

**GALVESTON COUNTY
PURCHASING DEPARTMENT**



INVITATION TO BID

BID #B171025

CDBG ROUND 2.2 I-45 WATERLINE PROJECT

BID DUE DATE: 10/12/2017

2:00 P.M.

***Rufus Crowder, CPPO, CPPB
Purchasing Agent
Galveston County
722 Moody (21st Street)
Fifth (5th) Floor
Galveston, Texas 77550
(409) 770-5372***

ITB #B171025
OPENING: 10/12/2017
TIME: 2:00 P.M.



**INVITATION TO BID
CDBG ROUND 2.2: I-45 WATERLINE PROJECT
GALVESTON COUNTY, TEXAS**

Sealed bids in sets of five (5), one (1) original and four (4) copies, will be received in the office of the Galveston County Purchasing Agent until 2:00 P.M. CST, on Thursday, October 12, 2017 and opened immediately in that office in the presence of Galveston County Auditor and the Purchasing Agent. Sealed qualifications are to be delivered to Rufus G. Crowder, CPPO CPPB, Galveston County Purchasing Agent at the Galveston County Courthouse, 722 Moody, (21st Street), Floor 5, Purchasing, Galveston, Texas 77550, (409) 770-5372. The time stamp clock located in the Purchasing Agent's office shall serve as the official time keeping piece for this solicitation process. Any bid received after 2:00 P.M., CST on the specified date will be returned unopened.

Purpose:

Install a new adequately sized looped water line system. Work includes installing new water line, air release valves, blow off valves, gate valves, reconnect service lines, provide other associated appurtenances, and perform site work associated with construction, including but not limited to: tree removal, trenching, fencing and fencing replacement.

All bids must be marked on the outside of the envelope:

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Bidder's name, return address, should be prominently displayed on the bid package for identification purposes.

Specifications can be obtained at the office of the Galveston County Purchasing Agent, located in the Galveston County Courthouse, 722 Moody, (21st Street), Floor 5, Purchasing, Galveston, Texas, 77550, or by visiting the Galveston County website @ <http://www.galvestoncountytexas.gov/pu/Pages/BidListings.aspx>.

Submitted prices shall be either lump sum or unit prices as shown on bid sheets, if applicable. The net price shall be delivered to Galveston County, including all freight, shipping, and license fees. Galveston County is tax exempt and no taxes should be included in bid pricing.

A non-mandatory pre-bid conference will be held on Thursday, September 21, 2017 at 2:00 P.M. at the Galveston County Courthouse, Purchasing Department, 722 Moody (21st Street), Fifth (5th) Floor, Galveston, Texas 77550.

Plans and specifications may be obtained from the office of the Engineer at 1710 Seamist Drive, Houston, TX 77008 upon a **NON-REFUNDABLE** payment of Fifty dollars (\$50.00) for each set or provided free of charge in electronic format (PDF) on CD or DVD. Copies of bid/Contract Documents may also be obtained from www.Civcast.com search Galveston County I-45 Water Line Project. Bidders must register on this website in order to view and/or download specifications and plans for this project. There is NO

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charge to view or download documents. If copies of the bidding documents are to be mailed, please contact Binkley & Barfield, LLC for postage and handling. Return of documents is not required and no refund will be granted.

Upon satisfaction of contractual terms (e.g., goods delivered in promised condition, services rendered as agreed, etc.), contractor shall be paid via Galveston County's normal accounts payable process.

Bonding Requirements:

- **BID GUARANTEE:** Evidencing its firm commitment to engage in the contract if Bidder is selected for award of contract, each Bidder is required to furnish with their bid a Cashier's Check, or an acceptable Bidder's Bond, in the amount of five percent (5%) of the total contract price. The Bidder's Bond must be executed with a surety company authorized to do business in the State of Texas. Failure to furnish the bid/proposal guarantee in the proper form and amount, by the time set for opening of bids may be cause or rejection of the bid.
- **PERFORMANCE AND PAYMENT BONDS:** Successful bidder, before beginning work, shall execute a performance bond and a payment bond, each of which must be in the amount of the contract. The required payment and performance bonds must each be executed by a corporate surety in accordance with Section 1, Chapter 87, Acts of the 56th Legislature, Regular Session, 1959 (Article 7.19-1, Vernon's Texas Insurance Code).

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

The Galveston County Commissioners' Court reserves the right to waive any informality and to reject any and all bids and to accept the bid or bids which, in its opinion, is most advantageous to Galveston County with total respect the governing laws.

All contractors/subcontractors that are debarred, suspended or otherwise excluded from or ineligible for participation on federal assistance programs may not undertake any activity in part or in full under this project

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

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**GENERAL PROVISIONS – INVITATION TO BID
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1. BID PACKAGE

*The Invitation to Bid, general and special provisions, drawings, specifications/line item details, contract documents and the Bid sheet are all part of the Bid package. **BIDs must be submitted in sets of four (4), one (1) original and three (3) copies** on the forms provided by the County if County forms are provided, including the Bid sheets completed in their entirety and signed by an authorized representative by original signature. Failure to complete and sign the Bid sheets/contract page(s) may disqualify the Bid from being considered by the Commissioners' Court. Any individual signing on behalf of the Bidder expressly affirms that he or she is duly authorized to tender this Bid and to sign the Bid sheet/contract under the terms and conditions in this bid on behalf of the Bidder and to bind the Bidder to the terms and conditions of this bid and the Bidder's response hereto. Bidder further understands that its' signing of the contract shall be of no effect unless the contract is subsequently awarded by the Commissioners' Court and the contract properly executed by the Commissioners' Court. All figures must be written in ink or typed. Figures written in pencil or with erasures are not acceptable. However, mistakes may be crossed out, corrections inserted, and initialed in ink by the individual signing the bid. If there are discrepancies between unit prices quoted and extensions, the unit price shall prevail. Each Bidder is required to thoroughly review this entire Bid package to familiarize themselves with the Bid procedures, the plans and specifications for the requested work, as well as the terms and conditions of the contract the successful Bidder will execute with the County.*

2. BIDDER'S RESPONSIBILITY

The Bidder must affirmatively demonstrate its responsibility. The Bidder must also meet the following minimum requirements:

- A. have adequate financial resources or the ability to obtain such resources as required;
- B. be able to comply with all federal, state, and local laws, rules, regulations, ordinances and orders regarding this Invitation to Bid;
- C. have a satisfactory record of performance;
- D. have a satisfactory record of integrity and ethics; and
- E. be otherwise qualified and eligible to receive an award.

3. TIME FOR RECEIVING BIDS

Bids may be submitted by mail or hand delivery and **must be submitted to the Galveston County Purchasing Agent**. If by delivery, the Bidder must deliver to the reception desk in the County Purchasing Agent's Office. The delivery and mailing instructions for the Galveston County Purchasing Agent are the following:

**Rufus Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550**

Bids will **not** be accepted by facsimile transmission or by electronic mail (email) unless superseded by instructions within the Special Provisions sections of this solicitation. Bids must be received by the County Purchasing Agent on or before the deadline for the opening of the bids. For clarity, mailing date/postmark is **not** sufficient – bids **must be received** by the County Purchasing Agent on or before the deadline. Late bids will not be accepted and will be returned to the bidder unopened. Bids received prior to the submission deadline will be maintained unopened until the specified time for opening.

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The County Purchasing Agent will accept bids from 8:00 a.m. to 5:00 p.m. on each business day up to the submission deadline. Business days do not include Saturdays and Sundays, and do not include other days in which the County is closed for business in observance of holidays or for other reasons.

The time-stamp clock within the County Purchasing Agent's Office shall be the official time-clock for the purpose of this solicitation and thus shall be the determinant of whether the bid was timely received.

The bidder should prominently identify the procurement number and name on the outside of the envelope/ mailing package. A label shall be provided for this purpose and usage of the label is preferred. If the bidder fails to identify the bid on the outside of the envelope as required, the Purchasing Agent will open the envelope for the sole purpose of identifying the bid number for which the submission was made. The envelope will then be resealed. No liability will attach to a County office or employee for the premature opening of a bid.

If a bid is not submitted, return this Invitation to Bid and state reason (s), otherwise your name may be removed from the Purchasing Agent's mailing list.

4. COMPETITIVENESS, INTEGRITY, INQUIRIES AND QUESTIONS

To prevent biased evaluations and to preserve the competitiveness and integrity of the procurement process, **bidders are to direct all communications regarding this invitation to bid only to the Galveston County Purchasing Agent**, unless otherwise specifically noted.

Do not contact the requesting department. Attempts by offering firms to circumvent this requirement will be viewed negatively and may result in rejection of the bid of the firm found to be in non-compliance.

All questions regarding this Invitation to Bid must be submitted in writing to:

**Rufus Crowder, CPPO CPPB, Purchasing Agent
722 Moody
Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997
E-mail: rufus.crowder@co.galveston.tx.us**

All questions received and the responses thereto will be mailed, emailed, or faxed to all prospective bidders by addendum. No inquiries except clarification of instructions will be addressed by telephone.

Bidder is advised to carefully review this Invitation to Bid – it provides specific information necessary to aid participating firms in formulating a thorough response. Bidder's failure to examine all documents shall not entitle the bidder to any relief from the conditions imposing in the Invitation to Bid and the resultant contract.

An authorized person from the bidder must sign the bid. This signatory must be a person from the submitting firm who is duly authorized to tender and sign the bid on behalf of the bidder and to bind the bidder to the terms and conditions of this Invitation to Bid, the bidder's response, and all other terms and conditions of the contract. By this signature, the bidder further acknowledges that the bidder has read the bid documents thoroughly before submitting a bid and will fulfill the obligations in accordance to the terms, conditions, and specifications detailed herein.

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5. BID OPENING

The Purchasing Agent shall open the bids on the date and time specified herein. Information read aloud at the bid opening is at the sole discretion of the Purchasing Agent. The Purchasing Agent will examine bids promptly and thoroughly.

6. WITHDRAWAL OF BID

Bidders may request withdrawal of their sealed bid prior to the scheduled bid opening time provided the request for withdrawal is submitted to the Purchasing Agent in writing. No bids may be withdrawn for a period of sixty (60) calendar days after opening of the bids.

7. COMMISSIONERS' COURT

No contract is binding on the County until it is properly placed on the Commissioners' Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

Department heads and elected officials are not authorized to enter into any type of agreement or contract on behalf of the County. Only the Commissioners' Court acting as a body may enter into a contract on behalf of and contractually bind the County. Additionally, department heads and elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being accepted and signed by the County's authorized representative.

8. REJECTION OF BIDS/DISQUALIFICATION

Galveston County, acting through its Commissioners' Court, reserves the right to:

- reject any and all Bids in whole or in part received by reason of this Invitation to Bid;
- waive any informality in the Bids received;
- disregard the Bid of any Bidder determined to be not responsible; and/or;
- discontinue its efforts for any reason under this Bid package at any time prior to actual execution of contract by the County.

Bidders may be disqualified and rejection of Bids may be recommended to the Commissioners' Court for any of (but not limited to) the following causes:

- A. Failure to use the bid forms furnished by the County, if applicable;
- B. Lack of signature by an authorized representative of bidder;
- C. Failure to properly complete the bid;
- D. Failure to meet the mandatory requirements of this invitation to bid; and/or
- E. Evidence of collusion among bidders.

9. RESTRICTIVE OR AMBIGUOUS SPECIFICATIONS

It is the responsibility of the prospective Bidder to review the entire Invitation to Bid packet and to notify the Purchasing Agent if the specifications are formulated in a manner that would restrict competition or appear ambiguous. Any protest or question(s) regarding the specifications or Bid procedures must be received in the

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Purchasing Agent's Office not less than seventy-two (72) hours prior to the time set for Bid opening. Bidders are to submit their Bid as specified herein or propose an approved equal.

10. SUBSTITUTES/DESCRIPTION OF MATERIALS AND EQUIPMENT

Any brand name or manufacturer reference used herein is intended to be descriptive and not restrictive, unless otherwise noted, and is used to indicate the type and quality of material. The term "or equal" if used, identifies commercially produced items that have the essential performance and salient characteristics of the brand name stated in the item description. All supplies, material, or equipment shall be new and of the most suitable grade for the purpose intended. For clarification, "new" includes products containing recovered materials that are EPA-designated items. It is not the County's intent to discriminate against any materials or equipment of equal merit to those specified. However, if Bidder desires to use any substitutions, prior written approval must be obtained from the Purchasing Agent and sufficiently in advance such that an addendum may be issued. All material supplied must be one hundred percent (100%) asbestos free. Bidder, by submission of its bid, certifies that if awarded any portion of this procurement, the bidder will supply only material and equipment that is 100% asbestos free.

