) |
| Water Marks (B1) Dry-Season Water Table (C2) | Oxidized Rhizospheres on Living Roots |
| (C3) Sediment Deposits (B2) Oxidized Rhizospheres on Living Root Drift Deposits (B3) (where not tilled) Algal Mat or Crust (B4) Presence of Reduced Iron (C4) Iron Deposits (B5) Thin Muck Surface (C7) Inundation Visible on Aerial Imagery (B7) Other (Explain in Remarks) Water-Stained Leaves (B9) Frost-Heave Hummocks (D7) (LRR F) | Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) FAC-Neutral Test (D5) |
| Field Observations: | |
| Surface Water Present? Yes No 🖌 Depth (inches): | |
| Water Table Present? Yes No 🖌 Depth (inches): | |
| Saturation Present? Yes No 🖌 Depth (inches): We | etland Hydrology Present? Yes No 🔽 |
| Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections | s), if available: |
| | |
| Remarks: | |
| Wetland hydrology indicators were not observed. | |
| | |

| Project/Site: WRF 48-in Pipeline | | City/Cou | nty: <u>Collin Cou</u> | inty | _ Sampling Date: 10/15/2019 | 9 | |
|--|---------------------------------------|-------------------------------|----------------------------------|---|---|-----|--|
| Applicant/Owner: North Texas Municipal Water District | | | | | | | |
| Investigator(s): SDG, MREA | | Section, Township, Range: N/A | | | | | |
| Landform (hillslope, terrace, etc.): <u></u> | | | | | Slope (%): <u><1</u> | | |
| Subregion (LRR): LRR J Lat: <u>33.00808</u> | | | | | | | |
| Soil Map Unit Name: Trinity clay, 0 to 1 percent slopes, occa | asionally fl | ooded | | NWI classificat | tion: none | | |
| Are climatic / hydrologic conditions on the site typical for this | s time of y | | | | | - | |
| Are Vegetation Soil, or Hydrologys | significantl | y disturbe | ed? Are " | Normal Circumstances" | present? Yes 🖌 No 🔄 | | |
| Are Vegetation Soil, or Hydrology | naturally p | roblemati | | eded, explain any answe | | | |
| SUMMARY OF FINDINGS – Attach site map | showing | g samp | ling point l | ocations, transect | s, important features, e | tc. | |
| Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No Remarks: | | | s the Sampled vithin a Wetlar | | No 🖌 | | |
| Upland. Photos: 13- | -16 | | | | | | |
| VEGETATION – Use scientific names of plants. | | | | | | | |
| | Absolute | . Domin | ant Indicator | Dominance Test wor | ksheet: | | |
| Tree Stratum (Plot size:30') 1 2 | <u>% Cove</u> | r Speci | es? Status | Number of Dominant S That Are OBL, FACW (excluding FAC-): | | (A) | |
| 3 | | | | Total Number of Domi | inant | | |
| 4 | | | | Species Across All Sti | 2 | (В) | |
| 5 | · . <u></u> | | | Percent of Dominant S | | | |
| Copling/Chruh Stratum (Distaira) 15' | 0 | = Tota | l Cover | That Are OBL, FACW | , or FAC: <u>100</u> (A/ | /B) | |
| Sapling/Shrub Stratum (Plot size: <u>15</u> ') 1. | | | | Prevalence Index wo | orksheet: | | |
| 2 | | | | Total % Cover of: | Multiply by: | | |
| 3 | | | | | x 1 = | | |
| 4 | | | | | x 2 = | | |
| 5 | | | | | x 3 = | | |
| | 0 | = Tot | al Cover | | x 4 = x 5 = | | |
| Herb Stratum (Plot size: <u>5'</u>) 1. Elymus virginicus | 90 | Yes | FAC | | (A)(B) | 、 | |
| 2. Ambrosia trifida | 20 | No | FAC | | (A)(D) | , | |
| 3. Iva annua | 20 | No | FAC | Prevalence Inde | ex = B/A = | | |
| Amphiachyris dracunculoides | 5 | No | FAC | Hydrophytic Vegetat | ion Indicators: | | |
| 5 | · · · · · · · · · · · · · · · · · · · | | | | r Hydrophytic Vegetation | | |
| 6 | | | | 2 - Dominance Te | est is >50% | | |
| 7 | | | | 3 - Prevalence In | dex is ≤3.0 ¹ | | |
| 8 | | | | 4 - Morphologica | I Adaptations ¹ (Provide supportii ks or on a separate sheet) | ng | |
| 9 | | | | | | | |
| 10 | | | | Problematic Hydr | rophytic Vegetation ¹ (Explain) | | |
| | 135 | = Tot | al Cover | 1 | | | |
| Woody Vine Stratum (Plot size:15') | | | | | oil and wetland hydrology must sturbed or problematic. | | |
| 1. <u>Cardiospermum halicacabum</u> | 10 | Yes | FAC | · · | | | |
| 2 % Bare Ground in Herb Stratum | 10 | = Tota | I Cover | Hydrophytic Vegetation Present? Y | es 🖌 No 📃 | | |
| Remarks: (Include photo numbers here or on a separate s | heet.) | | | 1 | | | |

Hydrophytic vegetation was dominant, but all dominant species are facultative.

| Depth | Matrix | | Redox | Features | | _ | | |
|-----------------------------|--|----------------------|-------------------------------|----------------------------------|-------------|--|--|--|
| (inches) | Color (moist) | % Colo | r (moist) | % Туре | | Texture Remarks | | |
| 0-8 | 2.5YR 3/1 | 100 | | | | Clay | | |
| | | | | | | | | |
| | | | | | | | | |
| Type: C=Co lydric Soil I | | pletion, RM=Reduce | ed Matrix, CS: | =Covered or Co | ated Sand G | Grains. ² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ : | | |
| Histoso | ol (A1) | | | ndy Gleyed Mat | ix (S4) | 1 cm Muck (A9) (LRRI, J) | | |
| | Epipedon (A2) | | | ndy Redox (S5) | | Coast Prairie Redox (A16) (LRR F, G, H) | | |
| | Histic (A3) | | | ipped Matrix (S6 | , | Dark Surface (S7) (LRR G) | | |
| | gen Sulfide (A4) ed Layers (A5) (LRI | | | amy Mucky Mine amy Gleyed Mat | . , | High Plains Depressions (F16) (LRRH outside of MLRA 72 & 73) | | |
| | luck (A9) (LRR F, C | | | pleted Matrix (F | | Reduced Vertic (F18) | | |
| | ed Below Dark Surf | | | dox Dark Surfac | , | Red Parent Material (TF2) | | |
| | Dark Surface (A12) | | | pleted Dark Sur | . , | Other (Explain in Remarks) | | |
| | Mucky Mineral (S1) |) | | dox Depression | . , | ³ Indicators of hydrophytic vegetation and | | |
| | Mucky Peat or Pea | , | | gh Plains Depres | . , | | | |
| | lucky Peat or Peat | | | RA 72 & 73 of I | , , | unless disturbed or problematic. | | |
| | Layer (if observed) | | | | , | | | |
| Туре: 8 | | | | | | | | |
| Depth (ind | _{ches):} Compact | | | | | Hydric Soil Present? Yes No | | |
| emarks: | | | | | | | | |
| dric soil ind | dicators were not ob | bserved. | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| DROLO | GV | | | | | | | |
| DICOLO | | | | | | | | |
| etland Hvo | arology indicators | | | | | | | |
| - | drology Indicators | | ck all that apr | olv) | | Secondary Indicators (minimum of two requi | | |
| rimary Indic | ••• | one is required; che | ck all that app Salt Crust | | | Secondary Indicators (minimum of two requi | | |

| High Water Table (A2) | Aquatic Invertebrates (B13) | Sparsely Vegetated Concave Surface (B8) |
|---|---|---|
| Saturation (A3) | Hydrogen Sulfide Odor (C1) | Drainage Patterns (B10) |
| Water Marks (B1) | Dry-Season Water Table (C2) | Oxidized Rhizospheres on Living Roots |
| | | |
| Sediment Deposits (B2) | Oxidized Rhizospheres on Living R | Roots (C3) (where tilled) |
| Drift Deposits (B3) | (where not tilled) | Crayfish Burrows (C8) |
| Algal Mat or Crust (B4) | Presence of Reduced Iron (C4) | Saturation Visible on Aerial Imagery (C9) |
| Iron Deposits (B5) | Thin Muck Surface (C7) | Geomorphic Position (D2) |
| Inundation Visible on Aerial Imagery (B7) | Other (Explain in Remarks) | FAC-Neutral Test (D5) |
| Water-Stained Leaves (B9) | Frost-Heave Hummocks (D7) (LRF | R F) |
| Field Observations: | | |
| Surface Water Present? Yes No | Depth (inches): | |
| Water Table Present? Yes No | Depth (inches): | |
| Saturation Present? Yes No (includes capillary fringe) | Depth (inches): | Wetland Hydrology Present? Yes No 🔽 |
| Describe Recorded Data (stream gauge, monito | oring well, aerial photos, previous inspectio | ons), if available: |
| | | |
| Remarks: | | |
| Wetland hydrology indicators were not observed | 1. | |
| | | |

| Project/Site: WRF 48-in Pipeline | | City/County | /: Collin Cou | unty Sampling Date: 10/15/2019 | | | |
|---|---------------|--|----------------------------|---|--|--|--|
| Applicant/Owner: North Texas Municipal Water District | | _ City/County: <u>Collin County</u> Sampling Date: <u>10/15/2019</u> State: <u>Texas</u> Sampling Point: <u>5</u> | | | | | |
| Investigator(s): SDG, MREA | | Section To | wnshin Ran | | | | |
| Landform (hillslope, terrace, etc.): <u>none</u> | ` | | iof (concovo | convex none Stone (%): <1 | | | |
| | | | | | | | |
| | | | Long: <u>-96</u> | | | | |
| Soil Map Unit Name: Trinity clay, 0 to 1 percent slopes, occa | | _ | | NWI classification: Freshwater Forested/Shrub | | | |
| Are climatic / hydrologic conditions on the site typical for this | - | | | | | | |
| Are Vegetation Soil, or Hydrology s | significantly | y disturbed | ? Are "I | Normal Circumstances" present? Yes 🔽 No 🛄 | | | |
| Are Vegetation Soil, or Hydrology n | naturally pr | oblematic? | (If ne | eded, explain any answers in Remarks.) | | | |
| SUMMARY OF FINDINGS – Attach site map | showing | g sampli | ng point l | ocations, transects, important features, etc. | | | |
| Hydrophytic Vegetation Present?YesYesNoHydric Soil Present?YesNoNoWetland Hydrology Present?YesNo | | | he Sampled hin a Wetlar | | | | |
| Forested Upland. P | hot | DS: [^] | 17-2 | 0 | | | |
| VEGETATION – Use scientific names of plants. | | | | | | | |
| | Absolute | Dominar | t Indicator | Dominance Test worksheet: | | | |
| Tree Stratum (Plot size: <u>30'</u>) | | <u>Species</u> | | Number of Dominant Species | | | |
| 1. Ulmus crassifolia | 75 | Yes | FAC | That Are OBL, FACW, or FAC | | | |
| 2 | | | | (excluding FAC-): <u>3</u> (A) | | | |
| 3 | | | | Total Number of Dominant | | | |
| 4 | | · | | Species Across All Strata: <u>3</u> (B) | | | |
| 5 | | | | Percent of Dominant Species | | | |
| | 75 | = Total (| Cover | That Are OBL, FACW, or FAC: 100 (A/B) | | | |
| Sapling/Shrub Stratum (Plot size: <u>15</u> ') | 30 | Yes | FAC | Prevalence Index worksheet: | | | |
| 1. <u>Celtis laevigata</u> | 30 | 165 | FAC | Total % Cover of:Multiply by: | | | |
| 2 | | | | OBL species x 1 = | | | |
| 3 | | | | FACW species x 2 = | | | |
| 4 | | | | FAC species x 3 = | | | |
| 5 | 30 | | | FACU species x 4 = | | | |
| Herb Stratum (Plot size: <u>5'</u>) | 30 | _ = Total | Cover | UPL species x 5 = | | | |
| 1. Elymus virginicus | 80 | Yes | FAC | Column Totals: (A)(B) | | | |
| 2 | | | | | | | |
| 3 | | | | Prevalence Index = B/A = | | | |
| 4 | | | | Hydrophytic Vegetation Indicators: | | | |
| 5 | | | | 1 - Rapid Test for Hydrophytic Vegetation | | | |
| 6 | | | | ∠ 2 - Dominance Test is >50% | | | |
| 7 | | | | 3 - Prevalence Index is ≤3.0 ¹ | | | |
| 8 | | · | | 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) | | | |
| 9 | | · | | Problematic Hydrophytic Vegetation ¹ (Explain) | | | |
| 10 | 00 | | | | | | |
| Woody Vine Stratum (Plot size:15') | | = Total | | ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. | | | |
| 1 | | · | | Livera niveria | | | |
| 2% Bare Ground in Herb Stratum 20 | • | = Total (| Cover | Hydrophytic Vegetation Present? Yes No | | | |

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation was dominant, but all dominant species were facultative.