11. EXCEPTIONS TO BID

The Bidder will list on a separate sheet of paper any exceptions to the conditions of the bid. This sheet will be labeled, "Exceptions to Bid Conditions", and will be attached to the bid. If no exceptions are stated, it will be understood that all general and specific conditions will be complied with, without exception.

The Bidder must specify in its Bid any alternatives it wishes to propose for consideration by the County. Each alternative should be sufficiently described and labeled within the Bid and should indicate its possible or actual advantage to the program being offered.

The County reserves the right to offer these alternatives to other Bidders.

12. PRICING

Bids will be either lump sum or unit prices as shown on the Bid sheet. The net priced items will be delivered to Galveston County, including all freight or shipping charges.

Cash discount must be shown on bid, otherwise prices will be considered net. Unless prices and all information requested are complete, Bid may be disregarded and given no consideration.

In case of default by the contractor, the County of Galveston may procure the articles or services from other sources and may deduct from any monies due, or that may thereafter become due to the contractor, the difference between the price named in the contract of purchase order and the actual cost thereof to the County of Galveston. Prices paid by the County of Galveston shall be considered the prevailing market price at the time such purchase is made. Periods of performance may be extended if the facts as to the cause of delay justify such extension in the opinion of the Purchasing Agent and the Commissioners' Court.

13. PROCUREMENT CARD (P-CARD) PROGRAM

The County of Galveston participates in a Procurement Card (P-Card) program that allows payments made to a vendor by credit card. This method typically results in substantially faster bill payments, sometimes within three (3) to five

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(5) days of the actual transaction date. All transaction fees from the card provider are to be paid by the successful contractor. If your company will accept payment via credit card (Visa, MasterCard), please notate this in your Bid submittal.

14. PASS THROUGH COST ADJUSTMENTS

Except in instances of extreme extenuating circumstances Contractor prices shall remain firm throughout the contract period and any renewals. Examples of extreme extenuating circumstances include such situations as a nationwide rail strike, oil shortage or oil embargo.

In extreme extenuating circumstances, Contractors may be allowed to temporarily “pass through” additional costs they are forced to incur through no fault of their own. A request for a pass through cost increase will not be considered unless a Contractor’s cost for the Contractor’s product exceeds 10% over the original cost for the product. Also, the increase in cost must be nationwide and consistent for a minimum period of sixty (60) days. Costs that historically are anticipated to rise over a period of time (for example only, such as wages or insurance costs) do not qualify for pass through. If a Contractor thinks he will be asking for a pass through cost adjustment during the term of the contract, then the original cost of the product to Contractor must be stated in Contractor’s original bid.

A request for a pass through cost does not guarantee that one will be granted. Contractors must submit such information on each request as required by the County Purchasing Agent. The County Purchasing Agent will review each request on a case-by-case basis and determine the appropriateness of each request as well as amount and duration of increase. Contractors will not be permitted any additional compensation for mark-ups or profits based on the increase in price. Rather, such additional compensation will be limited to the actual increase in original cost to the Contractor as such increase is reflected by the original cost stated in the bid. But in no event will the amount of additional compensation exceed 25% increase in Contractor’s original cost for the product as such cost is reflected in Contractor’s original Bid or the duration exceed a period of sixty (60) days. In addition should the cost, during the period of the pass through, return to normal or decrease to below pre pass through prices, appropriate downward adjustments shall be made. No more than one pass through adjustment will be permitted per year.

15. MODIFICATION OF BIDS

A Bidder may modify a bid by letter at any time prior to the submission deadline for receipt of Bids. Modification requests must be received prior to the submission deadline. Modifications made before opening time must be initialed by Bidder guaranteeing authenticity. Bids may not be amended or altered after the official opening with the single exception that any product literature and/or supporting data required by the actual specifications, if any, will be accepted at any time prior to the Commissioners’ Court considering of same.

16. SIGNATURE OF BIDS

Each Bid shall give the complete mailing address of the Bidder and be signed by an authorized representative by original signature with the authorized representative’s name and legal title typed below the signature line. Each bid shall include the Bidder’s Federal Employer Identification Number (FEIN). Failure to sign the Contract page(s) and bid response sheets may disqualify the bid from being considered by the County. The person signing on behalf of the Bidder expressly affirms that the person is duly authorized to tender the bid and to sign the bid sheets and contract under the terms and conditions of this Invitation to Bid and to bind the Bidder thereto and further understands that the signing of the contract shall be of no effect until it is properly placed on the Commissioners’ Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

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17. AWARD OF BIDS – EVALUATION CRITERIA AND FACTORS

The award will be made to the responsible Bidder whose bid is determined to be the lowest and best evaluated offer demonstrating the best ability to fulfill the requirements set forth in this Invitation to Bid. **The proposed cost to the County will be considered firm and cannot be altered after the submission deadline.**

“Lowest and best” means a bid or offer providing the best value considering associated direct and indirect costs, including transport, maintenance, reliability, life cycle, warranties, and customer service after a sale.

Each Bidder, by submitting a bid, agrees that if its bid is accepted by the Commissioners’ Court, such Bidder will furnish all items and services upon which prices have been tendered and upon the terms and conditions in this bid and contract.

The contractor shall commence work only after the transmittal of a fully executed contract and after receiving written notification to proceed from the County Purchasing Agent. The contractor will perform all services indicated in the bid in compliance with this contract.

Neither department heads nor elected officials are authorized to sign any binding contracts or agreements prior to being properly placed on the Commissioners’ Court agenda and approved in open court. Department heads and other elected officials are not authorized to enter into any type of agreement or contract on behalf of Galveston County. Only the Commissioners’ Court, acting as a body, may enter into a contract on behalf of the County. Additionally, department heads and other elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being signed by the County’s authorized representatives.

The County of Galveston reserves the right to accept bids on individual items listed, or group items, or on the bid as a whole; to reject any and all bids; to waive any informality in the bids; and to accept the bid that appears to be in the best interest of the County. The selection process may, however, include a request for additional information or an oral presentation to support the written bid.

In determining and evaluating the best bid, the pricing may not necessarily be controlling, but quality, equality, efficiency, utility, general terms, delivery, suitability of the service offered, and the reputation of the service in general use will also be considered along with any other relevant items. The Commissioners’ Court shall be the sole judge in the determination of these matters.

The County reserves the right to reject any or all Bids in whole or in part received by reason of this Invitation to Bid and may discontinue its efforts under this Invitation to Bid for any reason or no reason or solely for the County’s convenience at any time prior to actual execution of the contract by the County.

A Bidder whose bid does not meet the mandatory requirements set forth in this Invitation to Bid may be considered non-compliant.

The invitation to submit a bid which appears in the newspaper, or other authorized advertising mediums, these general provisions, the specifications which follow, the Bid sheets, and any addenda issued are all considered part of the Bid.

Each Bidder, by submitting a bid, agrees that if its bid is accepted by the Commissioners’ Court, such Bidder will furnish all items and services upon the terms and conditions in this Invitation to Bid and the resultant contract.

Notice of contract award will be made within ninety (90) days of opening of Bids to the lowest responsive and responsible contractor, whose bid complies with all the requirements in the Invitation to Bid.

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Contractor shall submit to the County, for approval, within ten (10) days from notice of contract award, all Certificates of Insurance evidencing the required coverage as described under Section 35, Requirement of and Proof of Insurance.

The contractor shall not commence work under these terms and conditions of the contract until all applicable Certificates of Insurance, Performance and Payment Bonds, and Irrevocable Letters of Credit (if required) have been approved by the County of Galveston and the Contractor has received notice to proceed in writing and an executed copy of the contract from the County Purchasing Agent.

18. DISPUTE AFTER AWARD/PROTEST

Any actual or prospective Bidder who is allegedly aggrieved in connection with the solicitation of this Invitation to Bid or award of a contract resulting therefrom may protest. The protest shall be submitted in writing to the Purchasing Agent within seven (7) calendar days after such aggrieved person knows of or should have known of the facts giving rise thereto. If the protest is not resolved by mutual agreement, the Purchasing Agent will promptly issue a decision in writing to the protestant. If the protestant wishes to appeal the decision rendered by the Purchasing Agent, such appeal must be made to the Commissioners' Court through the Purchasing Agent. The decision of the Commissioners' Court will be final. The Commissioners' Court need not consider protests unless this procedure is followed.

19. PUBLIC INFORMATION ACT (f/k/a Open Records Act)

The bidder acknowledges that the County is a government body for purposes of the Public Information Act, codified as Chapter 552 of the Texas Government Code, and as such is required to release information in accordance with the provisions of the Public Information Act.

If bidder considers any of its submitted information to be proprietary in nature, trade secret, or otherwise confidential, then it must clearly and conspicuously mark such information as proprietary, trade, secret, or confidential. By the submission of its bid, Bidder expressly affirms that it has clearly and conspicuously marked any information within its submission that Bidder considers confidential, proprietary, and/or trade secret.

In the event the County receives a request for information under the Public Information Act seeking information that the Bidder has marked as confidential, proprietary, and /or trade secret, then the County agrees that it shall provide notice to the Bidder of the request for information and the request for decision process under the Public Information Act. Thus, the County will submit the initial correspondence to the Texas Attorney General – however, the burden is and shall be on the Bidder to submit correspondence to the Attorney General if the Bidder wishes its information to be withheld. Bidder is deemed to have knowledge of the Public Information Act. **By the submission of its bid, bidder expressly acknowledges that the burden to withhold its' information from public disclosure lays with the bidder;** thus, bidder further acknowledges and agrees that it shall submit comments to the Texas Attorney General in the request for decision process if bidder wishes to have its' information withheld from public disclosure.

20. BIDDER'S E-MAIL ADDRESSES – CONSENT TO DISCLOSURE

Notwithstanding the foregoing Section 19, Bidder acknowledges and agrees that the confidentiality of any and all email addresses Bidder uses or discloses in communicating with the County are **open** to the public in accordance with Section 552.137 of the Government Code and Bidder consents to the release of its email addresses.

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21. RESULTANT CONTRACT

Bidder shall correctly and fully execute the resultant contract first. After this, the contract shall be set for consideration by the Commissioners' Court. If the Commissioners' Court authorizes the execution of the contract, the resultant contract shall become effective upon the Commissioners' Court execution of same. Contract documents shall consist of the contract, the General and Special Provisions, drawings, bid package (including best and final offer(s) if such is utilized), any addenda issued, and any change orders issued during the work. If applicable to the attached bid, bidder must sign three (3) original contracts and return all three with their bid submittal.

Bidder should submit a proposed contract with its Bid or its sample material terms and conditions for review and consideration.

22. CONTRACT TERM

The term of the resultant contract will begin on the date of full execution or the execution by the Commissioners' Court, whichever is later, and will terminate on the date specified in the resultant contract unless terminated earlier as herein set forth.

23. TERMINATION FOR DEFAULT

Failure of either party in the performance of any of the provisions of this contract shall constitute a breach of contract, in which case either party may require corrective action within ten (10) business days from date of receipt of written notice citing the exact nature of such breach. Failure of the party being notified to take corrective action within the prescribed ten (10) business days, or failure to provide written reply of why no breach has occurred, shall constitute a Default of Contract.

All notices relating to default by Bidder of the provisions of the contract shall be issued by County by its Legal Department, and all replies shall be made in writing to the County Legal Department. Notices issued by or issued to anyone other than the County Legal Department shall be null and void and shall be considered as not having been issued or received.

Galveston County reserves the right to enforce the performance of this contract in any manner prescribed by law in the event of breach or default of this contract, and may contract with another party, with or without solicitation of bids or further negotiations. At a minimum, Bidder shall be required to pay any difference in service or materials, should it become necessary to contract with another source, plus reasonable administrative costs and attorney fees.

In the event of Termination for Default, Galveston County, its agents or representatives shall not be liable for loss of any profits anticipated to be made by Bidder.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

No waiver by either party of any event of default under this agreement shall operate as a waiver of any subsequent default under the terms of this agreement.

County reserves the right to terminate this contract immediately in the event Bidder:

- A. Fails to meet delivery or completion schedules; and/or
- B. Fails to otherwise perform in accordance with the accepted Bid and the contract.