| Profile Des | cription: (Describe | to the depth need | led to docur | nent the in | dicator | or confirr | n the absenc | | rs.) | |
|------------------------|---|----------------------|-----------------|-------------|-------------------|------------------|--|-----------------------|-----------------------------------|--------|
| Depth | Matrix | | | x Features | | | | | - / | |
| (inches) | Color (moist) | | or (moist) | % | Type ¹ | Loc ² | | | Remarks | |
| 0-8 | 2.5YR 2.5/1 | 100 | | | | | Clay | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| ¹ Tvpe: C=C | concentration, D=Dep | oletion. RM=Reduc | ed Matrix. CS | =Covered | or Coate | d Sand G | rains. ² Lo | ocation: PL=P | ore Lining, M=Matrix | |
| Hydric Soil | | | | | | | Indicator | | natic Hydric Soils ³ : | |
| Histos | sol (A1) | | Sa | andy Gleyed | d Matrix | (S4) | 1 cn | n Muck (A9) (L | _RRI, J) | |
| Histic | Epipedon (A2) | | sa sa | andy Redox | (S5) | | Coa | st Prairie Red | ox (A16) (LRR F, G, I | H) |
| | Histic (A3) | | | ripped Matr | . , | | | < Surface (S7) | | |
| | gen Sulfide (A4) | | | amy Mucky | | . , | - | Plains Depre | · · · · | |
| | ïed Layers (A5) (LRF Muck (A9) (LRR F, G | | | epleted Mat | | (F2) | , in the second se | uced Vertic (F | MLRA 72 & 73) | |
| | ted Below Dark Surf | | | edox Dark S | | F6) | | Parent Materi | , | |
| | Dark Surface (A12) | | | epleted Dar | | , | | (Explain in R | · , | |
| | / Mucky Mineral (S1) |) | | edox Depre | | · · / | | | phytic vegetation and | b |
| | n Mucky Peat or Pea | | | gh Plains D | • | . , | | | must be present, | |
| | Mucky Peat or Peat | | (M) | LRA 72 & 7 | '3 of LR | R H) | unles | s disturbed or | problematic. | |
| | Layer (if observed) | | | | | | | | | |
| | | | | | | | | | | |
| Depth (in | nches): | | | | | | Hydric So | il Present? | Yes No | |
| Remarks: | | | | | | | | | | |
| Hydric soil in | ndicators were not ob | oserved. | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| IYDROLC | DGY | | | | | | | | | |
| Wetland Hy | drology Indicators | : | | | | | | | | |
| Primary Indi | icators (minimum of o | one is required; che | eck all that ap | ply) | | | Second | dary Indicators | (minimum of two req | uired) |
| Surfac | ce Water (A1) | | Salt Crust | (B11) | | | S | urface Soil Cra | acks (B6) | |
| High V | Water Table (A2) | | | vertebrates | s (B13) | | S S | parsely Vegeta | ated Concave Surface | e (B8) |
| Satura | ation (A3) | | Hydrogen | Sulfide Od | or (C1) | | D | rainage Patter | ms (B10) | |
| | ⁻ Marks (B1) | | Dry-Seas | on Water Ta | able (C2 |) | O 0 | xidized Rhizos | spheres on Living Roo | ots |
| (C3) | | _ | - | | | | (| | | |
| | nent Deposits (B2) | | = | Rhizospher | es on Liv | ving Roots | . , | nere tilled) | | |
| | Deposits (B3) | ļ | (where not | , | | | | rayfish Burrow | | |
| | Mat or Crust (B4) | F | | of Reduced | | 4) | | | le on Aerial Imagery (| (09) |
| | eposits (B5) | | _ | (Surface (C | -/) | | | eomorphic Po | () | |

| Algal Mat or Crust (B4) | Presence of Reduced Iron (C4) | Saturation Visible on Aerial Imagery (C9) |
|---|---|---|
| Iron Deposits (B5) | Thin Muck Surface (C7) | Geomorphic Position (D2) |
| Inundation Visible on Aerial Ima | agery (B7) 🔲 Other (Explain in Remarks) | FAC-Neutral Test (D5) |
| Water-Stained Leaves (B9) | Frost-Heave Hummocks (D7) (L | RR F) |
| Field Observations: | | |
| Surface Water Present? Yes | No 🔽 Depth (inches): | |
| Water Table Present? Yes | No 🖌 Depth (inches): | |
| | | |
| Saturation Present? Yes | No V Depth (inches): | Wetland Hydrology Present? Yes No 🖌 |
| (includes capillary fringe) | No 🔽 Depth (inches): | , , , |
| (includes capillary fringe) | | , , , |
| (includes capillary fringe) Describe Recorded Data (stream gau | No 🔽 Depth (inches): | , , , |
| (includes capillary fringe) | No 🔽 Depth (inches): | , , , |
| (includes capillary fringe) Describe Recorded Data (stream gau | No | , , , |

| Project/Site: WRF 48-in Pipeline | (| city/Co | ounty: Collin Co | ounty | Sampling Date: <u>10/15/2019</u> | |
|---|---------------------|--|--|---|--|--|
| Applicant/Owner: North Texas Municipal Water Distri | ct | | | | Sampling Point: <u>6</u> | |
| Investigator(s): SDG, MREA | S | _ Section, Township, Range: <u>N/A</u> | | | | |
| Landform (hillslope, terrace, etc.): Flat | | | | | Slope (%): >1 | |
| Subregion (LRR): LRR J Lat: <u>33.01112</u> | | | Long: <u>-96</u> | .48719 | Datum: NAD83 | |
| Soil Map Unit Name: Tf - Tinn clay, 0 to 1 percent slop | oes, frequ | ently | flooded | NWI classificati | ion: Freshwater Emergent Wetland | |
| Are climatic / hydrologic conditions on the site typical for this | time of yea | ar? Y | | | | |
| Are Vegetation Soil, or Hydrologys | ignificantly | distur | bed? Are "I | Normal Circumstances" p | present? Yes 🔽 No | |
| Are Vegetation Soil, or Hydrology r | aturally pro | blem | | eded, explain any answe | | |
| SUMMARY OF FINDINGS – Attach site map | showing | sam | pling point l | ocations, transects | s, important features, etc. | |
| Hydrophytic Vegetation Present? Yes 🖌 No | | | | - | | |
| Hydric Soil Present? Yes V | | | Is the Sampled | | | |
| Wetland Hydrology Present? Yes 🖌 No | | | within a Wetlar | | No | |
| Remarks: | | | | | | |
| Forested Wetland, Photos 21-24 | | | | | | |
| VEGETATION – Use scientific names of plants. | | | | - | | |
| Tree Stratum (Plot size: 30') | Absolute % Cover | | inant Indicator cies? <u>Status</u> | Dominance Test work | | |
| 1. Fraxinus pennsylvanica | 30 | Y | FAC | Number of Dominant S That Are OBL, FACW, | or FAC | |
| 2. Ulmus crassifolia | 30 | Υ | FAC | (excluding FAC-): | 6 (A) | |
| 3. Celtis laevigata | 20 | Υ | FAC | Total Number of Domir | nant | |
| 4 | | | | Species Across All Stra | C | |
| 5 | | | | Percent of Dominant S | pecies | |
| | 80 | _= To | otal Cover | That Are OBL, FACW, | | |
| <u>Sapling/Shrub Stratum</u> (Plot size: <u>15'</u>) 1. Ulmus crassifolia | 10 | Y | FAC | Prevalence Index wor | rksheet: | |
| 2. Celtis lavigata | 10 | Y | FAC | Total % Cover of: | Multiply by: | |
| 3 | | | | OBL species | x 1 = | |
| 4 | | | | FACW species | x 2 = | |
| 5. | | | | FAC species | x 3 = | |
| | 20 | = T | otal Cover | FACU species | x 4 = | |
| Herb Stratum (Plot size: 5') | 40 | ~ | | UPL species | | |
| 1. Symphyotrichum lanceolatum | 40 | Y | FACW | Column Totals: | (A)(B) | |
| 2 | | | | Prevalence Index | x = B/A = | |
| 3 | | | | Hydrophytic Vegetati | on Indicators: | |
| 4 | | | | 1 - Rapid Test for | Hydrophytic Vegetation | |
| 5 | | | | 2 - Dominance Te | st is >50% | |
| 6 7 | | | | 3 - Prevalence Inc | dex is ≤3.0 ¹ | |
| 8 | | | | | Adaptations ¹ (Provide supporting | |
| 9 | | | | data in Remark | s or on a separate sheet) | |
| 10 | | | | Problematic Hydro | ophytic Vegetation ¹ (Explain) | |
| | 40 | | otal Cover | | | |
| Woody Vine Stratum (Plot size:15') | | | | ¹ Indicators of hydric so be present, unless dist | bil and wetland hydrology must turbed or problematic. | |
| 1 | | | | Hydrophytic | | |
| 2 % Bare Ground in Herb Stratum <u>60</u> | 0 | | otal Cover | Vegetation | | |
| | | _= 10 | Juai Cover | Present? Ye | es Mo | |
| Remarks: (Include photo numbers here or on a separate s | heet.) | _ | | | | |
| Hydrophytic vegetation was observed. | | | | | | |

SOIL

Sampling Point: 2

| | ption: (Describe | to the depth | | | | or confirm | n the absence | e of indicators.) |
|--------------------------|--|----------------------|----------------------|-------------------------|------------------------|------------------|----------------|--|
| Depth (inches) | Matrix Color (moist) | % | Red Color (moist) | <u>ox Feature</u> % | s Type ¹ | Loc ² | Texture | Remarks |
| | 2.5Y 3/1 | | .5YR 3/3 | 2 | C | M, PL | | |
| | 2.5Y 5/1 | 18 | | | <u> </u> | <u> </u> | | |
| | 2.51 5/1 | 10 | | | | | | |
| | | · | | | | | | |
| | | <u> </u> | | | | | | |
| | | | | | | | | |
| | | · | | | | | | |
| · | | | | | | | | · |
| · | | | | | | <u> </u> | | |
| | | | | | | | | |
| ¹ Type: C=Con | centration, D=Dep | pletion, RM=Re | educed Matrix, C | S=Covered | d or Coat | ed Sand G | | cation: PL=Pore Lining, M=Matrix. |
| Hydric Soil In | dicators: | | | | | | Indicators | s for Problematic Hydric Soils ³ : |
| Histosol | . , | | | Sandy Gley | | (S4) | | Muck (A9) (LRRI, J) |
| | oipedon (A2) | | | Sandy Redo | | | | st Prairie Redox (A16) (LRR F, G, H) |
| Black Hi | . , | | I I | Stripped Ma | · · · | | | Surface (S7) (LRR G) |
| | n Sulfide (A4) |) E) | | .oamy Muc .oamy Gley | | · · / | | Plains Depressions (F16) |
| | d Layers (A5) (LRF ick (A9) (LRR F, G | | | Depleted M | | ((7 2) | | RH outside of MLRA 72 & 73) uced Vertic (F18) |
| | d Below Dark Surfa | | | Redox Dark | · · · | (F6) | | Parent Material (TF2) |
| | ark Surface (A12) | | | Depleted Da | | . , | | (Explain in Remarks) |
| | ucky Mineral (S1) | | | Redox Depi | | . , | | ators of hydrophytic vegetation and |
| 2.5 cm N | /lucky Peat or Pea | t (S2) (LRR G | , H) 🗌 H | ligh Plains | Depress | ions (F16) | wetlan | nd hydrology must be present, |
| | icky Peat or Peat (| | (N | ILRA 72 & | 73 of LR | RH) | unless | s disturbed or problematic. |
| Restrictive La | yer (if observed) | : | | | | | | |
| Туре: | | | | | | | | |
| Depth (inch | ies): | | | | | | Hydric Soi | l Present? Yes 🚩 No |
| Remarks: | | | | | | | 1 | |
| Hydric soils we | re observed. | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| HYDROLOG | | | | | | | | |
| Wetland Hydr | ology Indicators: | | | | | | | |
| Primary Indica | tors (minimum of c | one is required | ; check all that a | pply) | | | <u>Second</u> | ary Indicators (minimum of two required) |
| | Water (A1) | | Salt Crus | st (B11) | | | Su | ırface Soil Cracks (B6) |
| High Wa | ater Table (A2) | | Aquatic I | nvertebrate | es (B13) | | L Sp | arsely Vegetated Concave Surface (B8) |
| Saturatio | on (A3) | | Hydroge | n Sulfide C | dor (C1) | | Dr: | ainage Patterns (B10) |
| | arks (B1) | | Dry-Sea | son Water | Table (C2 | 2) | Ox | kidized Rhizospheres on Living Roots |
| (C3) | t Depender (DO) | | | Dhimana | | uina Dest | (02) 4-1- | |
| | nt Deposits (B2) | | | Rhizosphe | eres on L | wing Roots | | ere tilled) |
| | posits (B3) | | (where no | | od Iron (C | 24) | | ayfish Burrows (C8) |
| | at or Crust (B4) | | | e of Reduc | | -4) | | aturation Visible on Aerial Imagery (C9) |
| | oosits (B5) | | | ck Surface | | | | eomorphic Position (D2) |
| | on Visible on Aeria tained Leaves (B9 | | | xplain in R | | | L V _FA | C-Neutral Test (D5) |
| | | 1 | | ave Humm | IUUKS (D7 | | | |

Wetland hydrology was observed.

Surface Water Present?

(includes capillary fringe)

Water Table Present?

Saturation Present?

Remarks:

No 🖌

No 🖌

No 🗸

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Yes

Yes

Yes

Depth (inches):

Depth (inches):

_ Depth (inches): _

No

Wetland Hydrology Present? Yes

| Project/Site: WRF 48-in Pipeline | C | City/Count | _{y:} Collin Co | ounty | Sampling Date: 10/15/2019 |
|---|---------------------|------------|-------------------------|---|---|
| Applicant/Owner: North Texas Municipal Water Distric | ct | | | | Sampling Point: 7 |
| Investigator(s): SDG, MREA | | | | | |
| | | | | | Slope (%): >1 |
| | | | | .48600 | |
| Soil Map Unit Name: Tf - Tinn clay, 0 to 1 percent slop | | | - | | on: Freshwater Emergent Wetland |
| Are climatic / hydrologic conditions on the site typical for this | | - | | (If no, explain in R | |
| Are Vegetation Soil, or Hydrologys | - | | | Normal Circumstances" p | |
| | | | | | |
| Are Vegetation Soil, or Hydrology n | | | | eded, explain any answer | |
| SUMMARY OF FINDINGS – Attach site map s | showing | sampli | ng point l | ocations, transects | s, important features, etc. |
| Hydrophytic Vegetation Present? Yes 🖌 No | | | | | |
| Hydric Soil Present? Yes V | | | the Sampled | | 1 🗖 |
| Wetland Hydrology Present? Yes 🖌 No | | wit | thin a Wetlar | nd? Yes 🔽 | No |
| Remarks: | | I | | | |
| Forested Wetland, Photos 25-28 | 3 | | | | |
| | | | | | |
| VEGETATION – Use scientific names of plants. | | | | | |
| Tree Stratum (Plot size: 30') | Absolute % Cover | | nt Indicator | Dominance Test work | |
| 1. Fraxinus pennsylvanica | 40 | Yes | FAC | Number of Dominant S That Are OBL, FACW, | |
| 2. Ulmus crassifolia | 30 | Yes | FAC | (excluding FAC-): | <u>4</u> (A) |
| 3. Celtis laevigata | 10 | No | FAC | Total Number of Domir | nant |
| 4. | | | | Species Across All Stra | E |
| 5. | | | | Percent of Dominant S | necies |
| | 80 | = Total | Cover | That Are OBL, FACW, | |
| Sapling/Shrub Stratum (Plot size: <u>15</u> ') | 4.5 | <u> </u> | 540 | Prevalence Index wor | rkshaat |
| 1. <u>Ulmus crassifolia</u> | 15 | Yes | FAC | | Multiply by: |
| 2. Fraxinus pennsylvanica | 15 | Yes | FAC | | x 1 = |
| 3. <u>Celtis lavigata</u> | <u>5</u> 5 | No | FAC | | x 2 = |
| 4. <u>Morus rubra</u> | 5 | No | FACU | | x 3 = |
| 5 | | | | | x 4 = |
| Herb Stratum (Plot size: <u>5</u> ') | 40 | _ = Total | Cover | UPL species | |
| 1. Toxicodendron radicans | 10 | Yes | FACU | | (A) (B) |
| 2 | | | | | () |
| 3 | | | | | < = B/A = |
| 4 | | | | Hydrophytic Vegetatio | |
| 5 | | | | | Hydrophytic Vegetation |
| 6 | | | | 2 - Dominance Te | |
| 7 | | | | 3 - Prevalence Ind | |
| 8 | | | | 4 - Morphological | Adaptations ¹ (Provide supporting s or on a separate sheet) |
| 9 | | | | | . , |
| 10 | | | | Problematic Hydro | ophytic Vegetation ¹ (Explain) |
| | 10 | _ = Total | Cover | 1 | |
| Woody Vine Stratum (Plot size: 15') | | | | be present, unless dist | vil and wetland hydrology must urbed or problematic. |
| 1 | | | | | |
| 2 | | | | Hydrophytic Vegetation | |
| % Bare Ground in Herb Stratum 90 | 0 | _= Total (| Cover | Present? Ye | es 🖌 No 🔄 |
| Remarks: (Include photo numbers here or on a separate s | heet.) | | | 4 | |
| | | | | | |
| Hydrophytic vegetation was observed. | | | | | |

SOIL

Sampling Point: 7

| Depth | Motrix | | Dod | ox Featur | ~~ | | n the absence | |
|---|--|-----------------------|---|---|--|------------------|--|---|
| (inches) | <u>Matrix</u> Color (moist) | % | Color (moist) | <u>ox realur</u> % | es Type ¹ | Loc ² | Texture | Remarks |
| 0-8 | 2.5Y 3/1 | 70 | 10YR 3/1 | 2 | C | | Silty Clay | |
| | 2.5Y 5/2 | 28 | | | | | | |
| | 2.51 5/2 | 20 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Type: C=C | oncentration. D=D | epletion. RM= | Reduced Matrix, C | S=Covere | ed or Coate | ed Sand G | rains. ² Lc | cation: PL=Pore Lining, M=Matrix. |
| Hydric Soil | | 001011011,1111 | | 00000 | | | | s for Problematic Hydric Soils ³ : |
| Histos | ol (A1) | | | andy Gle | yed Matrix | (S4) | 1 cm | Muck (A9) (LRRI, J) |
| Histic I | Epipedon (A2) | | | Sandy Red | lox (S5) | | Coas | st Prairie Redox (A16) (LRR F, G, H) |
| | Histic (A3) | | | | latrix (S6) | | | Surface (S7) (LRR G) |
| | gen Sulfide (A4) | | | • | cky Minera | . , | - | Plains Depressions (F16) |
| | ed Layers (A5) (LF | | | - | yed Matrix | (F2) | | RH outside of MLRA 72 & 73) |
| | Nuck (A9) (LRR F, | | | | Aatrix (F3) | | | uced Vertic (F18) |
| | ed Below Dark Su Dark Surface (A12 | | | | k Surface ()ark Surfac | . , | | Parent Material (TF2) (Explain in Remarks) |
| | Mucky Mineral (S | , | | • | pressions (| . , | | ators of hydrophytic vegetation and |
| | Mucky Peat or Pe | | | | s Depressi | , | | nd hydrology must be present, |
| | lucky Peat or Peat | | | - | & 73 of LR | , , | | s disturbed or problematic. |
| | | | , , | | | , | | • |
| | Layer (if observed | d): | | | | | | |
| | | | | | | | | |
| Restrictive I | | | | | | | Hydric Soi | l Present? Yes 🖌 No 📃 |
| Restrictive I Type: Depth (in | | | | | | | Hydric Soi | I Present? Yes 🖌 No 📃 |
| Restrictive I Type: Depth (ind Remarks: | | | | | | | Hydric Soi | I Present? Yes 🖌 No 📃 |
| Restrictive I Type: Depth (ind Remarks: | ches): | | | | | | Hydric Soi | l Present? Yes 🖌 No 🦲 |
| Restrictive I Type: Depth (ind Remarks: | ches): | | | | | | Hydric Soi | l Present? Yes 🖌 No 📃 |
| Restrictive I Type: Depth (ind Remarks: ydric soils v YDROLO | ches): vere observed. GY | | | | | | Hydric Soi | I Present? Yes 🖌 No 🦲 |
| Restrictive I Type: Depth (in/ Remarks: lydric soils v YDROLO Vetland Hy | ches): vere observed. GY drology Indicator | s: | ed; check all that a | (Vlgg | | | | |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO Wetland Hyd Primary India | ches): vere observed. GY drology Indicator cators (minimum of | s: | ed; check all that a | | | | Second | ary Indicators (minimum of two required) |
| Restrictive I Type: Depth (ind Remarks: Iydric soils v YDROLO Wetland Hyd Primary Indic | ches): vere observed. GY drology Indicator: cators (minimum of e Water (A1) | s: | Salt Crus | st (B11) | tes (B13) | | Second | lary Indicators (minimum of two required) Irface Soil Cracks (B6) |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO Vetland Hyd Crimary India Surfac High V | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) vater Table (A2) | s: | Salt Crus | st (B11) Invertebra | | | <u>Second</u> | lary Indicators (minimum of two required) Irface Soil Cracks (B6) Parsely Vegetated Concave Surface (B8) |
| Restrictive I Type: Depth (ind Remarks: lydric soils v YDROLO Vetland Hyd Primary India Surfac High V | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) Vater Table (A2) tion (A3) | s: | Salt Crus Aquatic I Hydroge | st (B11) Invertebra n Sulfide | Odor (C1) |) | Second Su Su Su Dr | lary Indicators (minimum of two required) Irface Soil Cracks (B6) parsely Vegetated Concave Surface (B8) ainage Patterns (B10) |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO Wetland Hyd Primary Indid Gurfac High V Satura | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) vater Table (A2) | s: | Salt Crus Aquatic I Hydroge | st (B11) Invertebra n Sulfide | |) | Second Su Su Su Dr | lary Indicators (minimum of two required) Irface Soil Cracks (B6) Parsely Vegetated Concave Surface (B8) |
| Restrictive I Type: Depth (in/ Remarks: Hydric soils v YDROLO Wetland Hyr Primary India Surfac High V Satura C3) Sedim | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) | s: | Salt Crus Aquatic I Hydroge | st (B11) Invertebra n Sulfide son Water | Odor (C1) | | Second Sc Sc Sc Sc Sc Sc Sc Sc Sc Sc Sc Sc Sc | lary Indicators (minimum of two required) Irface Soil Cracks (B6) parsely Vegetated Concave Surface (B8) ainage Patterns (B10) |
| Restrictive I Type: Depth (in/ Remarks: Hydric soils v YDROLO Wetland Hyr Primary India Surfac High V Satura C3) Sedim | ches): vere observed. GY drology Indicator eators (minimum of e Water (A1) Vater Table (A2) tion (A3) Marks (B1) | s: | Salt Crus Aquatic I Hydroge | st (B11) Invertebra n Sulfide son Water | Odor (C1) Table (C2 | | <u>Second</u> □ Su □ Sr □ Dr □ O; s (C3) (wh | lary Indicators (minimum of two required) Irface Soil Cracks (B6) Parsely Vegetated Concave Surface (B8) ainage Patterns (B10) kidized Rhizospheres on Living Roots |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO Wetland Hyd Primary Indid Surfac High V Satura V Satura C3) Sedim V Drift D | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) | s: | Salt Crus Aquatic I Hydroge Dry-Seas Oxidized | st (B11) Invertebra n Sulfide son Water I Rhizosph ot tilled) | Odor (C1) Table (C2 | ving Roots | Second Sc Sp Dr O S (C3) (wh | lary Indicators (minimum of two required) Irface Soil Cracks (B6) parsely Vegetated Concave Surface (B8) ainage Patterns (B10) kidized Rhizospheres on Living Roots Iere tilled) |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO Vetland Hyd Primary Indid Surfac High V Satura C3) Sedim C3) Sedim Algal N | ches): vere observed. GY drology Indicator: cators (minimum of e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) | s: | Salt Crus Aquatic I Hydroge Dry-Seas Oxidized | st (B11) Invertebra n Sulfide son Water I Rhizosph ot tilled) | Odor (C1) Table (C2 neres on Li ced Iron (C | ving Roots | Second Su Su Su Su Su Su Su Su Su Su | lary Indicators (minimum of two required) Irface Soil Cracks (B6) parsely Vegetated Concave Surface (B8) ainage Patterns (B10) kidized Rhizospheres on Living Roots here tilled) ayfish Burrows (C8) |
| Restrictive I Type: Depth (ind Remarks: Hydric soils v YDROLO YDROLO Wetland Hyd Primary Indid Primary Indid Surfac High V Satura Vater C3) Sedim Iron Do | ches): vere observed. GY drology Indicator cators (minimum of e Water (A1) Vater Table (A2) tion (A3) Marks (B1) ent Deposits (B2) eposits (B3) Mat or Crust (B4) | s: f one is requir | Salt Crus Aquatic I Hydroge Dry-Seas Oxidized (where no Presenc Thin Mut | st (B11) Invertebra n Sulfide son Water I Rhizosph ot tilled) e of Redu | Odor (C1) Table (C2 neres on Li ced Iron (C e (C7) | ving Roots | <u>Second</u> SL Sp Dr O; s (C3) (wh Cr Sa Ga | lary Indicators (minimum of two required) Irface Soil Cracks (B6) parsely Vegetated Concave Surface (B8) ainage Patterns (B10) kidized Rhizospheres on Living Roots Here tilled) ayfish Burrows (C8) aturation Visible on Aerial Imagery (C9) |

Wetland hydrology was observed.

Surface Water Present?

(includes capillary fringe)

Water Table Present?

Saturation Present?

Remarks:

No 🖌

No 🖌

No 🗸

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Yes

Yes

Yes

Depth (inches):

Depth (inches):