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24. TERMINATION FOR CONVENIENCE

County may terminate this contract upon at least thirty (30) calendar days prior written notice for its convenience or for any reason deemed by the County to serve the public interest. As well, County may terminate this contract upon thirty (30) calendar days prior written notice for any reason resulting from any governmental law, order, ordinance, regulation, or court order. In no event shall County be liable for loss of any profits anticipated to be made hereunder by Bidder should this contract be terminated early.

25. FORCE MAJEURE

If by reason of Force Majeure either Party shall be rendered unable, wholly or in part, to carry out its responsibilities under this contract by any occurrence by reason of Force Majeure, then the Party unable to carry out its responsibility shall give the other Party notice and full particulars of such Force Majeure in writing within a reasonable time after the occurrence of the event, and such notice shall suspend the Party's responsibility for the continuance of the Force Majeure claimed, but for no longer period.

Force Majeure means acts of God, floods, hurricanes, tropical storms, tornadoes, earthquakes, or other natural disasters, acts of a public enemy, acts of terrorism, sovereign conduct, riots, civil commotion, strikes or lockouts, and other causes that are not occasioned by either Party's conduct which by the exercise of due diligence the Party is unable to overcome and which substantially interferes with operations.

26. ESTIMATED QUANTITIES

Any reference to quantities shown in the Invitation to Bid is an estimate only. Since the exact quantities cannot be predetermined, the County reserves the right to adjust quantities as deemed necessary to meet its requirements.

27. CONTRACTOR INVESTIGATION

Before submitting a bid, each Bidder shall make all investigations and examinations necessary to ascertain all site conditions and requirements affecting the full performance of the contract and to verify any representations made by the County upon which the contractor will rely. Bidder shall exercise due diligence and is further charged with knowledge of the local, State, and Federal laws, rules, and regulations applicable to this contract. If the bidder receives an award as a result of its bid submission in this procurement, the bidder's failure to have made such investigations and examinations will in no way relieve the bidder from its obligation to comply in every detail with all provisions and requirements of the contract, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim whatsoever by the contractor for additional compensation and/or for excused nonperformance.

28. NO COMMITMENT BY COUNTY OF GALVESTON

This Invitation to Bid does not commit the County of Galveston to award any costs or pay any costs, or to award any contract, or to pay any costs associated with or incurred in the preparation of a bid in response to this Invitation to Bid and does not commit the County of Galveston to procure or contract for services or supplies.

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29. BID COSTS BORNE BY BIDDER

Galveston County shall not be liable for any costs incurred by Bidder in preparation, production, or submission of a bid, including but not limited to best and final offer if applicable. As well, Galveston County shall not be liable for any work performed by Bidder prior to issuance of fully executed contract and properly issued notice to proceed. Galveston County shall not be liable for any costs incurred by Bidder by reason of attending a pre-Bid conference. Galveston County shall not be liable for any costs incurred by Bidder by reason of the County invoking use of best and final offers.

30. SINGLE BID RESPONSE

If only one bid is received in response to the Invitation to Bid, a detailed cost bid may be requested of the single bidder. A cost/price analysis and evaluation and/or audit may be performed of the cost bid in order to determine if the price is fair and reasonable.

31. CHANGES IN SPECIFICATIONS

If it becomes necessary to revise any part of this bid, a written notice of such revision will be provided to all Bidders in the form of addenda. The County is not bound by any oral representations, clarifications, or changes made in the written specifications by the County's employees or officials, unless such clarification or change is provided to Bidders in a written addendum from the Purchasing Agent. Bidders are advised to inquire prior to the submission deadline as to whether any addenda to this invitation to bid have been issued, as the successful bidder will be required to abide by such addenda.

The County of Galveston reserves the right to revise or amend the specifications up to the time set for opening of bids. Such revisions and amendments, if any, shall be announced by form of addenda. Copies of such addenda (or addendum in the event only one addendum is issued in the procurement) shall be furnished to all prospective contractors. Prospective contractors are defined as those contractors listed on the County's Invitation to Bid list for this material/service or those who have obtained documents subsequent to the advertisement. If revisions and amendments require changes in quantities or prices proposed, or both, the date set for opening of bids may be postponed by such number of days as in the opinion of the County shall enable contractors to revise their bids. In any case, the bid opening shall be at least seven (7) business days after the last revising or amendment addendum and the addendum shall include an announcement of the new date, if applicable, for the opening or bids.

32. BID IDEAS AND CONCEPTS

The County reserves to itself the right to adopt or use for its benefit, any concept, plan, or idea contained in any bid.

33. BID DISCLOSURES

While this procurement is pending, the names of those who submitted bids will not be made public unless in conformity with the County Purchasing Act. Likewise, no pricing or staffing information will be released unless in conformity with the County Purchasing Act. Bidders are requested to withhold all inquiries regarding their bid or other submissions until after an award is made. No communication is to be had with any County employee or official, other than the County Purchasing Agent, regarding whether a bid was received - violations of this provision may result in the rejection of a bid.

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34. INDEMNIFICATION

The contractor shall agree to assume all risks and responsibility for, and agrees to indemnify, defend, and save harmless, the County of Galveston, its elected and appointed officials and department heads, and its agents and employees from and against all claims, demands, suits, actions, recoveries, judgments, and costs and expenses including reasonable attorney's fees for the defense thereof in connection therewith on account of the loss of life, property or injury or damage to the person which shall arise from contractor's operations under this contract, its use of County facilities and/or equipment or from any other breach on the part of the contractor, its employees, agents or any person(s), in or about the County's facilities with the expressed or implied consent of the County. Contractor shall pay any judgment with cost which may be obtained against Galveston County resulting from contractor's operations under this contract.

Contractor agrees to indemnify and hold the County harmless from all claims of subcontractors, laborers incurred in the performance of this contract. Contractor shall furnish satisfactory evidence that all obligations of this nature herein above designated have been paid, discharged or waived. If Contractor fails to do so, then the County reserves the right to pay unpaid bills of which County has written notice direct and withhold from Contractor's unpaid compensation a sum of money reasonably sufficient to liquidate any and all such lawful claims.

35. REQUIREMENT OF AND PROOF OF INSURANCE

The successful Bidder shall furnish evidence of insurance to the County Purchasing Agent and shall maintain such insurance as required hereunder or as may be required in the Special Provisions or resultant contract, if different. Contractor shall obtain and thereafter continuously maintain in full force and effect, commercial general liability insurance, including but not limited to bodily injury, property damage, and contractual liability, with combined single limits as listed below or as may be required by State or Federal law, whichever is greater.

- A. For damages arising out of bodily injury to or death of one person in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.
- B. For damages arising out of bodily injury to or death of two or more persons in any one accident:
THREE HUNDRED THOUSAND AND NO/100 (\$300,000.00) DOLLARS.
- C. For any injury to or destruction of property in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.

Insurance shall be placed with insurers having an A.M. Best's rating of no less than A. Such insurance must be issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from loss or damage that may arise to any person or property by reason of services rendered by Contractor.

Galveston County shall be listed as the additional insured on policy certificates and shall be provided with no less than thirty (30) calendar days prior notice of any changes to the policy during the contractual period.

Certificates of Insurance, fully executed by a licensed representative of the insurance company written or countersigned by an authorized Texas state agency, shall be filed with the County Purchasing Agent within ten (10) business days of issuance of notification from the County Purchasing Agent to Bidder that the contract is being activated as written proof of such insurance and further provided that Bidder shall not commence work under this contract until it has obtained all insurance required herein, provided written proof as required herein, and received written notice to proceed issued from the County Purchasing Agent.

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Proof of renewal/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy. Said insurance shall not be cancelled, permitted to expire, or changed without at least thirty (30) days prior written notice to the County.

Insurance required herein shall be maintained in full force and effect during the life of this contract and shall be issued on an occurrence basis. Contractor shall require that any and all subcontractors that are not protected under the Contractor's own insurance policies take and maintain insurance of the same nature and in the same amounts as required of Contractor and provide written proof of such insurance to Contractor. Proof of renewed/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy. Contractor shall not allow any subcontractor to commence work on the subcontract until such insurance required for the subcontractor has been obtained and approved.

Workers' Compensation Insurance: Successful Bidder shall carry in full force Workers' Compensation Insurance Policy(ies), if there is more than one employee, for all its' employees, including but not limited to full time, part time, and emergency employees employed by the successful Bidder. Current insurance certificates certifying that such policies as specified above are in full force and effect shall be furnished by successful Bidder to the County.

Insurance is to be placed with insurers having a Best rating of no less than A. The Bidder shall furnish the County with certificates of insurance and original endorsements affecting coverage required by these insurance clauses within ten (10) business days of receiving notification from the County Purchasing Agent that the contract is being activated. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. The Bidder shall be required to submit annual renewals for the term of this contract prior to expiration of any policy.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

The County agrees to provide Bidder with reasonable and timely notice of any claim, demand, or cause of action made or brought against the County arising out of or related to utilization of the property. Bidder shall have the right to defend any such claim, demand, or cause of action at its sole cost and expense and within its sole and exclusive discretion. The County agrees not to compromise or settle any claim or cause of action arising out of or related to the utilization of the property without the prior written consent of the Bidder.

In no event shall the County be liable for any damage to or destruction of any property belonging to the Bidder.

Subrogation Waiver. Bidder and Bidder's insurance carrier waive any and all rights to subrogation against Galveston County in regard to any suit or claim arising out of personal injury or property damage resulting from Bidder's performance under this agreement.

36. BID GUARANTEE

Unless specified differently within the Special Provisions of this procurement, each Bidder shall be required to submit a bid guarantee with its bid as required within this Section.

Evidencing its firm commitment to engage in contract if Bidder is selected for award of contract, each Bidder is required to furnish with their bid a cashier's check or an acceptable Bidder's bond in the amount of five percent (5%) of the total contract price. If Bidder is using a bond, then the Bidder bond must be executed with a surety company authorized to do business in the State of Texas. Failure to furnish the bid guarantee in the proper form and amount, by the time set for opening of bids may be cause for rejection of the bid.

The cashier's check or Bidder/bid bond (as applicable) will be returned to each respective unsuccessful Bidder(s)

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subsequent to the Commissioners Court award of contract, and shall be returned to the successful Bidder upon the completion and submission of all contract documents. Provided however, that the cashier's check or Bidder bond will be forfeited to the County as liquidated damages should successful Bidder fail to execute the contract within thirty (30) days after receiving notice of the acceptance of its bid.

37. PERFORMANCE AND PAYMENT BONDS (if required)

Successful Bidder, before beginning work, shall execute a performance bond and a payment bond, each of which must be in the amount of the contract. The required payment and performance bonds must each be executed by a corporate surety authorized to write surety bonds in the State of Texas and in accordance with Chapter 3503 of the Insurance Code (codified in 2005 and originally within Section 1, Chapter 87, Acts of the 56th Leg., R.S., 1959, and in Article 7.19-1, Vernon's Texas Insurance Code).

The performance and payment bonds must each clearly and prominently display on the bond or on an attachment to the bond:

- a.) The name, mailing address, physical address, and telephone number, including the area code, of the surety company to which any notice of claim should be sent; or
- b.) The toll-free telephone number maintained by the Texas Department of Insurance under Subchapter B, Chapter 521, Insurance Code, and a statement that the address of the surety company to which any notice of claim should be sent may be obtained from the Texas Department of Insurance by calling the toll free-telephone number.

The performance bond shall be solely for the protection of Galveston County, in the full amount of the contract, and conditioned on the faithful performance of the work in accordance with the plans, specifications, and contract documents. The payment bond is solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the prime contractor or a subcontractor to supply labor or material, and in the amount of the contract.

The payment and performance bonds required to be furnished herein must be furnished before the contractor begins work and are a requirement for issuance of a Notice to Proceed. Such bonds must be furnished to the Galveston County Purchasing Agent within thirty (30) calendar days after the date of the full execution of the contract or, if applicable, as required under Chapter 2253, Government Code, whichever is earlier. Contractor's failure to provide the required payment and performance bonds within such time period shall constitute an event of default under this contract. Contractor shall not commence work until all applicable certificates of insurance, performance bonds, and payment bonds have been received and approved by the County Purchasing Agent and the Contractor receives notice to proceed in writing that has been issued by the County Purchasing Agent.