_ Depth (inches): _

No

Wetland Hydrology Present? Yes

Attachment D

SITE PHOTOGRAPHS





























































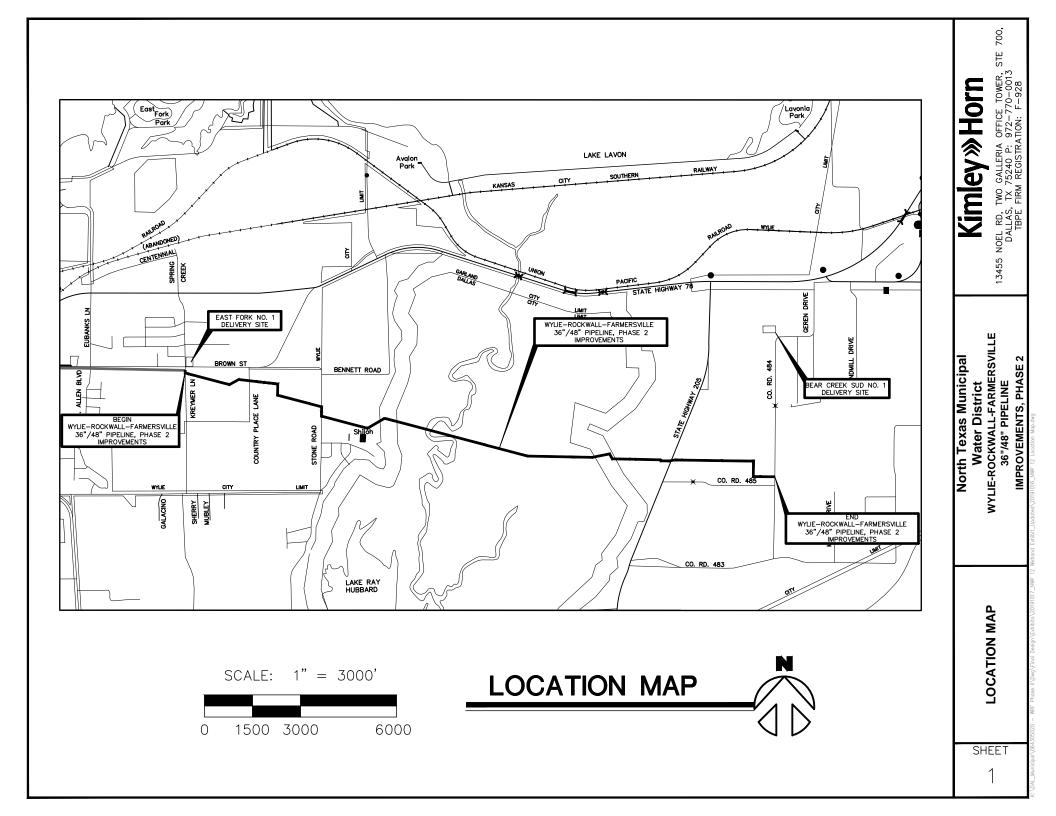


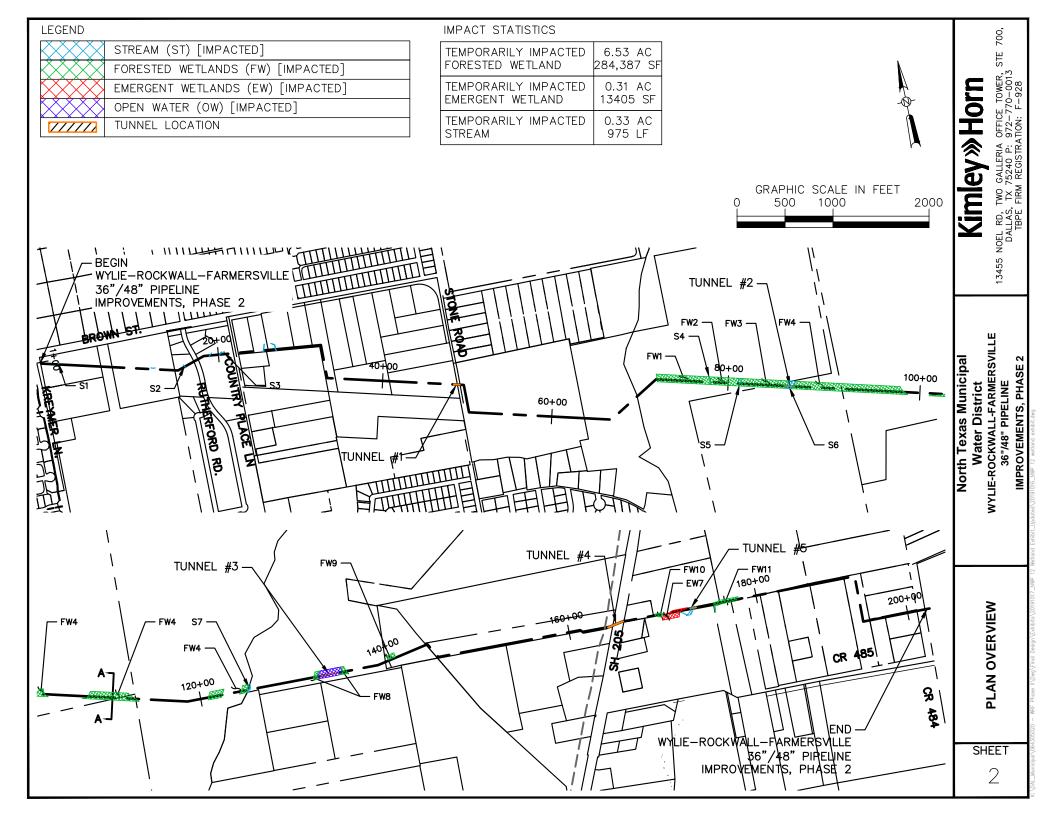


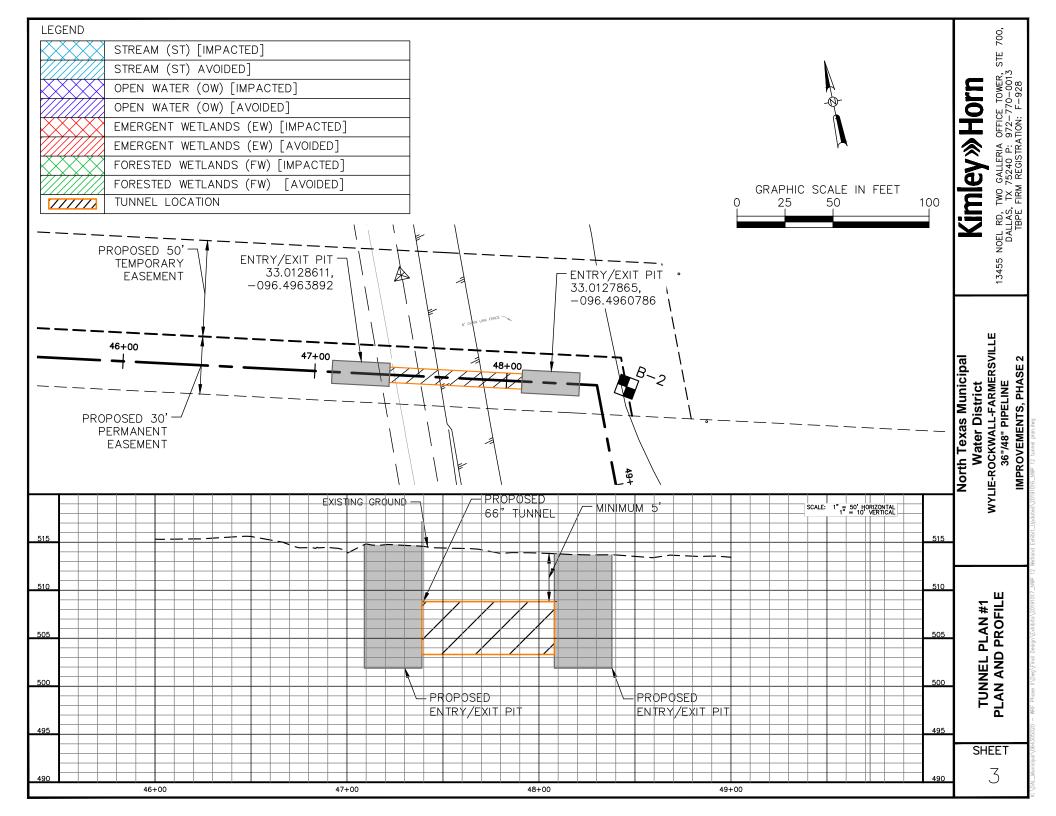


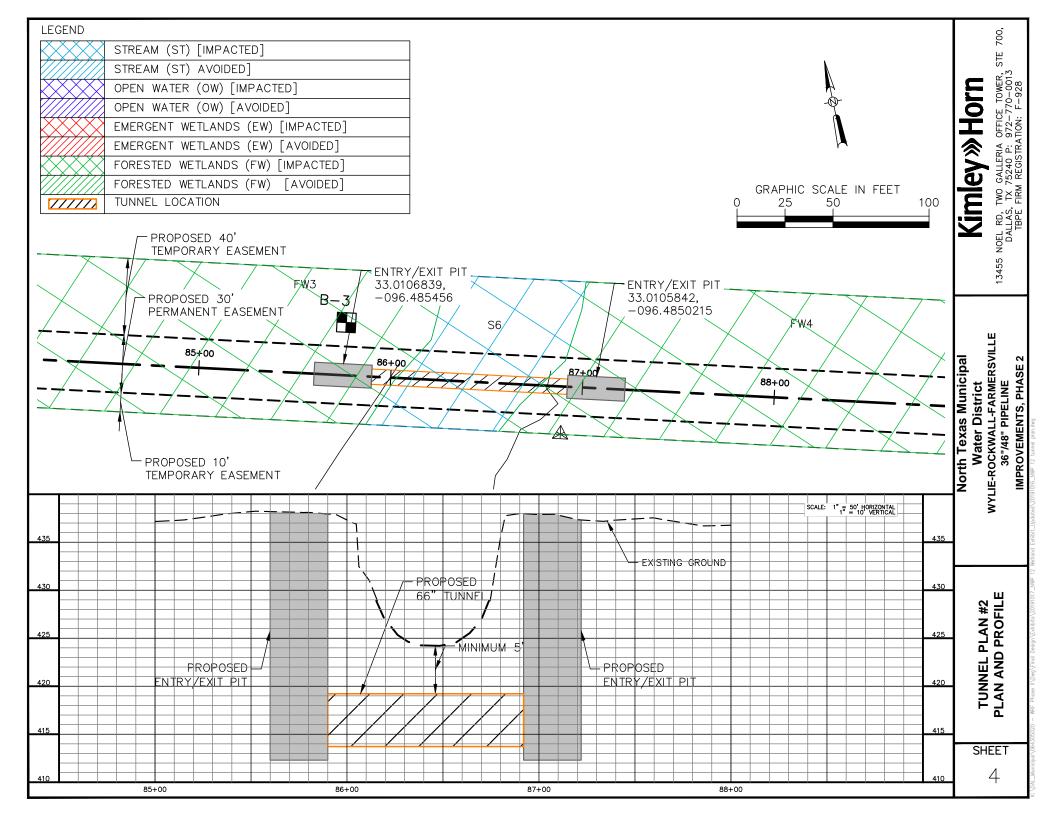
Attachment E

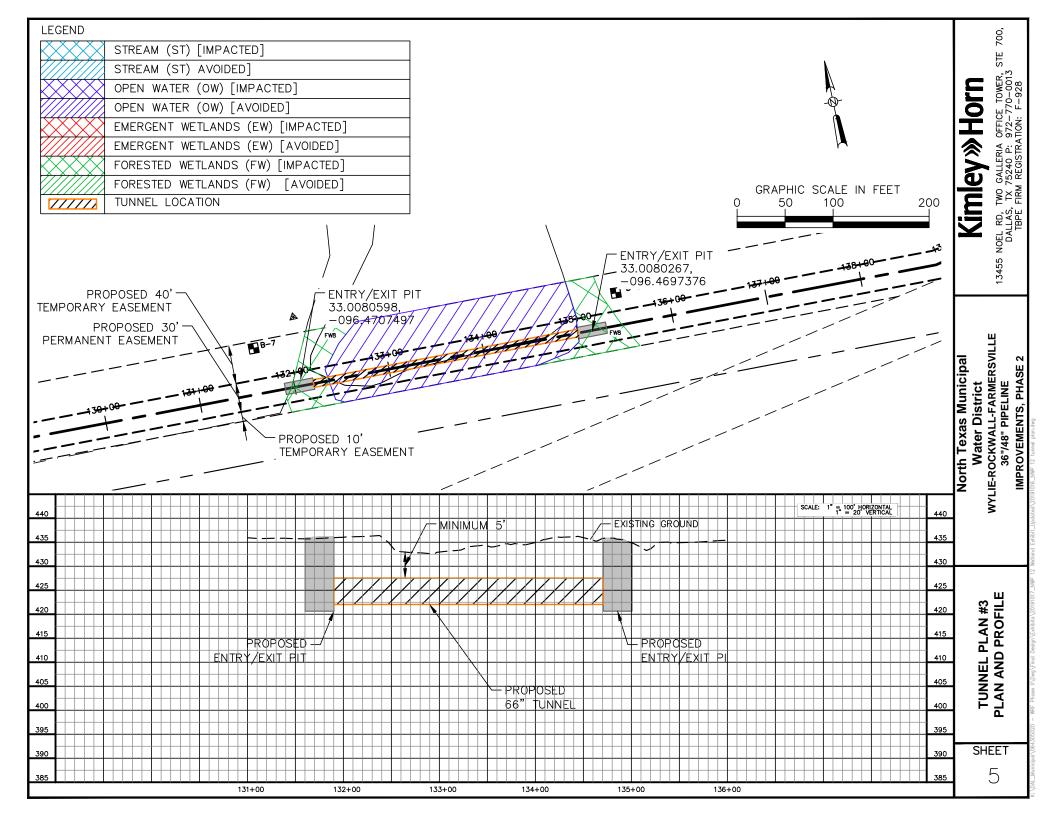
REVISED IMPACTS MAPS

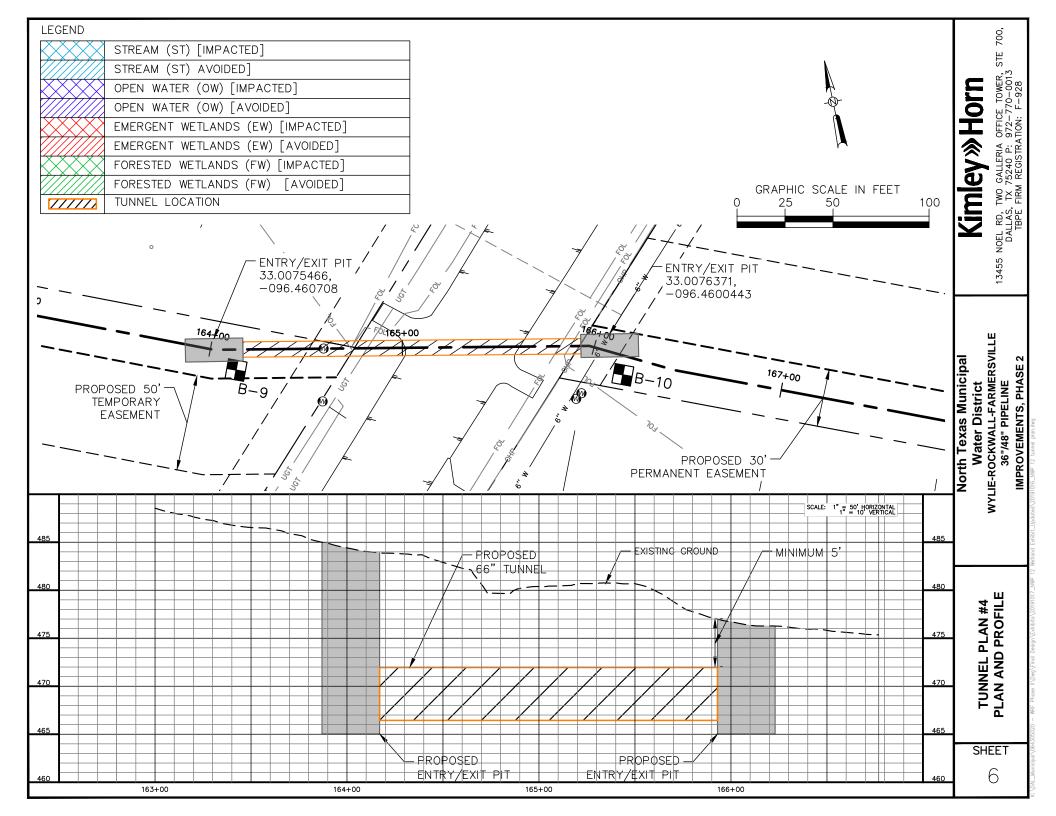


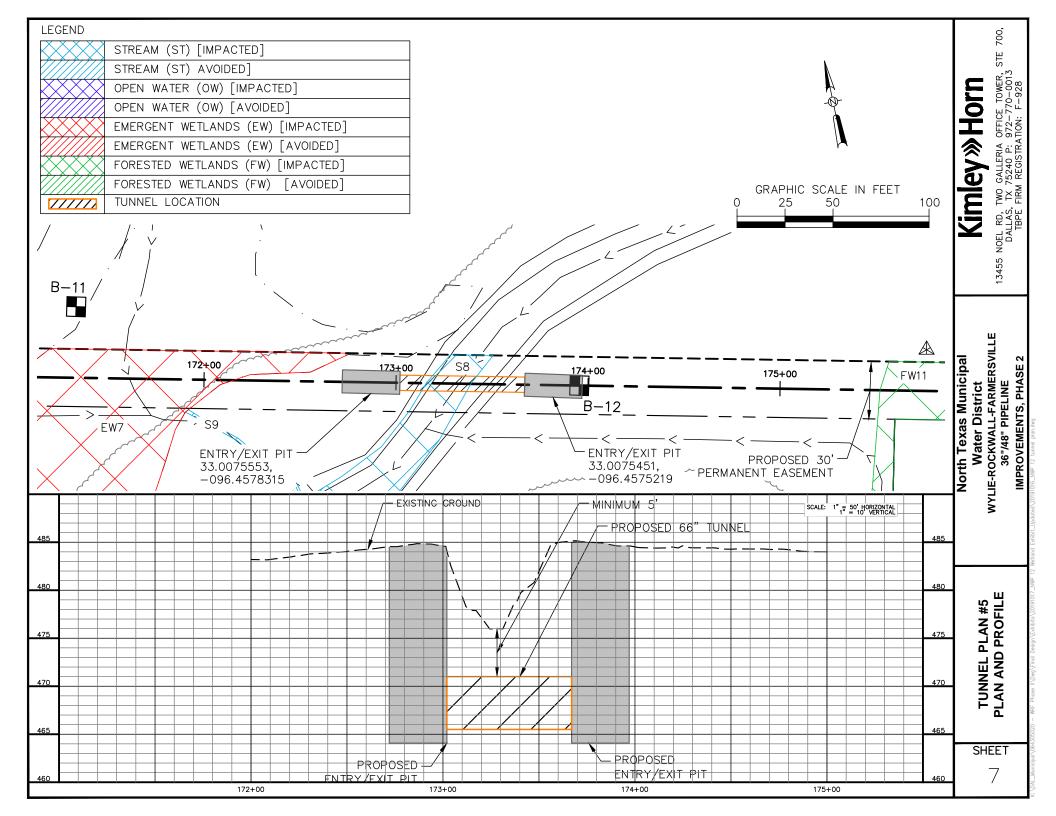


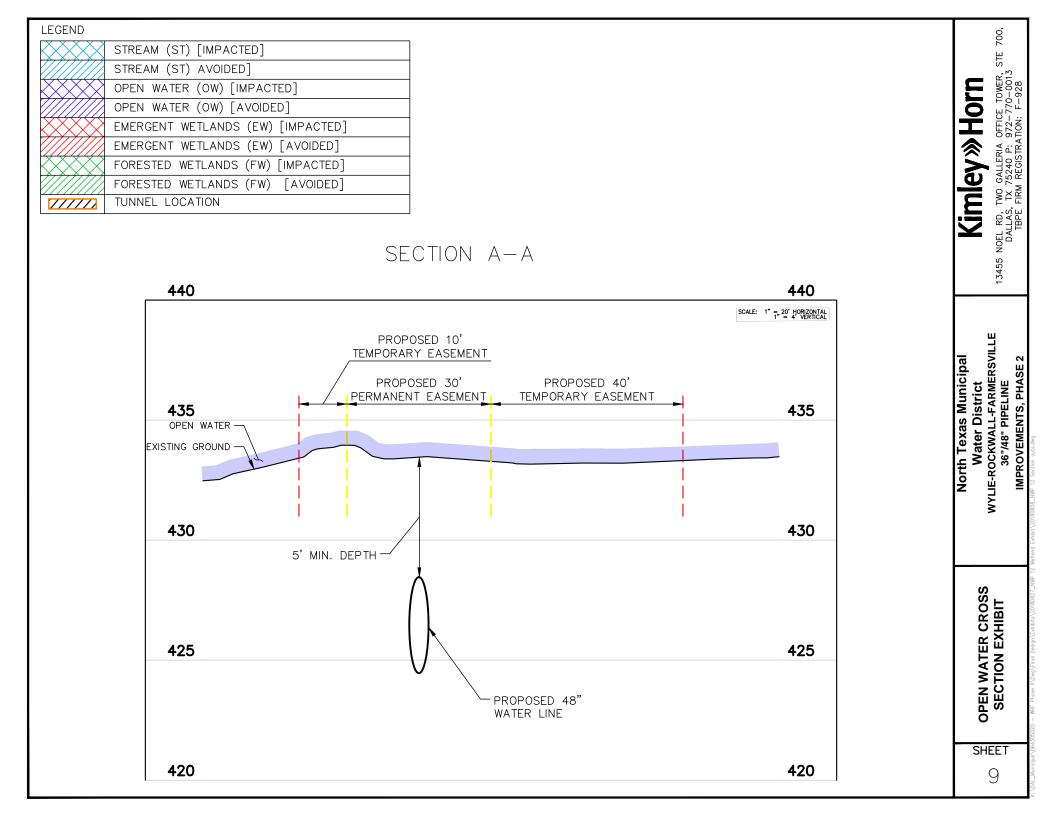












Attachment F

TABLE OF SINGLE AND COMPLETE CROSSINGS

Summary Table of Single and Complete Crossings

| Waterbody ID ¹ | Latitude | Longitude | Resource Type ² | Linear Feet IN Project Area | Acres in Project Area | Impact Type ³ | Linear Feet of Impact | Acres of Impact | Cubic Yards of Material to be Discharged | PCN Required | Reason⁴ |
|------------------------------|----------|-----------|-------------------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------|--|-----------------|---------|
| S1 | 33.0160 | -96.5093 | ES | 15.96 lf | 0.001 ac | D/T | 15.96 lf | 0.001 ac | 1.61 | N | n/a |
| S2 | 33.0152 | -96.5042 | IS | 379.02 lf | 0.04 ac | D/T | 379.02 lf | 0.04 ac | 64.53 | N | n/a |
| S3 | 33.0152 | -96.5037 | IS | 43.61 lf | 0.001 ac | D/T | 43.61 lf | 0.001 ac | 1.61 | N | n/a |
| S4 | 33.0112 | -96.4878 | PS | 82.27 lf | 0.02 ac | D/T | 82.27 lf | 0.02 ac | 32.27 | N | n/a |
| S 5 | 33.0110 | -96.4868 | PS | 81.32 lf | 0.04 ac | D/T | 81.32 lf | 0.04 ac | 64.53 | N | n/a |
| S6 | 33.0106 | -96.4852 | PS | 90.99 lf | 0.14 ac | n/a | 0.00 lf | 0.00 ac | - | N | n/a |
| S7 | 33.0081 | -96.4730 | PS | 84.62 lf | 0.05 ac | D/T | 84.62 lf | 0.05 ac | 80.67 | N | n/a |
| S8 | 33.0076 | -96.4577 | PS | 104.37 lf | 0.05 ac | n/a | 0.00 lf | 0.00 ac | - | N | n/a |
| S9 | 33.0075 | -96.4577 | ES | 80 lf | 0.002 ac | D/T | 80 lf | 0.002 ac | 32.27 | N | n/a |
| OW6 | 33.0086 | -96.4700 | I | n/a | 0.46 ac | n/a | - | 0.00 ac | - | N | n/a |
| FW1 | 33.0115 | -96.4887 | FW | n/a | 1.02 ac | D/T | - | 1.02 ac | 1,371.33 | Y | A, E |
| FW2 | 33.0112 | -96.4874 | FW | n/a | 0.54 ac | D/T | - | 0.54 ac | 871.20 | Y | A, E |
| FW3 | 33.0109 | -96.4861 | FW | n/a | 0.87 ac | D/T | - | 0.87 ac | 1,339.07 | Y | A, E |
| FW4 | 33.0100 | -96.4824 | FW | n/a | 3.55 ac | D/T | - | 3.55 ac | 5,678.94 | Y | A, E |
| FW8 | 33.0081 | -96.4721 | FW | n/a | 0.16 ac | D/T | - | 0.16 ac | 1,629.46 | Y | A, E |
| FW9 | 33.007 | -96.4692 | FW | n/a | 0.09 ac | D/T | - | 0.09 ac | 814.73 | Y | А |
| FW10 | 33.0076 | -96.4589 | FW | n/a | 0.07 ac | D/T | - | 0.07 ac | 80.67 | Y | А |
| FW11 | 33.0075 | -96.4566 | FW | n/a | 1.27 ac | D/T | - | 0.51 ac | 822.80 | Y | A, E |
| EW7 | 33.0076 | -96.4582 | NFW | n/a | 0.31 ac | D/T | - | 0.31 ac | 371.07 | Y | E |

Notes:

- Changes made to the January 2019 submittal are shown in red.
- Open water features: OW1, OW2, OW3, OW4, OW5, OW7, OW8, and OW9; Forested wetlands: FW5, FW6, and FW7; and Emergent wetlands: EW1, EW2, EW3, EW4, EW5, and EW6 were removed from the list because they are no located within the waterline easement.

Summary Table of Single and Complete Crossings

| ^L Waterbody ID ma | y be the name of a feature or an assigned label such as "W-1" for a wetland. | | | | |
|------------------------------|---|--|--|--|--|
| ² Resource Types: | : NFW – Non-forested wetland, FW – Forested wetland, PS – Perennial Stream, IS – Intermittent Stream, ES – Ephemeral Stream, I – Impoundment | | | | |
| ³ Impact Types: | D/P - Direct* and Permanent, D/T - Direct and Temporary, I/P - Indirect** and Permanent, I/T - Indirect and Temporary * Direct impacts are here defined as those adverse affects caused by the proposed activity, such as discharge or excavation. ** Indirect impacts are here defined as those adverse affects caused subsequent to the proposed activity, such as flooding or effects of drainage on adjacent waters of the U.S. | | | | |
| Reasons for PCN | requirement: | | | | |
| | A – Mechanized land clearing in a forested wetland | | | | |
| | B – Require a Section 10 permit | | | | |
| | C – Utility line exceeds 500 feet in waters of the U.S., excluding overhead lines | | | | |
| | D – Utility line is within a jurisdictional area (i.e., water of the U.S.), and the utility line runs parallel to a stream bed that is within that jurisdictional area | | | | |
| | E – The loss of waters of the U.S. exceeds 1/10 acre | | | | |
| | F – Permanent access roads are constructed above grade in waters of the U.S. for a distance of more than 500 feet G – Permanent access roads are constructed in waters of the U.S. with impervious materials | | | | |
| | H – Potential endangered species | | | | |
| | I – Potential historic properties | | | | |
| | J – Discharge into pitcher plant bog or bald cypress-tupelo swamp | | | | |
| | K- Discharge into the area of Caddo Lake within Texas that is designated as a "Wetland of International Importance" under the Ramsar Convention | | | | |
| | L – Required by Regional Conditions | | | | |
| | M – Other | | | | |

Attachment G

REVISED MITIGATION PLAN

Kimley »Horn

Compensatory Mitigation Plan

Project Information

| Project Name: | Wylie-Rockwall-Farmersville 48-Inch Pipeline |
|-------------------|---|
| Applicant: | North Texas Municipal Water District |
| USACE File No.: | SWF-2018-00201 |
| Project Location: | Btwn. Kreymer Lane in Wylie and County Road 484 in Lavon, Collin County, TX |
| Watershed: | East Fork Trinity Watershed (HUC 12030106) |
| County: | Collin County |

Compensatory Mitigation

The proposed project includes open-cut trenching and boring. The East Fork Trinity River (S6) and S8 will be avoided by boring beneath. Impacts to all other features will be limited to the minimum width of temporary construction limits and permanent easement as necessary for the project. The project will minimize impacts to wetlands and will return wetland areas to pre-construction contours and conditions, so these areas can continue to function as wetlands following construction completion. It is anticipated that compensatory mitigation for the impacts to the jurisdictional aquatic resources will be accomplished by purchasing the appropriate number of credits from the Red Oak Umbrella Mitigation Bank (ROUMB). The project site is located within ROUMB's secondary service area.

The East Fork Trinity River (S6) and S8 will be avoided by boring beneath. One open water feature (OW6) will also be avoided by boring beneath. The proposed project would result in open-cut trenching through seven streams resulting in temporary impacts measuring approximately 766.78 linear feet and 0.15 acre. These features will be restored to pre-construction contours and conditions upon project completion. Therefore, no mitigation is proposed for streams or open water features.

The proposed project would result in impacts to eight forested wetlands (6.53 acres) and one emergent wetland (0.31 acres) as a result of open-cut trenching. Following completion of construction activities, impacted wetlands will be restored to pre-construction contours and conditions. Emergent wetlands that will be impacted by the project will continue to function as emergent wetlands following completion of construction activities. Therefore, no mitigation is proposed for the temporary impacts to emergent Forested wetlands that will be impacted by the project will function as emergent wetlands wetlands. following completion of construction activities; however, they will no longer be considered forested wetlands based on tree clearing being required for construction activities. Based on this, the Applicant is proposing to mitigate for the loss of function from a conversion from forested wetlands to emergent wetlands. In order to quantify the required mitigation amount for a loss of function, Kimley-Horn performed a TXRAM analysis on the forested wetlands to be impacted and on the existing emergent wetlands located within an existing overhead powerline easement that will not be impacted by the proposed project. It is anticipated that the TXRAM scores for the existing wetlands within the overhead powerline easement south of the alignment would be sufficient for projecting the anticipated TXRAM scores that the post-construction pipeline easement would achieve. Forested wetlands within the easement that were observed to exhibit similar conditions were grouped into wetland assessment areas. The Applicant proposes to purchase mitigation credits from the Red Oak Umbrella Mitigation Bank

Kimley »Horn

(ROUMB) for the difference in the TXRAM scores between the pre-project forested wetlands and the post-project emergent wetlands. The TXRAM data sheets and scoring sheets are attached for reference.

The table below depicts the proposed number of mitigation bank credits required from the ROUMB determined by the difference in TXRAM scores between the pre-project forested wetlands and the post-project emergent wetlands. Mitigation bank credits will compensate for unavoidable impacts to forested wetlands which will revert to emergent wetlands following project completion.

| Wetland ID | Acres | Pre-Project (Existing) TXRAM Score | Post-Project TXRAM Score | TXRAM Score Delta | Required Credits |
|---|-------|--|--------------------------------|----------------------|---------------------|
| FW1 | 1.02 | 68 | 55 | 13 | 0.1326 |
| FW2 0.54 | | 68 | 55 | 13 | 0.0702 |
| FW3 | 0.58 | 68 | 55 | 13 | 0.0754 |
| FVV3 | 0.29 | 70 | 55 | 15 | 0.0435 |
| | 0.25 | 70 | 55 | 15 | 0.0375 |
| FW4 | 1.65 | 66 | 55 | 11 | 0.1815 |
| | 1.65 | 68 | 55 | 13 | 0.2145 |
| FW8 | 0.16 | 66 | 55 | 11 | 0.0176 |
| FW9 | 0.09 | 68 | 55 | 13 | 0.0117 |
| FW10 | 0.07 | 66 | 55 | 11 | 0.0077 |
| FW11 | 0.23 | 68 | 55 | 13 | 0.0299 |
| EW7 | 0.31 | 55 | 55 | 0 | 0 |
| | 0.68 | | | | |
| ROUMB Secondary Service Area Multiplier | | | | | 1.5 |
| Total Credits Required | | | | | 1.02 |

The Applicant proposes to purchase 1.02 credits from the ROUMB to compensate for the loss of function from forested wetlands (pre-project) being reestablished as emergent wetlands (post-project).

For construction activities in wetlands, the top 6 to 12 inches of the trench will be sidecast and replaced upon completion of the installation of the water line. The trench will not be backfilled in a manner as to drain Waters of the U.S. Heavy equipment working in wetlands may be placed on mats, or other measures will be taken to minimize soil disturbance. Additionally, the easement will be seeded with a wetland native mix following the installation of the pipeline.

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APPENDIX C

ONCOR ELECTRIC DELIVERY ENCROACHMENT AGREEMENT

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ENCROACHMENT ON EASEMENT

WHEREAS, **Oncor Electric Delivery Company LLC** ("**Oncor**"), is the owner of easements in Collin County, Texas, which are recorded in Volume 639, Page 363, Volume 642, Page 151, Volume 515, Page 528, Volume 639, Page 398, Volume 516, Page 54, and Volume 642, Page 153 of the Deed Records of Collin County, Texas ("**Easement**"); and

WHEREAS, **North Texas Municipal Water District** ("**User**"), desires permission to construct, operate and maintain access for a forty-eight (48) inch water line crossing ("**Encroaching Facility**") within the area or boundaries of the Easement ("**Easement Area**").