Additionally, if this request for bid is for the award of a public works contract, then compliance with Chapter 2253 of the Texas Government Code, which is known as the McGregor Act, is mandatory. Performance and payment bonds are required to be furnished in accordance with Chapter 2253 of the Texas Government Code. Bidder should familiarize itself with the entire provisions of Chapter 2253 of the Texas Government Code.

38. PATENT AND COPYRIGHT PROTECTION

The Bidder agrees at its sole expense to protect the County from claims involving infringement of patents, copyright, trademark, trade secret, or other intellectual property rights. **Bidder shall indemnify and save harmless the County of Galveston, its officers, employees, and agents, from liability of any nature and kind whatsoever, including without limitation cost and expenses, for or on account of any copyrighted, trademarked, trade secret, patented or un-patented invention, process, or article manufactured or used in the performance of the contract, or other intellectual property rights, including its use by the County.** Bidder also agrees that if Bidder is awarded this

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contract, that no work performed hereunder shall be subject to patent, copyright, or other intellectual property by Bidder.

39. CONFLICT OF INTEREST DISCLOSURE REPORTING (FORM CIQ)

Bidder may be required under Chapter 176 of the Texas Local Government Code to complete and file a conflict of interest questionnaire (CIQ Form). The CIQ Form pertains to business relationship, gift giving and family relationship reporting. IF bidder is required to file a CIQ Form, then the completed CIQ Form must be filed with the County Clerk of Galveston County, Texas.

Business relationship. If Bidder has an employment or other business relationship with a local government officer of Galveston County or with a family member of a local government officer of Galveston County that results in the officer or family member of the officer receiving taxable income that exceeds \$2,500.00 during the preceding 12-month period, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Gift-giving. If Bidder has given a local government officer of Galveston County or a family member of a local government officer of Galveston County one or more gifts with an aggregate value of more than one-hundred dollars (\$100.00) during the preceding 12-months, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Family member. For purposes of the business relationship and gift giving reporting requirements, a “family member” means a person related to another person with the first degree of consanguinity or affinity, as described by Subchapter B, Chapter 573, Texas Government Code. Examples of persons within the first degree by consanguinity or affinity include a son, daughter, father, mother, spouse, son-in-law, daughter-in-law, father-in-law, mother-in-law, stepson, stepdaughter, stepmother, and stepfather.

Family relationship. If Bidder has a “family relationship” with a local government officer of Galveston County then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County, regardless of whether Bidder has a business relationship or has given gifts to the local government office or a family member of the local government officer. For this purpose, “family relationship” means Bidder is related within the third degree by consanguinity or the second degree by affinity, as those terms are defined under Chapter 573 of the Texas Government Code, to a local government officer of Galveston County. Examples of such relationships include a son, daughter, mother, father, brother, sister, grandchild, great-grandchild, grandparent, great-grandparent, niece, nephew, uncle, aunt, spouse, mother-in-law, father-in-law, daughter-in-law, son-in-law, spouse’s grandchild, spouse’s grandparent, grandparent’s spouse, grandchild’s spouse, stepson, stepdaughter, stepmother, and stepfather.

Bidder must file its original CIQ Form with the Galveston County Clerk. The Galveston County Clerk has offices at the following locations:

Galveston County Clerk
Galveston County Justice Center, Suite 2001
600 59th Street
Galveston, Texas 77551

Galveston County Clerk
North County Annex, 1st Floor
174 Calder Road
League City, Texas 77573

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Again, if Bidder is required to file a CIQ Form, the original completed form is filed with the Galveston County Clerk (not the Purchasing Agent).

For Bidder's convenience, a blank CIQ Form is enclosed with this bid package. Blank CIQ Form(s) may also be obtained by visiting the Purchasing Agent's website – this website is linked from the Galveston County homepage, at <http://www.co.galveston.tx.us>.

Chapter 176 specifies deadlines for the filing of CIQ Forms (both initial filings and updated filings).

It is Bidder's sole responsibility to file a true and complete CIQ Form with the Galveston County Clerk if Bidder is required to file by the requirements of Chapter 176 of the Local Government Code. Bidder is advised that it is an offense to fail to comply with the disclosure reporting requirements dictated under Chapter 176 of the Texas Local Government Code, and the failure to file may be grounds to void the contract, if Bidder is awarded a contract.

If bidder has any questions about compliance with Chapter 176, Bidder may wish to consult its' legal counsel. Compliance is the individual responsibility of each person, business, and agent who is subject to Chapter 176 of the Texas Local Government Code.

40. DISCLOSURE OF INTERESTED PARTIES/FORM 1295

Under Section 2252.908 of the Government Code, any business entity that enters into a contract with Galveston County that requires the approval of the Commissioners Court must submit a "Disclosure of Interested Parties" to the County prior to the execution of the contract. This form, the "Disclosure of Interested Parties" form was promulgated by the Texas Ethics Commission, and is the "Form 1295". **This procurement is subject to these requirements.**

The Texas Ethics Commission was charged with promulgating rules to implement Section 2252.908 of the Government Code. The rules adopted by the Texas Ethics Commission are located at Sections 46.1, 46.3, and 46.5 of Title 1 of the Texas Administrative Code. Thus, the law covering these requirements is located at Section 2252.908 of the Government Code, and in Title 1, Sections 46.1, 46.3, and 46.5 of the Texas Administrative Code.

The Texas Ethics Commission's website is: www.ethics.state.tx.us. The area of the Texas Ethics Commission website pertaining to Form 1295 is:

www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm.

Form 1295 must be completed electronically through the Texas Ethics Commission website (handwritten forms are not allowable). Once the business entity has completed their electronic filing of Form 1295, then the business entity must print out the electronically completed form, and sign and notarize the Form 1295. Once Form 1295 is signed and notarized, the business entity must submit their completed, signed, and notarized Form 1295 to the Galveston County Purchasing Agent.

Successful Proposer is and shall be subject to these requirements, and no resultant contract may be executed by the Commissioners Court until the completed, signed, and notarized Form 1295 is on file with the County Purchasing Agent.

No portion of the Form 1295 process commits the County to any type of award of contract whatsoever.

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After the Purchasing Agent's Office receives the completed, signed, and notarized Form 1295, the Purchasing Agent's Office will, within 30 days, go the Texas Ethics Commission website to submit electronic confirmation of the County's receipt of the completed, signed, and notarized Form 1295.

41. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS & REQUIREMENT TO REGISTER IN SAM

Bidder certifies that neither it, nor any of its Principals, are presently debarred, suspended, proposed for debarment, disqualified, excluded, or in any way declared ineligible for the award of contracts by any Federal agency. Contractor agrees that it shall refund Galveston County for any payments made to Contractor while ineligible. Contractor acknowledges that Contractor's uncured failure to perform under this Agreement, if such should occur, may result in Contractor being debarred from performing additional work for the County, the respecting State Agency administering the grant funding the contract, if applicable, the State, FEMA or HUD (as applicable), and other Federal and State entities. Further, Bidder has executed the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters and returned the fully completed and executed original certification with the submission of its bid. **The truthful and fully completed and executed original of the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters must be included with the submission of Bidder's Bid and is a mandatory requirement of this Invitation to Bid. Bidder's failure to include the fully completed and executed original of this Certification shall be considered non-compliance with the requirements of this Invitation to Bid and grounds for the rejection of Bidder's Bid.** Proposer shall immediately notify the County Purchasing Agent if it becomes debarred or suspended, placed on the Consolidated List of Debarred Contractors, or in any other way becomes ineligible for award of contract by any Federal agency. This Certification is a material fact relied upon by Galveston County; if it is later determined that the contractor did not comply with 2 C.F.R. Part 180 and 2 C.F.R. Part 3000, in addition to the remedies available to Galveston County and the State agency administering this grant, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment of contractor.

If the contract to be awarded pursuant to this procurement involves the use of Federal funds, then bidder must also be registered in the Federal Contractor Registry through the System for Award Management (SAM) to be eligible for award of contract pursuant to this procurement.

Information regarding the SAM is available at:

<http://www.federalcontractorregistry.com/?gclid=CIG1hf2rr8wCFYkCaQoducANZw> or at
<https://www.sam.gov/portal/SAM/#1>.

No contract involving the use of Federal funds may be awarded to any bidder unless and until such registration is current and in good standing under SAM. Successful bidder must maintain SAM registration throughout the entire term of the agreement with the County. If this contract involves the use of Federal funds, then bidder must enclose proof of such SAM registration within its response, which is also a mandatory requirement of this procurement; failure to enclose such proof shall be considered non-compliance with the requirements of this procurement and grounds for the rejection of bidder's response to this procurement (i.e., bid, proposal, or qualifications statement, as applicable).

42. SOVEREIGN IMMUNITY

The County specifically reserves any claim it may have to sovereign, qualified, or official immunity as a defense to any action arising in conjunction with this contract.

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43. CONTROLLING LAW AND VENUE

Bidder acknowledges and agrees that the contract is and shall be governed and construed by the laws of the State of Texas and that venue shall lie exclusively in a court of competent jurisdiction in Galveston County, Texas.

44. MERGERS, ACQUISITIONS

The Bidder shall be required to notify the County of any potential for merger or acquisition of which there is knowledge at the time that a bid is submitted.

If subsequent to the award of any contract resulting from this Invitation to Bid the Bidder shall merge or be acquired by another firm, the following documents must be submitted to the County:

- A. Corporate resolutions prepared by the awarded Bidder and the new entity ratifying acceptance of the original contract, terms, conditions and prices;
- B. New Bidder's Federal Identification Number (FEIN) and;
- C. New Bidder's proposed operating plans.

Moreover, Bidder is required to provide the County with notice of any anticipated merger or acquisition as soon as Bidder has actual knowledge of the anticipated merger or acquisition. The New Bidder's proposed plan of operation must be submitted prior to merger to allow time for submission of such plan to the Commissioners' Court for its approval.

45. DELAYS

The County reserves the right to delay the scheduled commencement date of the contract if it is to the advantage of the County. There shall be no additional costs attributed to these delays should any occur. Bidder agrees it will make no claims for damages, for damages for lost revenues, for damages caused by breach of contract with third parties, or any other claim by Bidder attributed to these delays, should any occur. In addition, Bidder agrees that any contract it enters into with any third party in anticipation of the commencement of the contract will contain a statement that the third party will similarly make no claim for damages based on delay of the scheduled commencement date of the contract.

46. ACCURACY OF DATA

Information and data provided through this Invitation to Bid are believed to be reasonably accurate.

47. SUBCONTRACTING/ASSIGNMENT

Bidder shall not assign, sell, or otherwise transfer its contract in whole or in part without prior written permission of the County acting by and through its Commissioners' Court. Such consent, if granted, shall not relieve the Bidder of any of its responsibilities under this contract.

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48. INDEPENDENT CONTRACTOR

Bidder expressly acknowledges that it is an independent contractor. Nothing in this agreement is intended nor shall be construed to create an agency relationship, an employer/employee relationship, a joint venture relationship, or any other relationship allowing County to exercise control or direction over the manner or method by which Bidder or its subcontractors perform in providing the requirements stated in the Invitation to Bid.

49. MONITORING PERFORMANCE

The County shall have the unfettered right to monitor and audit the Bidder's work in every respect. In this regard, the Bidder shall provide its full cooperation and insure the cooperation of its employees, agents, assigns, and subcontractors. Further, the Bidder shall make available for inspection and/or copying when requested, original data, records, and accounts relating to the Bidder's work and performance under this contract. In the event any such material is not held by the Bidder in its original form, a true copy shall be provided.

50. SUBJECT TO APPROPRIATION OF FUNDS

State law prohibits the obligation and expenditure of public funds beyond the fiscal year for which a budget has been approved by the Commissioners' Court. Galveston County anticipates this to be an integral part of future budgets to be approved during the periods of this contract, except for unanticipated needs or events which may prevent such payments against this contract. However, Galveston County cannot guarantee the availability of funds, and enters into this contract only to the extent such funds are made available through appropriation (allocation) by the Commissioners' Court. This contract shall not be construed as creating any debt on behalf of the County of Galveston in violation of TEX. CONST. art. XI, § 7, and it is understood that all obligations of Galveston County are subject to the availability of funds.