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Oncor and User do hereby agree as follows:

1. **Location of Encroaching Facility**. User may locate the Encroaching Facility in the Easement Area, but only as described and shown on the attached drawing marked **Exhibit "A"** and incorporated herein. User may not relocate the Encroaching Facility within the Easement Area without the consent and approval of Oncor, which consent and approval shall be at Oncor's sole discretion. User acknowledges and agrees that Oncor holds easement rights on the Easement Area; therefore, User shall obtain whatever rights and permission, other than Oncor's, that are necessary.

2. **Restrictions on Use of Easement Area**. User shall use only so much of the Easement Area as may be necessary to construct, maintain and repair the Encroaching Facility. User shall, at its own cost and expense, comply with all applicable laws, including but not limited to existing zoning ordinances, governmental rules and regulations enacted or promulgated by any governmental authority and shall promptly execute and fulfill all orders and requirements imposed by such governmental authorities for the correction, prevention and abatement of nuisances in or upon or connected with said Encroaching Facility. At the conclusion of any construction, User shall remove all debris and other materials from the Easement Area and restore the Easement Area to the same condition it was in prior to the commencement of User's construction thereon or in proximity thereto.

User shall not place trash dumpsters, toxic substances or flammable material in the Easement Area. Further, if the Easement Area has transmission or distribution facilities located thereon, User shall not place upon the Easement Area any improvements, including but not limited to, buildings, light standards, fences (excluding barriers installed around transmission towers, if applicable), shrubs, trees or signs unless approved in advance in writing by Oncor. Additional general construction limitations on encroachments are described and listed in **Exhibit "B"**, attached hereto and by reference made a part hereof.

3. <u>Maintenance of Encroaching Facility</u>. User, at User's sole expense, shall maintain and operate the Encroaching Facility. Oncor will not be responsible for any costs of construction, reconstruction, operation, maintenance or removal of User's Encroaching Facility.

4. **<u>Risk and Liability</u>**. User assumes all risks and liability resulting or arising from or relating to User's use, the existing condition or location, or existing state of maintenance, repair or operation of the Easement Area. It is further agreed that Oncor shall not be liable for any damage to the Encroaching Facility as a result of Oncor's use or enjoyment of its Easement. Any Oncor property damaged or destroyed by User or its agents, employees, invitees, contractors or subcontractors shall be repaired or replaced by Oncor at User's expense and payment is due upon User's receipt of an invoice from Oncor.

5. <u>Indemnification</u>. User agrees to defend, indemnify and hold harmless Oncor, its officers, agents and employees from and against any and all claims, demands, causes of action, loss, damage, liabilities, costs and expenses (including attorney's fees and court costs) of any and every kind or character, known or unknown, fixed or contingent, for personal injury (including death), property damage or other harm for which recovery of damages is sought or suffered by any person or persons, including claims based on strict liability, arising out of or in connection with User's actions or omissions or the actions or omissions of its officers, agents, associates, employees, contractors or subcontractors or the actions or omissions of any other person entering onto the Easement Area or the Encroaching Facility, **including the negligent actions or omissions of Oncor**, when such actions or omissions relate to User's use of the Easement Area.

6. <u>High Voltage Restrictions</u>. Use of draglines or other boom-type equipment in connection with any work to be performed on the Easement Area by User, its employees, agents, invitees, contractors or subcontractors must comply with Chapter 752, Texas Health and Safety Code, the National Electric Safety Code and any other applicable safety or clearance requirements. Notwithstanding anything to the contrary herein, in no event shall any equipment be within fifteen (15) feet of the Oncor 138,000 volt or less power lines or within twenty (20) feet of the Oncor 345,000 volt power lines situated on the aforesaid property. User must notify the **Region Transmission Office at (972)564-7050** 48 hours prior to the beginning of any work on the Easement Area.

7. <u>Removal by Oncor</u>. If at any time in the future, the Encroaching Facility, in the sole judgment of Oncor, interferes with Oncor's use or enjoyment of its easement rights, Oncor shall have the right to remove said Encroaching Facility. Oncor shall notify User in writing that within 90 days the Encroaching Facility must be removed at User's sole cost. If at the end of the 90 day period the Encroaching Facility has not been removed, Oncor may remove it, at User's expense. Oncor will not be responsible nor will compensation be paid for damages incurred by such removal, including, but not limited to, damages for loss of use of the Encroaching Facility or business interruption. However, in an emergency, Oncor shall have the right to immediately remove the Encroaching Facility. If the Encroaching Facility is removed, Oncor will not unreasonably withhold consent for User to relocate the Encroaching Facility within the Easement Area.

8. **Default and Termination**. It is understood and agreed that, in case of default by User or its agents in any of the terms and conditions herein stated and such default continues for a period of ten (**10**) days after Oncor notifies User of such default in writing, Oncor may at its election forthwith terminate this agreement and upon such termination all of User's rights hereunder shall cease and come to an end. This agreement shall also terminate upon the abandonment of the Encroaching Facility.

This agreement shall extend to and be binding upon User and its successors and assigns, and is not to be interpreted as a waiver of any rights held by Oncor under its Easement.

Executed this ____ day of _____, 2020.

Oncor Electric Delivery Company LLC

Ву:_____

Dennis L. Patton Attorney-In-Fact

North Texas Municipal Water District

By:_____ Name:_____ Title:_____

Encroachment on Easement

| STATE OF TEXAS | S S | |
|----------------|--------|--|
| COUNTY OF | § | |

BEFORE ME, the undersigned authority, on this day personally appeared _____, as the ______ of _____, known to me to be the person whose name is subscribed

to the foregoing instrument and acknowledged to me that he/she executed the same for the purposes and consideration therein expressed, in the capacity therein stated and he/she is authorized to do so.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this _____ day of _____, A. D. 2020.

Notary Public in and for the State of Texas

STATE OF TEXAS

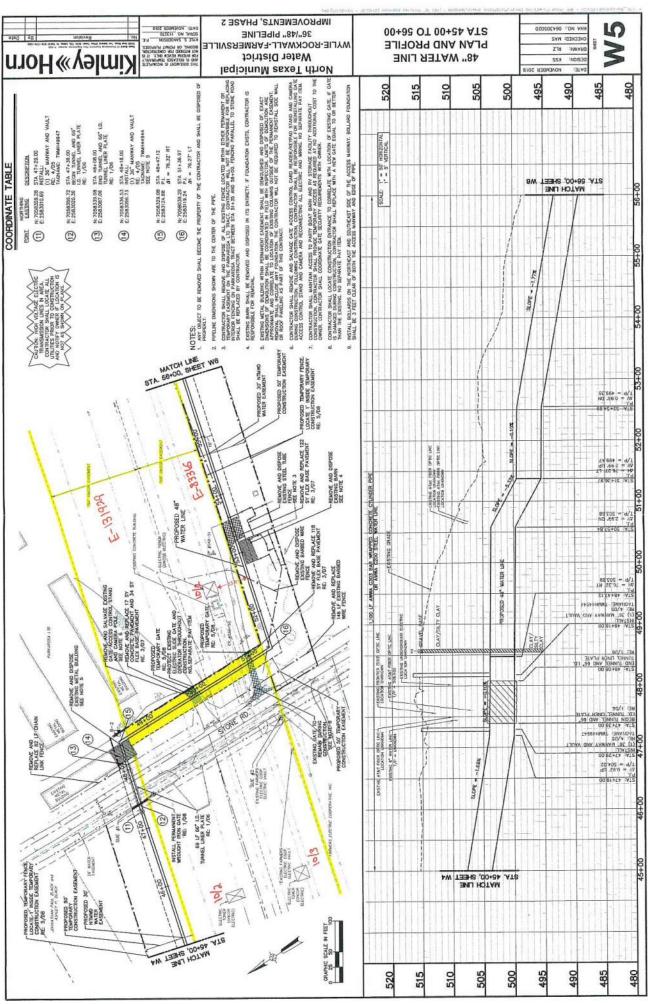
COUNTY OF TARRANT

BEFORE ME, the undersigned authority, on this day personally appeared Dennis L. Patton, as the Attorney-In-Fact of **Oncor Electric Delivery Company LLC**, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated and he is authorized to do so.

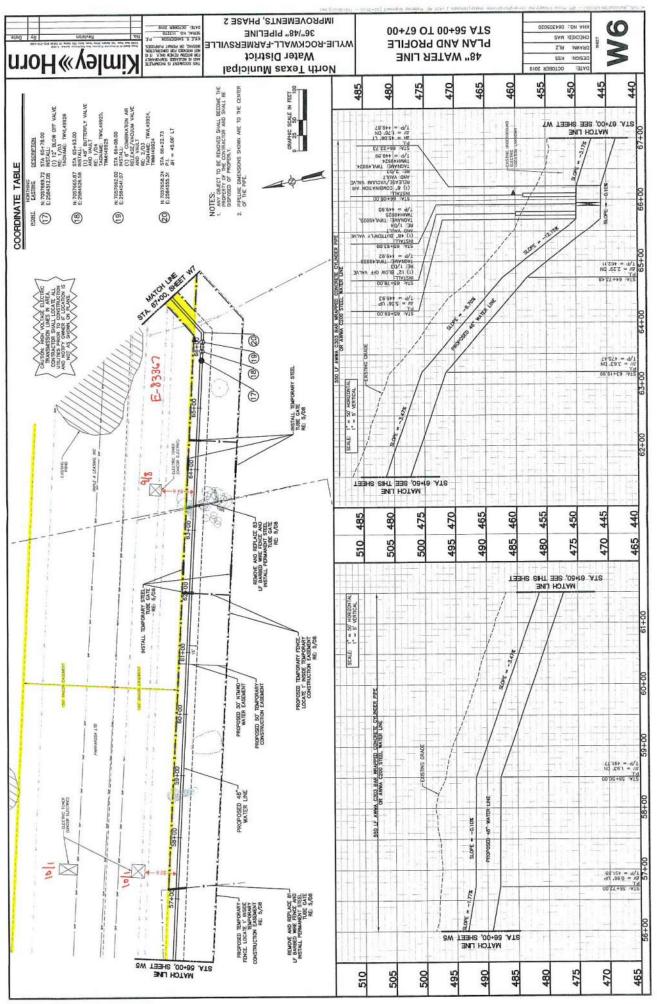
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GIVEN UNDER MY HAND AND SEAL OF OFFICE this _____ day of , A. D. 2020.

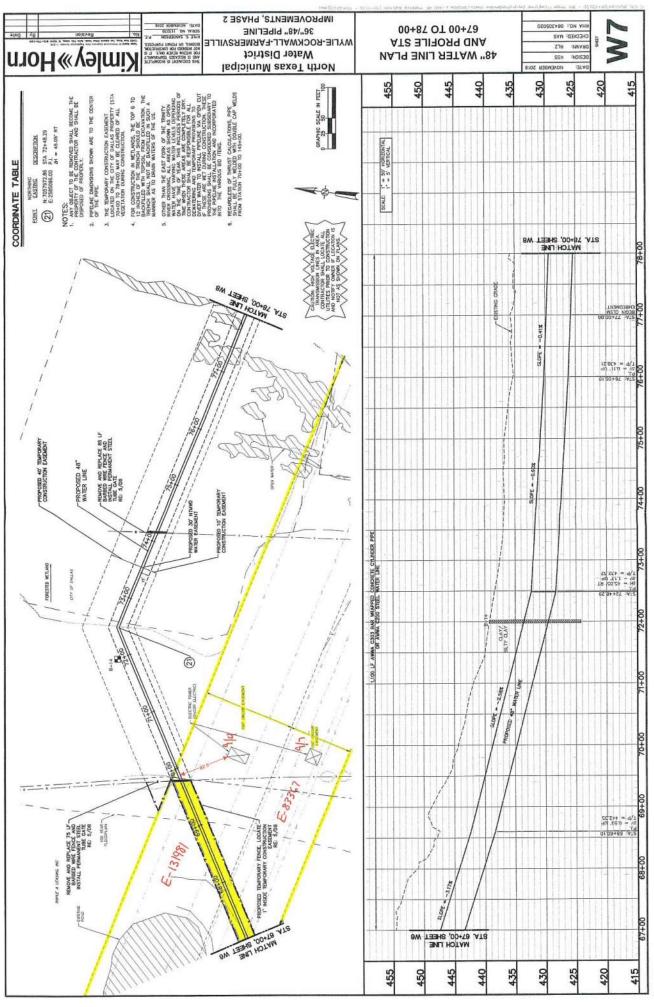
Notary Public in and for the State of Texas



Encroachment on Easement



Encroachment on Easement



CONSTRUCTION LIMITATIONS ON Oncor ELECTRIC DELIVERY COMPANY RIGHT OF WAY EXHIBIT "B"

- 1. You are notified, and should advise your employees, representatives, agents, and contractors, who enter the property that they will be working in the vicinity of high voltage electrical facilities and should take proper precautions, included but not limited to the following stipulations and in compliance, at all times, with Chapter 752, V.T.C.A., Health & Safety Code.
- 2. Blasting is not to be permitted on Oncor right-of-way or under Oncor lines.
- 3. Construction on electric transmission line easements acquired by Oncor after January 1, 2003 shall comply with the requirements of Public Utility Commission Substantive Rules §25.101, as amended from time to time.
- 4. No crossing less than 45 degrees to the centerline of the right-of-way.
- 5. Grading will be done in order to leave the right-of-way as near as possible to present condition. Spoil dirt will be removed from the right-of-way and no trash is to be left on right-of-way. Slopes shall be graded so that trucks can go down the right-of-way when required and such that the slopes can be mechanically maintained.
- 6. Equipment and materials will not be stored on the right-of-way during construction without written approval of the Supervisor of Regional Transmission.
- 7. Street or road crossings are to be based on drawings submitted. Any change in alignment or elevation will be resubmitted for approval.
- 8. No signs, lights or guard lights will be permitted on the right-of-way.
- Power line safety equipment operations: hazard assessment and precautions inside the work zone area must be performed and in compliance with OSHA Standard §1926.1408 at all times. Equipment shall not be placed within fifteen (15) feet of the Oncor 138,000 volt or less power lines or within twenty (20) feet of the Oncor 345,000 volt power lines.