51. CONTRACTS SUBJECT TO GRANT FUNDING

Notwithstanding the foregoing, if the contract to be awarded by this procurement is funded with Federal or State grant funds, the bidder acknowledges that the obligations of the County under the contract are contingent upon the continued availability of grant funding to meet the County's obligations. If the grant(s) to the County is reduced, de-obligated, or otherwise discontinued or terminated, Contractor agrees that the County may immediately terminate the contract without penalty or any liability whatsoever on the part of the County, the State, or the Federal awarding agency.

52. PROCUREMENT ETHICS

Galveston County is committed to the highest ethical standards. Therefore, it is a serious breach of the public trust to subvert the public purchasing process by directing purchases to certain favored vendors, or to tamper with the competitive bidding process, whether it's done for kickbacks, friendship or any other reason. Since misuse of the purchasing power of a local government carries criminal penalties, and many such misuses are from a lack of clear guidelines about what constitutes an abuse of office, the Code of Ethics outlined below must be strictly followed.

Galveston County also requires ethical conduct from those who do business with the County.

CODE OF ETHICS – Statement of Purchasing Policy:

Public employment is a public trust. It is the policy of Galveston County to promote and balance the objective of protecting the County's integrity and the objective of facilitating the recruitment and retention of personnel needed by

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Galveston County. Such policy is implemented by prescribing essential standards of ethical conduct without creating unnecessary obstacles to entering public office.

Public employees must discharge their duties impartially so as to assure fair competitive access to governmental procurement by responsible contractors. Moreover, they should conduct themselves in such a manner as to foster public confidence in the integrity of the Galveston County procurement organization.

To achieve the purpose of this Article, it is essential that those doing business with Galveston County also observe the ethical standards prescribed herein.

General Ethical Standards:

It shall be a breach of ethics to attempt to realize personal gain through public employment with Galveston County by any conduct inconsistent with the proper discharge of the employee's duties.

It shall be a breach of ethics to attempt to influence any public employee of Galveston County to breach the standards of ethical conduct set forth in this code.

It shall be a breach of ethics for any employee of Galveston County to participate directly or indirectly in a procurement when the employee knows that:

- The employee or any member of the employee's immediate family, has a financial interest pertaining to the procurement;
- A business or organization in which the employee or any member of the employee's immediate family, has a financial interest pertaining to the procurement; or
- Any other person, business, or organization with which the employee or any member of the employee's immediate family is negotiating or has an arrangement concerning prospective employment is involved in the procurement.

Gratuities:

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

Kickbacks:

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

Contract Clause:

The prohibition against gratuities and kickbacks prescribed above shall be conspicuously set forth in every contract and solicitation by Galveston County.

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Confidential Information:

It shall be a breach of ethics for any employee or former employee of Galveston County to knowingly use confidential information for actual or anticipated personal gain, or for the actual or anticipated gain of any other person.

Prohibition against Contingent Fees:

It shall be a breach of ethical standards for a person to be retained, or to retain a person, to solicit or secure a Galveston County contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies for the purpose of securing business. Failure to abide by this section constitutes a breach of ethical standards.

Representation:

Bidder represents and warrants, by signing and submitting its bid, that it has not retained anyone in violation of this section prohibiting contingent fees.

Contract Clause:

The representation prescribed above shall be conspicuously set forth in every contract and solicitation thereof.

53. NON-COLLUSION AFFIDAVIT

Bidder certifies, by signing and submitting a bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the contractor has not directly or indirectly induced or solicited another contractor to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any contractor or anyone else to put in a sham bid or that anyone shall refrain from bidding; that the contractor has not in any manner, directly or indirectly, sought by agreement, communications, or conference with anyone to fix the bid price of the contractor of any other bidder, or to fix any overhead, profit or cost element of the bid price, or that of any other contractor, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the contractor has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any cooperation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

A blank Non-Collusion Affidavit is included with this Bid packet. Bidder must enclose a truthful and fully executed original Non-Collusion Affidavit with the submission of its bid. This is a mandatory requirement of this Invitation to Bid. Failure to include the truthfully and fully executed Non-Collusion Affidavit in the submission of its Bid shall be considered non-compliance with the requirements of this Invitation to Bid by the Bidder and grounds for the rejection of Bidder's submission.

No negotiations, decisions, or actions shall be initiated by any company as a result of any verbal discussion with any County employee prior to the opening of responses to this Invitation to Bid.

No officer or employee of the County of Galveston, and no other public or elected official, or employee, who may exercise any function or responsibilities in the review or approval of this undertaking shall have any personal or financial interest, direct or indirect, in any contract or negotiation process thereof. The above compliance request will be part of all County of Galveston contracts for this service.

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54. CERTIFICATION REGARDING LOBBYING

Bidder certifies that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the bidder, to any person for influencing or attempting to influence a department or employee of an agency, a member of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.
- b. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence a department or employee of any agency, a member of Congress, a department or employee of congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the bidder shall complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying”, in accordance with its instructions.
- c. Bidder shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

The truthful and fully completed and executed original of the Certification Regarding Lobbying (included with bid packet) must be included with the submission of Bidder’s Bid and is a mandatory requirement of this Invitation to Bid. Bidder’s failure to include the fully completed and executed or original of this Certification shall be considered non-compliant with the requirements of this Invitation to Bid and grounds for the rejection of the Bidder’s Bid. Submission of the certification is a prerequisite for making or entering into a contract with Bidder and is imposed by Section 1352, Title 31, United States Code. Further, any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

55. NON-DISCRIMINATION

- a. **Equal Employment Opportunity:** Bidder will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, disability, genetic information or veteran status. Bidder will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, sex, disability, genetic information or veteran status. Such action shall include, but not be limited to, the following: employment; upgrading; demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Bidder agrees to post in conspicuous places, available to employees and applicants for employment, notices of employment.

Bidder will, in all solicitation or advertisements for employees placed by or on behalf of Bidder, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, disability, genetic information, or veteran status.

Bidder will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Agreement so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

Bidder will include the provisions herein in every subcontract or purchase order unless exempted.

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- b. Drug Free Work Place Act: Bidder shall comply with all applicable requirements of the Drug-Free Workplace Act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. § 8102, et seq.) and implementing regulations thereunder.
- c. Americans with Disabilities Act: Bidder shall comply with all applicable provisions of the Americans with Disabilities Act of 1990 (Public Law 101-136) and implementing regulations thereunder.
- d. OSHA Regulations: Bidder agrees to maintain and to display any applicable materials for its employees in accordance with OSHA regulations.
- e. Compliance with Immigration Laws and Use of E-Verify: Bidder agrees to comply with all requirements of the U.S. Immigration Reform and Control Act of 1986, as amended, and any implementing regulations thereto. Bidder further agrees to utilize the E-Verify system through the Department of Homeland Security on its employees. Bidder shall not employ unauthorized aliens, and shall not assign services to be performed to any supplier or subcontractor who are unauthorized aliens. If any personnel performing any services hereunder are discovered to be an unauthorized alien, then Bidder will immediately remove such personnel from performing services hereunder and shall replace such personnel with personnel who are not unauthorized alien(s).
- f. State and Federal Law Compliance: Bidder agrees to comply with all other State and Federal laws and regulations applicable to the provision of services under this contract.

56. RECORD RETENTION AND RIGHT TO AUDIT

Bidder shall keep and maintain all records associated with this contract for a minimum of five (5) years from the close of the contract or as required by Federal or State law or regulation, whichever period is longer. If awarded this contract, Bidder shall allow the County reasonable access to the records in Bidder's possession, custody, or control that the County deems necessary to assist it in auditing the services, costs, and payments provided hereunder. If this contract involves the use of Federal or State funds, then Bidder shall also allow reasonable access to representatives of the Office of Inspector General, the General Accounting Office, and the other Federal and/or State agencies overseeing the funds that such entities deem necessary to facilitate review by such agencies and Bidder shall maintain fiscal records and supporting documentation for all expenditures in a manner that conforms with OMB Circular A-87 (relocated to 2 C.F.R. Part 225) and this contract.

57. TITLE VI ASSURANCES/TxDOT

The County is subject to Title VI of the Civil Rights Act of 1964 and the Federal and State laws and regulations of the United States Department of Transportation and Texas Department of Transportation (TxDOT). Pursuant to these requirements, the County must have its contractors provide required assurances on compliance with non-discrimination by itself and its subcontractors. The Title VI Assurances within this Subsection are not exhaustive – whenever any Federal, State, or Local requirement requires additional clauses, this list shall not be construed as limiting. Contractor agrees as follows:

- (1) **Compliance with Regulations:** The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, DOT) Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are incorporated herein by reference and made a part of this contract.
- (2) **Non-discrimination:** The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the basis of race, color, national origin, religion, sex, age, disability or Veteran status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The

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Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

- (3) **Solicitations for Subcontractors, Including Procurement of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, religion, sex, age, disability or Veteran status.
- (4) **Information and Reports:** The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Galveston County or the Texas Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of the Contractor is in the exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to Galveston County or the Texas Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.
- (5) **Sanctions for Non-compliance:** In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, Galveston County shall impose such contract sanctions as it or the Texas Department of Transportation may determine to be appropriate, including, but not limited to:
- (a) withholding of payments to the Contractor under the contract until the Contractor complies, and/or;
 - (b) cancellation, termination, or suspension of the contract, in whole or in part.
- (6) **Incorporation of Provisions.** The Contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as Galveston County or the Texas Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request Galveston County to enter into such litigation to protect the interests of Galveston County, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

58. SECTION 231.006, FAMILY CODE/DELINQUENT CHILD SUPPORT

Pursuant to Title 5, Section 231.006 of the Texas Family Code, as applicable, Bidder certifies that it, including all of its principals, is/are current in child support payments and therefore, that it is eligible to receive payments from State funds under a contract for property, materials, or services. Bidder acknowledges and agrees that if it is awarded this contract, then the ensuing agreement may be terminated and payment withheld if this certification is inaccurate. Finally, by the submission of its bid, the Bidder certifies that it has included the names and social security numbers of each person with at least 25% ownership interest in Bidder within its response to the Invitation to Bid and that all such persons are current in child support payments.

59. ANTITRUST

Pursuant to 15 U.S.C. § 1, et seq., and Texas Business and Commerce Code, Chapter 15, Contractor, by the submission of its bid, certifies that neither Contractor nor any natural person, proprietorship, firm, corporation, partnership, association,

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or institution represented by Contractor or anyone acting for such natural person, proprietorship, firm, corporation, partnership, association, or institution has violated any Federal or State antitrust laws or communicated the nature of the offer, directly or indirectly, to any competitor or other person engaged in a similar line of business.

60. LABOR STANDARDS

On contracts funded under a federal grant: Bidder acknowledges that the contract to be awarded pursuant to this solicitation is on a grant program funded with Federal funds. Bidder shall comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled “Equal Employment Opportunity”, Copeland, “Anti-Kickback” Act (40 U.S.C. 3145, 29 C.F.R. Part 3), the Davis-Bacon and Related Acts (40 U.S.C. 3141-3148, 29 C.F.R. Parts 1,3, and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement. Bidder is also responsible for ensuring that all subcontractors comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled “Equal Employment Opportunity”, Copeland “Anti-Kickback” Act, the Davis-Bacon and Related Acts (29 CFR Parts 1, 3 and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement.

61. PROCUREMENT LAWS

- a. Bidder shall comply with all applicable local, State, and Federal procurement laws, rules, and regulations.
- b. If this contract is made pursuant to a federal award, then Contractor acknowledges that the contract is subject, without limitation, to applicable provisions within 2 C.F.R. Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. Contractor shall comply with applicable provisions within 2 C.F.R., Sections 200.319 through 200.326, including but not limited to the following:
 - 1.) **Equal Employment Opportunity**, 41 C.F.R. Part 60-1.4(b) (applicable to federally assisted construction contracts).
 - (a) During the performance of this contract, the contractor agrees as follows:
 - (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national original, disability, or veteran status. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national original, disability or veteran status. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
 - (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national original, disability, or veteran status.
 - (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers’ representatives of the contractor’s commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

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- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and by rules, regulations, and relevant orders of the Secretary of Labor.
 - (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to contractor's books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
 - (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 - (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.
- 2.) **Small and minority business, women's business enterprises, and labor surplus area firms (2 C.F.R. § 200.321).** The County is required to take affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. This includes requiring the prime contractor, if subcontracts are to be let in the performance of this contract, to itself take affirmative steps in letting the subcontract. Accordingly, if subcontracts are to be let in the performance of this contract, the contractor must take affirmative steps in the letting of the subcontract(s), which must include:
- (a) placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 - (b) assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 - (c) dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises; and
 - (d) using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

In accordance with FEMA procurement guidance:

A small business is a business that is independently owned and operated, not dominant in the field of operation in which it is bidding on Galveston County contracts, and qualified as a small business under the Small Business Administration criteria and size standards at 13 C.F.R. Part 121.

A women's business enterprise is a business enterprise that is: (a) at least 51 percent owned by one or more women or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more women; and (b) whose management and daily operations are controlled by one or more women.

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A minority business is a business that is (a) at least 51 percent owned by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more minority group members; and (b) whose management and daily operations are controlled by one or more minority group members.

- 3.) **Davis-Bacon Act as amended (40 U.S.C. 3141-3148).** When required by Federal program legislation, all prime construction contracts in excess of \$2,000 must include a provision for compliance with the Davis-Bacon Act as supplemented by the Department of Labor regulations (29 C.F.R. Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractor must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity (the County) must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be condition upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contract must also include a provision for compliance with the Copeland Anti-Kickback Act (40 U.S.C. § 3145) as supplemented by the Department of Labor regulations (29 C.F.R. Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”).
- 4.) **Compliance with the Copeland “Anti-Kickback” Act.** Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which the person is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. “Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined under this title [Title 18, U.S.C.] or imprisoned not more than five years, or both.” 18 U.S.C. § 874.
- (a) Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. Part 3 as may be applicable, which are incorporated by reference into this contract.
- (b) The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as the Federal awarding agency may be appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
- (c) Breach. A breach of the contract clause above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29C.F.R. § 5.12.
- 5.) **Contract Work Hours and Safety Standards Act.**
- (a) Where applicable, all contracts awarded by the County in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by the Department of Labor regulations at 29 C.F.R. Part 5. Under 40 U.S.C. 3702 of the Contract Work Hours and Safety Standards Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.S. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do

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not apply to the purchase of supplies or material or articles ordinarily available on the open market, or contractors for transportation or transmission of intelligence.

(b) Compliance with the Contract Work Hours and Safety Standards Act.

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this subsection the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this subsection, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this subsection.
- (3) Withholding for unpaid wages and liquidated damages. The awarding Federal agency, State agency, or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this subsection.
- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this subsection and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this subsection.

6.) **Rights to Inventions Made Under a Contractor Agreement.**

- (a) If the Federal award meets the definition of “funding agreement” under 37 C.F.R. § 401.2(a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under the “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 C.F.R. Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.
- (b) Stafford Act Disaster Grants. This requirement does not apply to Public Assistance, Hazard Mitigation Grant Program, Crisis Counseling Assistance and Training Grant program, Disaster Case Management Grant Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program, as FEMA awards under these programs do not meet the definition of “funding agreement.”

**GENERAL PROVISIONS – INVITATION TO BID
CDBG ROUND 2.2 I-45 WATERLINE PROJECT
GALVESTON COUNTY, TEXAS**

- (c) The regulations and 37 C.F.R. § 401.2(a) currently defines “funding agreement” as any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal government. This term also includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as defined in the first sentence of this paragraph.
- 7.) **Clean Air Act (42 U.S.C. §§ 7401 – 7671q) and the Federal Water Pollution Control Act 933 U.S.C. §§ 1251-1387), as amended.**
- (a) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401, et seq., and agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Contract Act, as amended, 33 U.S. C. § 1251, et seq.
- (b) The contractor agrees to report each violation of the Clean Air Act and/or the Federal Water Pollution Control Act to the Federal awarding agency, the State agency administering the grant, and the Regional Office of the Environmental Protection Agency (EPA) and understands and agrees that the Federal awarding agency, the State agency, and the EPA will, in turn, report each violation as required to assure notification to Galveston County, the Federal Emergency Management Agency, and the appropriate EPA Regional Office.
- 8.) **Debarment and Suspension (Executive Orders 12549 and 12689).** A contract award must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. Part 180 that implement Executive Orders 12549 and 12689. The Contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- Contractor must comply with 2 C.F.R. Part 180, Subpart C and 2 C.F.R. Part 3000, Subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into. Bidder agrees to comply with the requirements of 2 C.F.R. Part 180, Subpart C, and 2 C.F.R. Part 3000, Subpart C, while this offer is valid and through the period of any contract that may arise from this offer. The bidder further agrees to include a provision requiring such compliance in its lower tier covered transactions.
- 9.) **Procurement of Recovered Materials.**
- (a.) A non-Federal entity that is a State agency or agency of a political subdivision of the State and its contractors must comply with Section 6002 of the Solid Waste Disposal Act, Public Law No. 89-272 (1965) (codified as amended by the Resource Conservation and Recovery Act at 42 U.S.C. § 6962).
- (b.) In the performance of this contract, the contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—
- (1) Competitively within a timeframe providing for compliance with the contract performance schedule;
 - (2) Meeting contract performance requirements; or
 - (3) At a reasonable price.
- (c) Information about this requirement is available at EPA’s Comprehensive Procurement Guidelines website, <http://www.epa.gov/cpg/>. The list of EPA-designated items is available at <https://www.epa.gov/cpg/products.htm>.

**GENERAL PROVISIONS – INVITATION TO BID
CDBG ROUND 2.2 I-45 WATERLINE PROJECT
GALVESTON COUNTY, TEXAS**

In the event of any discrepancy between the provisions in this Section 61 of General Provisions and provisions on the same subject elsewhere within this procurement, the most stringent shall control.

62. ENTIRETY OF AGREEMENT AND MODIFICATION

This contract contains the entire agreement between the parties. Any prior agreement, promise, negotiation or representation not expressly set forth in this contract has no force or effect. Any subsequent modification to this contract must be in writing, signed by both parties.

An official representative, employee, or agent of the County does not have the authority to modify or amend this contract except pursuant to specific authority to do so granted by the Galveston County Commissioners' Court.

63. NOTICE

All notices or other communications required or permitted under this contract shall be in writing and shall be deemed to have been duly given if delivered personally in hand, transmitted by facsimile, or mailed certified mail, return receipt requested with proper postage affixed and addressed to the appropriate party at the following address or at such other address as may have been previously given in writing to the parties (Bidder shall provide its notice information with its Bid submission). If mailed, the notice shall be deemed delivered when actually received, or if earlier, on the third day following deposit in a United States Postal Service post office or receptacle, duly certified, return receipt requested, with proper postage affixed. If delivered in person, notice shall be deemed delivered when received for by, or actually received by, the receiving Party. If transmitted by facsimile, notice shall be deemed delivered when receipt of such transmission is acknowledged.

To the County at:

Hon. Mark Henry,
County Judge of Galveston County
722 Moody (21st Street), Second (2nd) Floor
Galveston, Texas 77550
Fax: (409) 765-2653

With copies to:

Rufus Crowder, CPPO CPPB,
Galveston County Purchasing Agent
722 Moody (21st Street), Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997

Robert Boemer, Director,
Galveston County Legal Department
722 Moody (21st Street), Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 770-5560

To the Contractor at:

(Bidder to provide its contact name, address, and facsimile number for notice under the contract.)

64. USE OF DHS SEAL, LOGO, AND FLAGS PROHIBITED WITHOUT PRIOR APPROVAL

Contractor must obtain permission from the U.S. Department of Homeland Security financial assistance office (DHS FAO) prior to using DHS seals(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials, including use of the United States Coast Guard seal, logo, crests or reproductions of flags or likenesses of Coast Guard Officials.

**GENERAL PROVISIONS – INVITATION TO BID
CDBG ROUND 2.2 I-45 WATERLINE PROJECT
GALVESTON COUNTY, TEXAS**

65. FEDERAL GOVERNMENT NOT A PARTY

Contractor acknowledges that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to Galveston County, contractor, or any other party pertaining to any matter resulting from the contract.

66. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS

In contracts funded through Federal grants, Contractor acknowledges that 31 U.S.C. Chapter 38, Administrative Remedies for False Claims and Statements (31 U.S.C. § 3801, et seq.) and the implementing regulations thereunder, 49 C.F.R. Part 79, apply to Contractors actions pertaining to the contract.

End of General Provision Section

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CERTIFICATION REGARDING LOBBYING
(31 U.S.C.A. § 1352)
This Certification must be completed, signed, dated and
returned to the Galveston County Purchasing Agent

Procurement Number and Description: _____

_____ Bid #B171025 CDBG Round 2.2 I-45 Waterline Project _____

Proposer **CERTIFIES**, to the best of its knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the proposer, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the proposer shall complete and submit **Standard Form LLL**, "Disclosure Form to Report Lobbying", in accordance with its instructions.
3. Proposer shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Name of Organization/Corporation: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature of Authorized Signatory for Proposer: _____ Date Signed: _____

Title of Authorized Signatory of Proposer: _____

State of Texas
County of Galveston

§
§
§

NON-COLLUSION AFFIDAVIT

Before me, the undersigned notary, on this day personally appeared _____ (Affiant), whom being first duly sworn, deposes and certifies that:

- Affiant is the _____ of _____, that
(Individual, Partner, Corporate Officer) (Name of Proposer)

submitted the attached Bid/Proposal in **Bid #B171025, CDBG Round 2.2 I-45 Waterline Project**
- Affiant is a duly authorized representative of Proposer and is authorized to make this Non-Collusion Affidavit;
- The attached Proposal/Bid is genuine and is not a collusive or sham Proposal/Bid;
- The attached Proposal/Bid has been independently arrived at without collusion with any other bidder, proposer, person, firm, competitor, or potential competitor;
- Bidder/Proposer has not colluded, conspired, connived or agreed, directly or indirectly, with any other bidder, proposer, person, firm, competitor, or potential competitor, to submit a collusive or sham bid or that such other bidder, proposer, person, firm, competitor, or potential competitor shall refrain from bidding/proposing;
- Bidder/Proposer has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other bidder, proposer, person, firm, competitor, or potential competitor to fix the price or prices in the attached Bid/Proposal or of the bid/proposal any other bidder/proposer;
- Bidder/Proposer has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other bidder, proposer, person, firm, competitor, or potential competitor to fix the overhead, profit or cost element of the Bid/Proposal price or prices of any other bidder/proposer, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against Galveston County or any person interested in the proposed contract;
- Affiant has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other bidder, proposer, person, firm, competitor, or potential competitor, paid or agreed to pay any other bidder, proposer, person, firm, competitor, or potential competitor any money or anything of value in return for assistance in procuring or attempting to procure a contract or in return for establishing the price or prices in the attached Bid/Proposal or the bid/proposal of any other Bidder/Proposer; and
- Affiant certifies that Affiant is fully informed regarding the accuracy of the statements contained herein, and under penalties of perjury, certifies and affirms the truth of the statements herein, such penalties being applicable to the Bidder/Proposer as well as to Affiant signing on its behalf.

Signature of Affiant

SWORN TO and SUBSCRIBED before me this _____ day of _____, 2017.

Notary Public

My Commission Expires: _____

BID FORM
CDBG ROUND 2.2 I-45 WATERLINE PROJECT
COUNTY OF GALVESTON, TEXAS

By signing here, the firm does hereby attest that it has fully read the instructions, conditions and general and special provisions and understands them.

THE COMPANY OF: _____

ADDRESS: _____

FEIN (TAX ID): _____

The following shall be returned with your bid. Failure to do so may be ample cause for rejection of bid as non-responsive. It is the responsibility of the Bidder to ensure that bidder has received all addenda.

Items:	Confirmed (X):
1. References (if required)	_____
2. Addenda, if any	#1_____ #2_____ #3_____ #4_____
3. One (1) original and four (4) copies of submittal	_____
4. Bid Form	_____
5. Vendor Qualification Packet	_____
6. Debarment Certification Form	_____
7. Non-Collusion Affidavit	_____
8. Form CIQ (sent to the Galveston County Clerk)	_____
9. Anti-Lobbying Form	_____

Person to contact regarding this bid: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

Name of person authorized to bind the Firm: _____

Signature: _____ Date: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

BID FORM
REMOVAL & RECONSTRUCTION OF BACK STOP FLAP GATES
GALVESTON COUNTY, TEXAS

Bidder shall use this form to provide the information for notice.

1. Contact information for notice:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

2. If a copy of notice is requested, please complete below:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

3. If second or more copies are requested for notice, please supplement this form and clearly mark the supplement as "Supplementary Notice Information."