- 10. Any pre-approved fencing will not exceed eight (8) feet in height, and if metal in nature, will be grounded, at ten (10) feet intervals, with an appropriate driven ground. Gates should be at least sixteen (16) feet in width to allow Oncor access to the right-of-way.
- 11. No dumpsters will be allowed on Oncor right-of-way or fee owned property.
- 12. Draglines will not be used under the line or on Oncor right-of-way.
- 13. The existing grade shall not be disturbed, excavated or filled within 25 feet of the nearest edge of any Oncor transmission structure (tower, pole, guy wire, etc...).
- 14. Right-of-way will be protected from washing and erosion by Oncor approved method before any permits are granted. No discharging of water will be allowed within any portion of the right of way. Drainage facilitation will not be allowed to discharge into/onto Oncor right-of-way.
- 15. No obstruction shall be installed on the right-of-way that would interfere with access to Oncor structures or prevent mechanical maintenance.
- 16. Before any work is done under Oncor lines or by Oncor structures notify the Region Transmission Department, (972)564-7050.
- 17. No hazardous materials will be stored on the right of way.
- 18. For purposes of this document, "Hazardous Materials" means and includes those substances, including, without limitation, asbestos-containing material containing more than one percent (1%) asbestos by weight, or the group of organic compounds known as polychlorinated biphenyls, flammable explosives, radioactive materials, chemicals known to cause cancer or reproductive toxicity and includes any items included in the definition of hazardous or toxic waste, materials or substances under any Hazardous Material Law. "Hazardous Material Laws" collectively means and includes any present and future local, state and federal law relating to the environment and environmental conditions including, without limitation, the Resource Conservation and Recovery Act of 1976 ("RCRA"), 42 U.S.C. §6901 <u>et seq.</u>, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, ("CERCLA"), 42 U.S.C. §§9601-9657, as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), the Hazardous Material Transportation Act, 49 U.S.C.

§6901 <u>et seq</u>., the Federal Water Pollution Control Act, 33 U.S.C. §1251, <u>et seq</u>., the Clean Air Act, 42 U.S.C. §741 <u>et seq</u>., the Clean Water Act, 33 U.S.C. §7401 <u>et seq</u>., the Toxic Substances Control Act, 15 U.S.C. §§2601-2629, the Safe Drinking Water Act, 42 U.S.C. §§300f-330j, and all the regulations, orders, and decrees now or hereafter promulgated thereunder.

- 19. Brush and cut timber is not to be piled or stacked on Oncor right-of-way nor is it allowed to be burned upon or in close proximity to the conductors or towers.
- 20. No structures or obstructions, such as buildings, garages, barns, sheds, swimming pools, playground equipment, guard houses, etc., will be permitted on the right-of-way.
- 21. Landscaping on Oncor right-of-way is permitted when Oncor approves landscaping plans in writing. No lighting or sprinkler systems are allowed on the right-of-way.
- 22. No park or park designation will be permitted on the right-of-way.
- 23. Gas Pipeline Protective Barrier; Grantee, at Grantee's sole expense, shall provide one of the following protective barriers; **1**) a concrete protective barrier between the surface and the pipe that is a minimum of one (1) foot thick by one (1) foot wide, if pipe is wider than one (1) foot, then width of pipe, with the top of the concrete barrier to be at least one (1) foot below the surface or final grade, **2**) construct the gas pipeline inside of a proper protective steel casing, **3**) where electric facilities are located above ground, install the pipeline a minimum of ten (10) feet below the ground surface, or **4**) where electric facilities are located below ground, install the pipeline at a depth that provides for a minimum of a ten (10) foot clearance between the pipeline and the underground electric facilities.
- 24. No fire hydrants or manholes will be permitted within the right-of-way.
- 25. Any drainage feature that allows water to pond, causes erosion, directs stormwater toward the right-of-way or limits access to or around Oncor's facilities is prohibited. Drainage facilitation will not be allowed to discharge into/onto Oncor right-of-way.
- 26. No boring pits or other type of pits will be permitted within the right-of-way.

APPENDIX D

ONCOR ELECTRIC DELIVERY INGRESS/EGRESS AGREEMENT

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March 23, 2020

- To: Kara Byrnes North Texas Municipal Water District
- Re: Temporary Ingress, Egress along a portion of Oncor Electric Delivery Company Easement Property E-131995 and E-131982 situated on the Royse – NW Carrollton 345Kv Transmission Right of Ways, Collin County, Texas.

Dear Kara:

This letter will evidence the temporary workspace between **Oncor Electric Delivery LLC.** ("Oncor") and **North Texas Municipal Water District**, its contractors and representatives ("Permitee") with respect to the temporary usage of Oncor's Transmission right of way ("Property") as shown on the attached Exhibit "A".

- 1. Subject to the terms hereof, Oncor consents to Permitee the temporary usage of its Property described above and as shown on the attached drawing for a period of (360) days beginning on August 1, 2020.
- 2. Permitee acknowledges that Oncor's consent will automatically terminate if and when Permitee's usage shall fail to conform with all applicable safety standards and electrical codes, laws, ordinances and regulations from time to time in effect, or (b) in the sole judgement of Oncor, the usage shall impair, endanger or interfere with the construction, efficiency or convenient operation and maintenance of Oncor's facilities located within the Property or Permitee shall fail to conform with the terms of this agreement.
- 3. Permitee shall not be allowed to drive or place equipment within 25' of any tower, pole or structure. Boom-type equipment, the storing of equipment, the piling of dirt and debris is not allowed on the Property.
- 4. Oncor shall continue to have unrestricted access to, on and across the Property.
- 5. Permitee acknowledges and understands that Oncor maintains overhead and/or underground electrical facilities within the Property. Permitee agrees to exercise extreme caution with respect to such electrical facilities.

- 6. Permitee agrees to and shall indemnify, hold harmless and defend Oncor, its officers, agents and employees, from and against any and all claims, demands, losses, costs, damages, causes of action, suits and liability of any kind, including all reasonable expenses of litigation, court costs and attorneys' fees, for injury to or death of any person, or for damages to Permitee's property or to any other property, arising out of or in any way resulting, directly or indirectly, from or incident to any activity, circumstance or condition connected with, Permitee's use of the Property, the operation or existence of Oncor's facilities on the Property or Oncor's failure to cause Permitee to remove itself or equipment from the Property, including but not limited to, such claims, demands, causes of action, suits and liability resulting from the sole or concurrent negligence, strict liability or other fault of Oncor.
- 7. Upon termination of this agreement, Permitee agrees to restore the Property to its original condition.

Accepted By:

North Texas Municipal Water District

By : _____

Title :_____

Approved By:

Oncor Electric Delivery Company LLC

| By: | | | | | |
|-----|--|--|--|--|--|
| | | | | | |

| Title: | | | |
|--------|--|--|--|
| | | | |



Exhibit A (Page 1 of 2)

NOTICES: The entirety of this graphical representation is confidential and proprietary to Oncor, contains Oncor Critical Energy Infrastructure Information, and may not be duplicated or distributed unless authorized. This representation is provided for reference purposes only and is not representative of actual size or scale. The underlying map image is copyrighted and owned by ESRI and/or its licensors. The foregoing notices may not be removed or obscured. Convrided for reference purposes only and is not representative of actual size or scale. The underlying map image is copyrighted and owned by ESRI and/or its licensors. The foregoing notices may not be removed or obscured. Convrident: @2013 EsrI I Convrident: @2014 EsrI I Convrident:

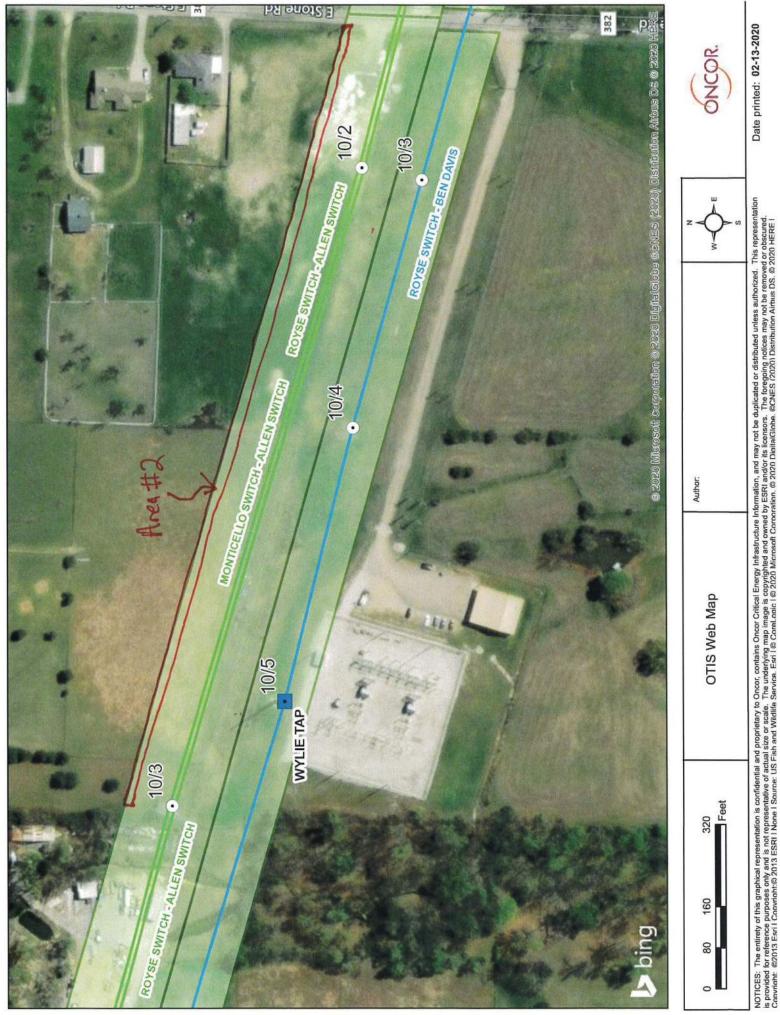


Exhibit A (Page 2 of 2)

APPENDIX E

GARLAND POWER AND LIGHT ENCROACHMENT AGREEMENT



Encroachment License Agreement

This Encroachment License Agreement ("Agreement") made and entered into this 25 [#] day of <u>February</u> 2020, by and between North Texas Municipal Water District (hereinafter referred to as NTMWD) and (hereinafter referred to as "**Owner**") whose address is 505 E. Brown Street, Wylie, Texas 75098 and **City of Garland, Texas**, a Texas home-rule municipality doing business as Garland Power & Light (hereinafter referred to as "GP&L") whose address is 217 N. 5th Street, Garland, Texas 75040.

WHEREAS, GP&L is the holder of an easement in Collin County, Texas, which is recorded as Instrument No. N/A, or, in the alternative, at Volume 513, Page 369 of the Real Property Records of Collin County, Texas ("Easement"); and North Texas Municipal Water District ("Owner"), desires an Encroachment License Agreement to install a new 48 inch water line in E.T.J. Collin County, Texas from GP&L northern easement limits at Point Seven X=2,591,731.80, Y=7,055,768.84 Station 144+54.32 to GP&L southern easement limits at Point Eight X=2,591,761.86, Y=7,055,714.14 Station 145+17.36. License Agreement includes a NTMWD 30-foot wide easement within the 60-foot wide GP&L easement from Point One X=2,591,716.59, Y=7,055,765.38, Point Two X=2,591,746.65, Y=7,055,710.69, Point Three X=2,591,747.02, Y=7,055,772.30 and Point Four X=2,591,777.08, Y=7,055,717.60. License Agreement also includes a temporary NTMWD 10-foot wide work space to be abandoned upon completion of the placement of the water line installation activities from Point Five X=2,591,757.16, Y=7,055,774.60 and Point Six X=2,591,787.22, Y=7,055,719.90 to Point Three X=2,591,747.02, Y=7,055,772.30 and Point Four X=2,591,777.08, Y=7,055,717.60 per GP&L Exhibit Coordinates within a portion of the Easement (hereinafter referred to as "Encroachment").

NOW, THEREFORE, in consideration of the mutual covenants set forth herein, GP&L and Owner do hereby agree as follows:

 For and in consideration of the sum of Ten and No/100 Dollars (\$10.00), payment of which is hereby acknowledged, and such other good and valuable consideration, GP&L hereby grants Owner a license to install the Encroachment within the Easement, subject to the terms and conditions herein ("License").

- 2. Owner may locate the Encroachment in the Easement Area as described and shown on the attached drawing marked GP&L Transmission Easement and Proposed NTMWD Easement and Temporary Workspace, W.A.S. Bohannan Survey, ABST. No. 121, E.T.J. of Wylie, Collin County, Texas Exhibit dated 1/5/2020 and NTMWD Wylie-Rockwall-Farmersville 36"/48" Pipeline Improvements, Phase 2 Kimley-Horn's 48" Water Line Plan & Profile Station 134+50 to Station 146+00 Sheet W13, KHA NO: 064305020 dated January 2020 and incorporated herein. Owner may not relocate the Encroachment within the Easement Area without the consent and approval of GP&L, which consent and approval shall be at GP&L's sole discretion.
- 3. Owner shall occupy only as much of the Easement Area deemed necessary to maintain the Encroachment. Owner shall, at its own cost and expense, comply with all applicable laws, including but not limited to existing zoning ordinances, governmental rules and regulations enacted or promulgated by any governmental authority and shall promptly execute and fulfill all orders and requirements imposed by such governmental authorities for the correction, prevention and abatement of nuisances in or upon or connected with said Encroachment. Owner shall obtain, at its sole cost and expense, any and all land rights necessary for Owner's construction and operation of the Encroachment.
- 4. Owner shall maintain the Encroachment at Owner's sole expense. GP&L will not be responsible for any costs pertaining to construction, maintenance or removal of Owner's Encroachment.
- 5. Owner shall not make any improvements to the Easement Area without the consent of GP&L, which consent shall be at GP&L's sole discretion.
- 6. Owner agrees that, if in the future GP&L, in its sole discretion, determines the Encroachment interferes with GP&L's use or enjoyment of its easement rights, GP&L shall have the right to revoke this License and require removal of the Encroachment at Owner's expense. GP&L will notify Owner in writing of such determination. Owner will have 90 days to remove the Encroachment. If upon passage of 90 days the Encroachment has not been removed by Owner, GP&L will remove the Encroachment at Owner's Expense.
- 7. OWNER HEREBY AGREES TO INDEMNIFY AND HOLD HARMLESS GP&L, ITS OFFICERS, AGENTS AND EMPLOYEES FROM AND AGAINST ANY AND ALL LIABILITIES, DAMAGES, CLAIMS, COST AND EXPENSES, INCLUDING ATTORNEY'S FEES, WHICH MAY BE IMPOSED UPON OR ASSERTED AGAINST GP&L, ITS OFFICERS, AGENTS AND EMPLOYEES ARISING FROM IN ANY WAY CONNECTED

WITH THE INSTALLATION, DESIGN, MAINTENANCE AND USE OF THE ENCROACHMENT WITH THE EASEMENT, OR ARISING FROM OR IN ANY WAY CONNECTED WITH ANY REMOVAL OR RELOCATION, IN WHOLE OR IN PART, OF THE ENCROACHMENT.