Bidder to submit reference information. Bidder shall use this form to provide minimum required reference information. If Bidder wishes to provide more than the minimum, Bidder should supplement this form and should clearly mark the supplement as "Supplementary Reference Information."

1. References who can attest to the Bidder's capability to carry out the requirements set forth in this bid:

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

BID FORM
REMOVAL & RECONSTRUCTION OF BACK STOP FLAP GATES
GALVESTON COUNTY, TEXAS

References of major supplier of Bidder who can speak to the financial capability of the Bidder to carry out the requirements set forth in this bid:

1. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

2. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

3. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

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County of Galveston Purchasing Department Vendor Qualification Packet

(rev. 1.3, July 5, 2017)

All interested parties seeking consideration for qualified vendor status with the County of Galveston should complete and return only the following attached forms to:

Galveston County Purchasing Department
722 Moody Avenue, (21st Street), 5th Floor
Galveston, Texas 77550
(409) 770-5371 office
(409) 621-7987 fax

Form PEID: Person /Entity Information Data

Form W-9: Request for Taxpayer Identification Number and Certification
(please note that the included form may not be the latest revised form issued by the Internal Revenue Service. Please check the IRS website at <http://www.irs.gov/pub/irs-pdf/fw9.pdf> for the latest revision of this form.)

Form CIQ: Conflict of Interest Questionnaire
(please note that the included form may not be the latest revised form issued by the State of Texas Ethics Commission. Please check the Texas Ethics Commission website at for the latest revision of this form. Please note that Galveston County Purchasing Agent is not responsible for the filing of this form with the Galveston County Clerk per instructions of the State of Texas Ethics Commission).

Debarment: **CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS & REQUIREMENT TO REGISTER IN SAM**
Vendors/contractor certifies that neither it, nor any of its Principals, are presently debarred, suspended, proposed for debarment, disqualified, excluded, or in any way declared ineligible for the award of contracts by any Federal agency. Vendor agrees that it shall refund Galveston County for any payments made to Contractor while ineligible. Vendor acknowledges that Contractor's uncured failure to perform under any agreement with the County of Galveston, if such should occur, may result in Contractor being debarred from performing additional work for the County, the respecting State Agency administering the grant funding the contract, if applicable, the State, FEMA or HUD (as applicable), and other Federal and State entities. Further, Vendor has executed the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters and returned the fully completed and executed original certification with the submission of this Vendor Qualification Packet. *The truthful and fully completed and executed original of the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters must be included with the submission of this Vendor Qualification Packet and is a mandatory requirement to become a vendor of Galveston County. Vendor's failure to include the fully completed and executed original of this Certification shall be considered non-compliant with the requirements of this vendor qualification request and grounds for the rejection of vendor's request.* Vendor shall immediately notify the County Purchasing Agent if it becomes debarred or suspended, placed on the Consolidated List of Debarred Contractors, or in any other way becomes ineligible for award of contract by any Federal agency. This Certification is a material fact relied upon by Galveston County; if it is later determined that the vendor did not comply with 2 C.F.R. Part 180 and 2 C.F.R. Part 3000, in addition to the remedies available to

Galveston County and the State agency administering a grant, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment of contractor.

If the contract to be awarded pursuant to a Galveston County procurement effort involves the use of Federal funds, then vendor must also be registered in the Federal Contractor Registry through the System for Award Management (SAM) to be eligible for award of contract pursuant to the procurement.

Information regarding the SAM is available at:

<http://www.federalcontractorregistry.com/?gclid=CIG1hf2rr8wCFYkCaQoducANZw> or at <https://www.sam.gov/portal/SAM/#1>.

No contract involving the use of Federal funds may be awarded to any vendor unless and until such registration is current and in good standing under SAM. Successful vendors must maintain SAM registration throughout the entire term of any contractual agreement with the County. If a contract involves the use of Federal funds, then vendor must enclose proof of such SAM registration within its response, which is also a mandatory requirement of County procurement policy; failure to enclose such proof shall be considered non-compliant with the requirements of any procurement effort and grounds for the rejection of vendor's response to any procurement efforts (i.e., bid, proposal, or qualifications statement, as applicable).

Certificate(s) of Insurance: If the person or entity seeking qualified vendor status with the County will be performing work at or on any County owned facility and/or property, Certificate(s) of Insurance are required to be submitted prior to performing any work.

Insurance requirements are as follows:

Public Liability and Property Damage Insurance:

Successful vendor agrees to keep in full force and effect, a policy of public liability and property damage insurance issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from any loss or damage that may arise to any person or property by reason of services rendered by vendor. Vendor shall at its own expense be required to carry the following minimum insurance coverages:

- For damages arising out of bodily injury to or death of one person in any one occurrence – one hundred thousand and no/100 dollars (\$100,000.00);
- For damages arising out of bodily injury to or death of two or more persons in any one occurrence – three hundred thousand and no/100 dollars (\$300,000.00); and
- For injury to or destruction of property in any one occurrence – one hundred thousand and no/100 dollars (\$100,000.00).

This insurance shall be either on an occurrence basis or on a claims made basis. Provided however, that if the coverage is on a claims made basis, then the vendor shall be required to purchase, at the termination of this agreement, tail coverage for the County for the period of the County's relationship with the vendor under this agreement. Such coverage shall be in the amounts set forth in subparagraphs (1), (2), and (3) above.

Worker's Compensation Insurance:

Successful vendor shall also carry in full force Workers' Compensation Insurance policy(ies), if there is more than one employee, for all employees, including but not limited to full time, part time, and emergency employees employed by the vendor. Current insurance certificates certifying that such policies as specified above are in full force and effect shall be furnished by the vendor to the County.

The County of Galveston shall be named as additional insured on policies listed in subparagraphs above and shall be notified of any changes to the policy(ies) during the contractual period.

Insurance is to be placed with insurers having a Best rating of no less than A. The vendor shall furnish the County with certificates of insurance and original endorsements affecting coverage required by these insurance clauses. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. The vendor shall be required to submit annual renewals for the term of any contractual agreement, purchase order or term contract, with Galveston County prior to expiration of any policy.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

The County agrees to provide vendor with reasonable and timely notice of any claim, demand, or cause of action made or brought against the County arising out of or related to utilization of the property. Vendor shall have the right to defend any such claim, demand, or cause of action at its sole cost and expense and within its sole and exclusive discretion. The County agrees not to compromise or settle any claim or cause of action arising out of or related to the utilization of the property without the prior written consent of the vendor.

In no event shall the County be liable for any damage to or destruction of any property belonging to the vendor unless specified in writing and agreed upon by both parties.

Procurement Policy - Special Note:

Understand that it is, according to Texas Local Government Code, Section 262.011, Purchasing Agents, subsections (d), (e), and (f), the sole responsibility of the Purchasing Agent to supervise all procurement transactions.

Therefore, be advised that all procurement transactions require proper authorization in the form of a Galveston County purchase order from the Purchasing Agent's office prior to commitment to deliver supplies, materials, equipment, including contracts for repair, service, and maintenance agreements. Any commitments made without proper authorization from the Purchasing Agent's office, pending Commissioners' Court approval, may become the sole responsibility of the individual making the commitment including the obligation of payment.

Code of Ethics - Statement of Purchasing Policy:

Public employment is a public trust. It is the policy of Galveston County to promote and balance the objective of protecting the County's integrity and the objective of facilitating the recruitment and retention of personnel needed by Galveston County. Such policy is implemented by prescribing essential standards of ethical conduct without creating unnecessary obstacles to entering public office.

Public employees must discharge their duties impartially so as to assure fair competitive access to governmental procurement by responsible contractors. Moreover, they should conduct themselves in such a manner as to foster public confidence in the integrity of the Galveston County procurement organization.

To achieve the purpose of these instructions, it is essential that those doing business with Galveston County also observe the ethical standards prescribed here.

General Ethical Standards: It shall be a breach of ethics to attempt to realize personal gain through public employment with Galveston County by any conduct inconsistent with the proper discharge of the employee's duties.

It shall be a breach of ethics to attempt to influence any public employee of Galveston County to breach the standards of ethical conduct set forth in this code.

It shall be a breach of ethics for any employee of Galveston County to participate directly or indirectly in procurement when the employee knows that:

- The employee or any member of the employee's immediate family has a financial interest pertaining to the procurement.
- A business or organization in which the employee, or any member of the employee's immediate family, has a financial interest pertaining to the procurement.
- Any other person, business or organization with which the employee or any member of the employee's immediate family is negotiating or has an arrangement concerning prospective employment is involved in the procurement.

Gratuities: It shall be a breach of ethics to offer, give or agree to give any employee of Galveston County, or for any employee or former employee of Galveston County to solicit, demand, accept or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of a program requirement or purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any program requirement or a contract or subcontract, or to any solicitation or proposal therefore pending before this government.

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

Contract Clause: The prohibition against gratuities and kickbacks prescribed above shall be conspicuously set forth in every contract and solicitation by Galveston County.

Confidential Information: It shall be a breach of ethics for any employee or former employee of Galveston County to knowingly use confidential information for actual or anticipated personal gain, or for the actual or anticipated gain of any person.

Questions/Concerns:

If you have any questions or concerns regarding the information or instructions contained within this packet, please contact any member of the Purchasing Department staff at (409) 770-5371.

CONFLICT OF INTEREST DISCLOSURE REPORTING

Proposer may be required under Chapter 176 of the Texas Local Government Code to complete and file a conflict of interest questionnaire (CIQ Form). If so, the completed CIQ Form must be filed with the County Clerk of Galveston County, Texas.

If Proposer has an employment or other business relationship with an officer of Galveston County or with a family member of an officer of Galveston County that results in the officer or family member of the officer receiving taxable income that exceeds \$2,500.00 during the preceding 12-month period, then Proposer **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

If Proposer has given an officer of Galveston County or a family member of an officer of Galveston County one or more gifts with an aggregate value of more than \$250.00 during the preceding 12-months, then Proposer **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

The Galveston County Clerk has offices at the following locations:

Galveston County Clerk
Galveston County Justice Center, Suite 2001
600 59th Street
Galveston, Texas 77551

Galveston County Clerk
North County Annex, 1st Floor
174 Calder Road
League City, Texas 77573

Again, if Proposer is required to file a CIQ Form, the original completed form is filed with the Galveston County Clerk (not the Purchasing Agent).

For Proposer's convenience, a blank CIQ Form is enclosed with this proposal. Blank CIQ Forms may also be obtained by visiting the Galveston County Clerk's website and/or the Purchasing Agent's website – both of these web sites are linked to the Galveston County homepage, at <http://www.co.galveston.tx.us>.

As well, blank CIQ Forms may be obtained by visiting the Texas Ethics Commission website, specifically at http://www.ethics.state.tx.us/whatsnew/conflict_forms.htm.

Chapter 176 specifies deadlines for the filing of CIQ Forms (both initial filings and updated filings).

It is Proposer's sole responsibility to file a true and complete CIQ Form with the Galveston County Clerk if Proposer is required to file by the requirements of Chapter 176. Proposer is advised that it is an offense to fail to comply with the disclosure reporting requirements dictated under Chapter 176 of the Texas Local Government Code.

If you have questions about compliance with Chapter 176, please consult your own legal counsel. Compliance is the individual responsibility of each person, business, and agent who is subject to Chapter 176 of the Texas Local Government Code.



COUNTY of GALVESTON
Purchasing Department

rev. 1.3, March 29, 2010

FORM PEID:	Request for Person-Entity Identification Data
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Instructions: Please type or print clearly when completing sections 1 thru 4 and return completed form to:

Galveston County Purchasing Agent
722 Moody Avenue (21st. Street), 5th Floor
Galveston, Texas 77550
(409) 770-5371 office
(409) 621-7987 fax

1.

Business Name:	
Attention Line:	

2.

Physical Address:			
City:		State:	Zip+4:

3.

Billing / Remit Address:			
City:		State:	Zip+4

4.

Main Contact Person:	
Main Phone Number:	
Fax Number:	
E-mail Address:	

Areas below are for County use only.