Use of draglines or other boom-type equipment in connection with any work to be performed on the GP&L easement by Owner, its employees, agents, invitees, contractors or subcontractors must comply with Chapter 752, Texas Health Safety Code, the National Electric Safety Code and any other applicable safety or clearance requirements. Notwithstanding anything to the contrary herein, in no event shall any equipment be within twenty (20) feet of GP&L power lines situated on the aforesaid property. Owner must notify the Transmission Manager at (972) 205-3470 or by email at ROW@gpltexas.org and receive written reply of confirmation from the GP&L Transmission Department prior to the commencement of any work in Easement area or the use of any boom-type equipment on the GP&L easement.

- 8. Owner may, with GP&L's prior approval, transfer this License to a subsequent landowner, but only upon Owner's sale or transfer of the ownership interest in the underlying real property. The transferee shall be bound to all terms and conditions of this License. In the event that Owner sells or otherwise transfers the underlying real property (including transfers through heirship or by any other means) without first obtaining GP&L's approval, this License shall expire 90 days after Owner ceases to own the underlying real property.
- GP&L shall send all notices required under the terms of this Agreement to the current landowner identified in the Real Property Records of Dallas County, Texas. Owner shall send all notices required under this Agreement to contact at <u>ROW@gpltexas.org</u>.

Approval:

City of Garland ("GP&L) By: Name: Dreve N Title: Transmission Services Director

State of Texas County of Dullas

| This instrument was acknowledged before me on <u>February 25</u> , 20 <u>20</u> by MARIA RAMIREZ NOTARY PUBLIC STATE OF TEXAS MY COMM. EXP. 06/13/23 NOTARY ID 13204928-2 | | |
|--|---|---|
| NOTARY PUBLIC STATE OF TEXAS MY COMM. EXP. 06/13/23 | This instrument was acknowledged | before me on <u>February 25</u> , 20 <u>20</u> by |
| | NOTARY PUBLIC STATE OF TEXAS MY COMM. EXP. 06/13/23 | Notary Public's Signature |

Name of Owner By:

Name: Cesar Baptista

Title: Deputy Director

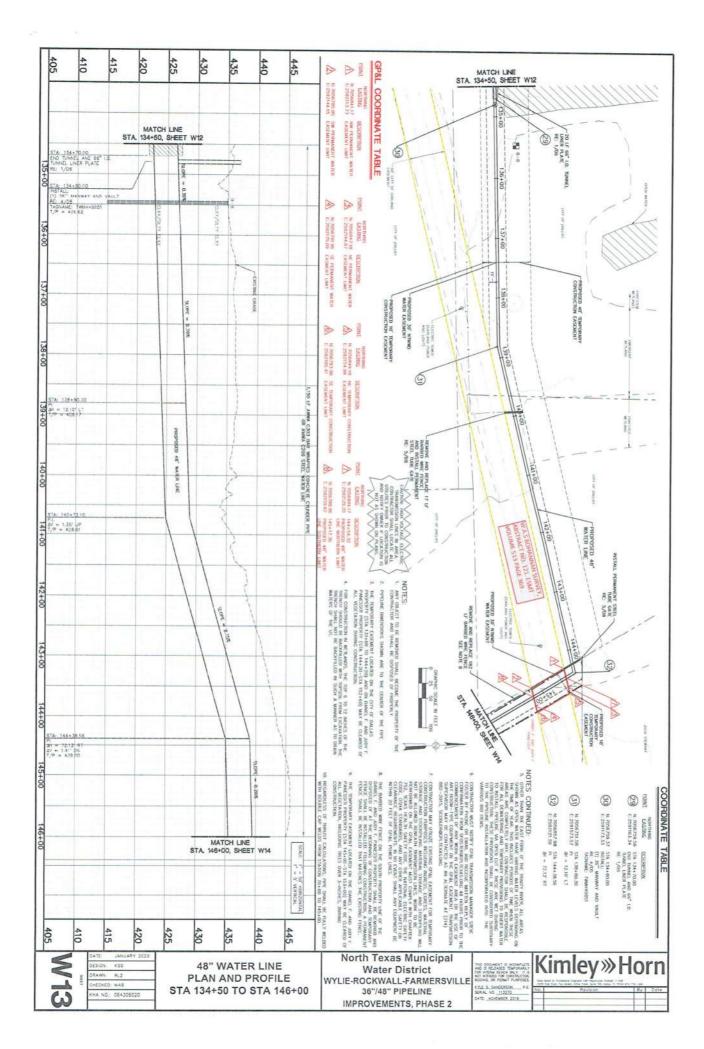
State of Texas County of ______

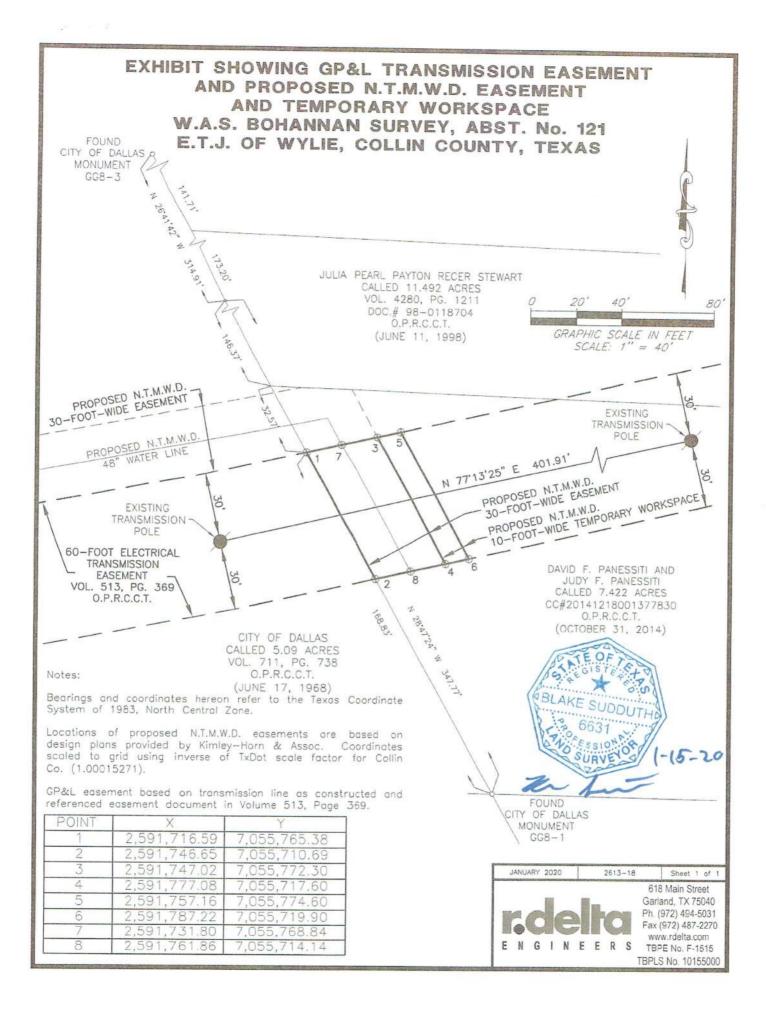
Accepted:

This instrument was acknowledged before me on <u>February 20</u>, 20<u>20</u> by <u>Ceran Baptista</u>.

LEANN BUMPUS Notary Public, State of Texas Comm. Expires 05-18-2020 Notary ID 10188600

Notary Public's Signature





ENDS EAST OF 5H. 205 THE STATE OF TEXAS, KNOW ALL MEN BY THESE PRESENTS: COUNTY OF COLLIN THAT Giln Payton and wife, Frances SueCounty, Texas, hereinafter called "Grantor", whether one or more, for a good and valof Tarrant and another and a state of Texas, of Greenville, Texas, an essential and right of way for the purpose of construct-ing, operating and maintaining an electric transmission or essential time on, over and actast Gruntor's land W. A. S Bohanan Survey. Abstract to 12 Collin more particularly described in down tranking & Daugherty it up to arthur Ellen Payton cords of said County, and containing...... acres. Tract No enter line of said electric transmission or distribution line shall be located across said land as follows:
 Tract No Electron the North of entrance in the North property line, said point being 162 feet East from the Northwest property corner; Thence South 72° OB1 Wast for a distance of 19h feet to a point of exit in the West property line, said point being 172 foot South from the Northwest property corner of the above described property. 57 feet South from the Northwest property corner of the above described property. Tract No. 2 No. 2 BEGINWINO at a point of entrance in the East property line, said point being 97 feet South from the Northeast property corner; Thence South 72° 08: West for a dis-tance of JOS feet to an angle point; Thence South 13° 30: East for a distance of 60 feet for guying purposes. Beginning again at said angle point and continuing South 80° 52! West for a distance of 2354 feet to a point of exit in the West pro-perty line, seld point being 59 feet North from the Southwest property corner of the above described property. For the consideration of the sum of One Hundred and Fifty Dollars (\$150.00), the receipt of which is hereby acknowledged, in addition to the enumerated rights and privileges granted herein, said Grantee shall have the right to erect 13 electric power poles, two guy wires, and appurtenances on the premises heretofore described; and the further consideration of the sum of One Thousand Three Hundred Fifty and no/100 (\$1,350.00) DOLLARS, as severance damages to the tract or tracts of land owned in fee by the Grantors herein. Grantor eccognizes that the general course of said line, as above described, is based upon a preliminary survey, and it is understood that the City may relocate said line in the same general direction before or at any

time after construction. Togethes with the right of ingress and egress over Grantor's adjacent lands to or from said right of way for the purpose of constructing, improving, reconstructing, repairing, inspecting, patrolling, maintaining, and removing said line and appurtenances; the right to relocate said line in the same rubative position to any adjacent road ment of the City, necessary to prevent the route down trees or shrubbery to the extent, in the sole judgehazards thereto, and the right to remove, or prevent the construction of. for a distance of 30 feet on each side of the actual center of said line, any or all buildings, structures or other obstructions which, in the sole judgehazards thereto, and the right to remove, or prevent the construction of. for a distance of 30 feet on each side of the actual center of said line, any or all buildings, structures or other obstructions which, in the sole judgement of purtnances. If such buildings, structures, or other obstructions are constructed by Grantor within the 60 foot space such space and Grantor agrees to pay to the City the reasonable cost of such movel, and the sugreement, together with the other provisions of this grant, shall constitute a covenant running with the land for the benefit of the City, its curcessors and assigns.

The right is reserved by Grantor to use the land within the 50 foot space above described for general agricultural and grazing purposes provided such use shall not include the growing of trees thereon or any other use granted. The Grantee however, will pay to the owner of the land for actual damages to fences, the land and inc.

TO HAVE AND TO HOLD the above described easement and rights unto said City of Greenville, its succes sorts and assigns, until said line shall be aliandoned.

And Grantus does hereby hind himself, bit heirs and legal representatives, to warrant and Forever Defend all and singular the abuve described easement and rights unto the rand City, its successors and assigns, against every person whomselver lawfully channed as to clean the same or any part theref.

| EXECUTED this 12 day of March A/0)19.55 | |
|---|------|
| WITNESSED, BY: (len fayton) | |
| Francial flere Youten | 1 |
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| | ···· |
| E40 000 260 | |

JOINT ACKNOWLEDGMENT THE STATE OF TEXAS. BEFORE ME, the undersigned, a Notary Public COUNTY OF. TARRANT in and for sold County, Tesar on this day personally appeared Olin Payton and Francos Sue Payton his wife, both known to me to be the persons whose names are subscribed in the foregoing instrument, and seknowledged to me that they each executed the same for the imposes and consideration therein expressed, and the examined by mn privily and apart from her husband, and having the same fully explained to her, she, the said Frances Sue Payton _____ acknowledged such instrument to be her set and deed and the de clared that vine had willingly signed the same for the purposes and consideration therein expressed, and that she did not wish to retract d. 1 GIVEN UNDER MY HAND AND SEAL OF OFFICE. This 12 day of March A. D. 1956 Notary Public, Tairant County, Teras 1. (fir S.) CORPORATION ACKNOWLEDGMENT THE STATE OF TEXAS. BEFORE ME, the undersigned, a Notary Public. COUNTY OF , in and for said County, Texas, on this day personally appeared known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said a corporation, and that he executed the same as the act of such corporation for the purposes and consideration increin expressed, and in the capacity therein stated. A D 19 (L. S.) FILE FOR RECORD 26 DAY OF MALA. D. 195 Gat 4 RECORDED 27 DAY OF MALA. D. 185 FILE FILE NUMBER als) Deputy

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Filed and Recorded Official Public Records Stacey Kemp, County Clerk Collin County, TEXAS 02/26/2020 01:55:27 PM \$58.00 TBARNETT 20200226000271420



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APPENDIX F

COLLIN COUNTY ROW PERMIT

NOTICE OF PROPOSED UTILITY LINE ACTIVITY

| * Required Submitted to Collin County Inspector/Engineer on | 4/16/20 | |
|--|---------|--|
| * <u>Required</u> Construction of this line will begin on or after | 8/3/20 | |

UTILITY COMPANY NAME: NORTH TEXAS MUNICIPAL WATER DISTRICT

| Contractor Company Name: | |
|--------------------------|--|
| Address: | |
| City, State, Zip: | |
| Phone: | |
| Fax: | |
| Contact Name and Phone: | |
| | |

Proposes to place a line within the road right-of-way of: CR 484

The contractor will use Best Management Practices to minimize erosion and sedimentation resulting from the installation, and will re-vegetate the project area.

The contractor will insure that traffic control devices complying with the applicable portions of the Texas Manual on Uniform Traffic Control Devices will be installed and maintained for the duration of the work involved for this installation.

*Drawings are required. The location and description of the proposed line, along with any appurtenances, is more fully shown on the attached drawings. Drawings will show closest address(s) to the project location.

The installation shall not damage any part of the roadway and adequate provisions must be made to cause

minimum inconvenience to the public. Any lines that are to be installed within a drainage ditch to include the front and back slopes is to be installed via bore. Any and all damage to the roadway and drainage areas are to be repaired by the contractor within 30 days of the end of the project. In the event the contractor fails to comply with any or all of the requirements as set forth herein, the County may take such action, as it deems appropriate to compel compliance at all times.

COLLIN COUNTY OFFICE USE ONLY

APPROVAL

Collin County offers no objections to the location of the proposed utility facility except as noted below.

Please notify the Collin County Utility Construction Inspector forty-eight (48) hours prior to construction beginning at (972) 548-3700 or cell (214) 686-0107 or the permit will be <u>VOIDED</u>.

| Collin County Permit Number: _ | 4-24-20-1699 | | |
|--------------------------------|--------------|-------|---------|
| Issued By: Tony Cook | | Date: | 4-24-20 |