Requested By:	Phone / Ext. #
Department:	Date:

Action Requested - Check One:	IFAS PEID Vendor Number:
<input type="checkbox"/> Add New	<input type="checkbox"/> Change Data
<input type="checkbox"/> Inactivate	<input type="checkbox"/> Employee
<input type="checkbox"/> Landlord	<input type="checkbox"/> Foster Parent
<input type="checkbox"/> One Time	<input type="checkbox"/> Foster Child
	<input type="checkbox"/> Re-activate
	<input type="checkbox"/> Attorney
	<input type="checkbox"/> Refund

Request for Taxpayer Identification Number and Certification

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

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)	
Business name, if different from above	
Check appropriate box: <input type="checkbox"/> Individual/Sole proprietor <input type="checkbox"/> Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶ <input type="checkbox"/> Exempt payee <input type="checkbox"/> Other (see instructions) ▶	
Address (number, street, and apt. or suite no.)	
City, state, and ZIP code	Requester's name and address (optional)
List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

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

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

Social security number
OR
Employer identification number

Part II Certification

Under penalties of perjury, I certify that:

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

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

Sign Here Signature of U.S. person ▶

Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

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

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

- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
- Certify that you are not subject to backup withholding, or
- Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

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

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,

- The U.S. grantor or other owner of a grantor trust and not the trust, and
- The U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

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

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

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

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

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

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

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

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

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),
3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

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

Also see *Special rules for partnerships* on page 1.

Penalties

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

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

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

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

Specific Instructions

Name

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

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

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

Limited liability company (LLC). Check the "Limited liability company" box only and enter the appropriate code for the tax classification ("D" for disregarded entity, "C" for corporation, "P" for partnership) in the space provided.

For a single-member LLC (including a foreign LLC with a domestic owner) that is disregarded as an entity separate from its owner under Regulations section 301.7701-3, enter the owner's name on the "Name" line. Enter the LLC's name on the "Business name" line.

For an LLC classified as a partnership or a corporation, enter the LLC's name on the "Name" line and any business, trade, or DBA name on the "Business name" line.

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

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

Exempt Payee

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

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

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

The following payees are exempt from backup withholding:

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

Other payees that may be exempt from backup withholding include:

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

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

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 9
Broker transactions	Exempt payees 1 through 13. Also, a person registered under the Investment Advisers Act of 1940 who regularly acts as a broker
Barter exchange transactions and patronage dividends	Exempt payees 1 through 5
Payments over \$800 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 7 ²

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

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

Part I. Taxpayer Identification Number (TIN)

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

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

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited liability company (LLC)* on page 2), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

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

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

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

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

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

Part II. Certification

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

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

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

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

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

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

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

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

What Name and Number To Give the Requester

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

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

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

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

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 1.

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

Privacy Act Notice

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

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

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, social security number (SSN), or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

Call the IRS at 1-800-829-1040 if you think your identity has been used inappropriately for tax purposes.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS personal property to the Treasury Inspector General for Tax Administration at 1-800-368-4484. You can forward suspicious emails to the Federal Trade Commission at: spam@uce.gov or contact them at www.consumer.gov/idtheft or 1-877-IDTHEFT(438-4338).

Visit the IRS website at www.irs.gov to learn more about identity theft and how to reduce your risk.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.
This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

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

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

OFFICE USE ONLY

Date Received

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

2 Check this box if you are filing an update to a previously filed questionnaire.

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information in this section is being disclosed.

Name of Officer

This section (item 3 including subparts A, B, C, & D) must be completed for each officer with whom the vendor has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes No

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

Yes No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more?

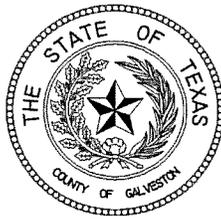
Yes No

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

4

Signature of vendor doing business with the governmental entity

Date



County of Galveston

**ACKNOWLEDGMENT AND CERTIFICATION REGARDING DEBARMENT,
SUSPENSION, AND OTHER INELGIBILITY**

Executive Orders 12549 & 12689 Certification, Debarment and Suspension

Solicitation Number: Bid #B171025

Solicitation Title: CDBG Round 2.2 I-45 Waterline Project

Contractor hereby CERTIFIES that:

Contractor, and all of its principals, is not presently debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and is not in any other way ineligible for participation in Federal or State assistance programs;

Contractor, and all of its principals, were not and have not been debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and were not and have not been in any other way ineligible for participation in Federal or State assistance programs at the time its' proposal was submitted in the procurement identified herein and at any time since submission of its' proposal;

Contractor has included, and shall continue to include, this certification in all contracts between itself and any sub-contractors in connection with services performed under this contract; **and**

Contractor shall notify Galveston County in writing immediately, through written notification to the Galveston County Purchasing Agent, if Contractor is not in compliance with Executive Order 12549 or 12689 during the term of its contract with Galveston County.

Contractor **Represents** and **Warrants** that the individual executing this Acknowledgment and Certification on its behalf has the full power and authority to do so and can legally bind the Contractor hereto.

Name of Business

Date

By: _____
Signature

Printed Name & Title

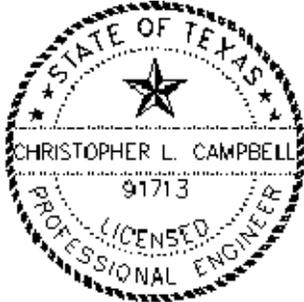


COUNTY OF GALVESTON

SPECIFICATIONS AND CONTRACT DOCUMENTS

I-45/HWY 6 WATER DISTRIBUTION SYSTEM

**GLO CONTRACT NO. 13-465-000-7974
PROJECT NO. P21465**



Chris Campbell

February 22, 2016

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**INVITATION TO BID
GALVESTON COUNTY I-45/HWY 6 WATER DISTRIBUTION SYSTEM
GALVESTON COUNTY, TEXAS**

The County of Galveston solicits bids on the following project funded through the Texas General Land Office, contract number 13-465-000-7974, Hurricane Ike disaster recovery program funds.

Contract to furnish labor, equipment, materials and incidentals as required for:
Bid #228101-1-BID 10, Galveston County I-45/HWY 6 Water Distribution System

Davis-Bacon rates will apply under this disaster recovery program.

Sealed bids in **sets of seven, (one (1) original and six (6) copies)** will be received in the office of the County Purchasing Agent, until **2:00 PM** on **xx/xx/xxxx** and opened immediately in that office in the presence of the County Auditor and the Purchasing Agent. **Bidders are specifically advised that any bid delivered after this time will be returned unopened.**

Submitted bids will be publicly opened on **xx/xx/xxxx at 2:00 PM** in the Purchasing Agent's office located in the Galveston County Courthouse, 722 Moody Avenue (21st St), Fifth (5th) Floor, Galveston, Texas 77550, (409) 770-5372 www.co.galveston.tx.us/Purchasing/BidListing .

All bids must be marked on the outside of the envelope:
Bid #228101-1-BID 10, Galveston I-45/HWY 6 Water Distribution System

A non-mandatory Pre-Bid Conference will be held on xx/xx/xxxx at 10:30 a.m. in the Galveston County Purchasing Department located in the Galveston County Courthouse, 722 Moody Avenue (21st St), Fifth (5th) Floor, Galveston, Texas 77550.

Bidder's name and return address should be on the outside of the envelope.

Plans and specifications may be obtained from the office of *Binkley & Barfield, Inc., 1710 Seamist Drive, Houston, Texas 77008, 713.869.3433, Chris Campbell, P.E.*

A \$50.00 non-refundable deposit shall be required for each set of plans and specifications. Bids will be completed on the forms and proposal sheets provided.

Each bid must be accompanied by a Cashier's Check or acceptable Bidder's Bond in the amount of 5% of bid as a guarantee that, if awarded the contract, within thirty (30) days from the date of bid opening, the bidder will enter into a contract and execute Performance and Payment Bonds statutorily required for public works projects. The county intends to award a contract within sixty (60) days.

Commissioners' Court reserves the right to waive any informality and to reject any and all bids, and to accept bid or bids which, in its opinion, is most advantageous to the County.

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

SECTION II

General Contract Conditions

Proposal Forms

Bid Proposal

Contract Award

Debarment Certification

Non-Collusion Affidavit

Vendor Qualification Packet

Texas General Land Office Forms

Disaster Recovery Projects

GENERAL CONTRACT CONDITIONS

1. Contract and Contract Documents

- (a) The project to be constructed pursuant to this contract will be financed with assistance from the CDBG and is subject to all applicable Federal and State laws and regulations.
- (b) The Plans, Specifications and Addenda, hereinafter enumerated in Paragraph 1 of the Supplemental General Conditions shall form part of this contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth.

2. Definitions

Whenever used in any of the contract Documents, the following meanings shall be given to the terms here in defined:

- (a) The term "Contract" means the Contract executed between the Galveston County, hereinafter called the Owner and (Name of Construction Co.), hereinafter called Contractor, of which these GENERAL CONDITIONS, form a part.
- (b) The term "Project Area" means the area within which are the specified Contract limits of the Improvements contemplated to be constructed in whole or in part under this contract.
- (c) The term "Engineer" means Binkley & Barfield, Inc., Engineer in charge, serving the Owner with architectural or engineering services, his successor, or any other person or persons, employed by the Owner for the purpose of directing or having in charge the work embraced in this Contract.
- (d) The term "Contract Documents" means and shall include the following: Executed Contract, Addenda (if any), Invitation for Bids, Instructions to Bidders, Signed Copy of Bid, General Conditions, Special Conditions, Technical Specifications, and Drawings (as listed in the Schedule of Drawings).

3. Supervision By Contractor

- (a) Except where the Contractor is an individual and gives his personal supervision to the work, the Contractor shall provide a competent superintendent, satisfactory to the Local Public Agency and the Engineer, on the work at all times during working hours with full authority to act for him. The Contractor shall also provide an adequate staff for the proper coordination and expediting of his work.
- (b) The Contractor shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.

4. Subcontracts

- (a) The Contractor shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has verified the subcontractor as eligible to participate in federally funded contracts.
- (b) No proposed subcontractor shall be disapproved by the city/county except for cause.
- (c) The Contractor shall be as fully responsible to the city/county for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.
- (d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work and required compliance by each subcontractor with the applicable provisions of the Contract.
- (e) Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Owner.

5. Fitting and Coordination of Work

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or material suppliers engaged upon this Contract.

6. Payments to Contractor

(a) Partial Payments

- 1) The Contractor shall prepare his requisition for partial payment as of the last day of the month and submit it, with the required number of copies, to the Engineer for his approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) five percent (5%) of the total amount, to be retained until final payment and (2) the amount of all previous payments. The total value of work completed to date shall be based on the estimated quantities of work completed and on the unit prices contained in the agreement. The value of materials properly stored on the site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for inspection of the Engineer.
- 2) Monthly or partial payments made by the Owner to the Contractor are moneys advanced for the purpose of assisting the contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Owner. Such payments shall not constitute a waiver of the right of the Owner to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Owner in all details.

(b) Final Payment

- 1) After final inspection and acceptance by the Owner of all work under the Contract, the Contractor shall prepare his requisition for final payment which shall be based upon the careful inspection of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the Contractor under this contract shall be the amount computed as described above less all previous payments.

- 2) The Owner before paying the final estimate, shall require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the Owner deems it necessary in order to protect its interest. The Owner may, if it deems such action advisable, make payment in part or in full to the Contractor without requiring the furnishing of such releases or receipts and any payments made shall in no way impair the obligations of any surety or sureties furnished under this Contract.
- 3) Any amount due the Owner under Liquidated Damages, shall be deducted from the final payment due the contractor.

(c) **Payments Subject to Submission of Certificates**

Each payment to the Contractor by the Owner shall be made subject to submission by the Contractor of all written certifications required of him and his subcontractors.

(d) **Withholding Payments**

The Owner may withhold from any payment due the Contractor whatever is deemed necessary to protect the Owner, and if so elects, may also withhold any amounts due from the Contractor to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the Owner and will not require the Owner to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any moneys for their protection unless the Owner elects to do so. The failure or refusal of the Owner to withhold any moneys from the Contractor shall in no way impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

7. **Estimated Quantities**

This Contract, including the specifications, plans and estimates, is intended to show clearly all the work to be done and material to be furnished hereunder. The estimated quantities of the various classes of work to be done and material to be furnished under this contract are approximate and are to be used as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat from these estimates, and that the basis for payment under this contract shall be the plan quantity or actual amount of such work done whichever is specified. It is further understood that the County does not guarantee any minimum amount of work under this Contract.

Contractor agrees that it will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this Contract and the estimated quantities contemplated and contained in the proposals.

8. **Changes in the Work**

- (a) The Owner may make changes in the scope of work required to be performed by the Contractor under the Contract without relieving or releasing the Contractor from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless it is

expressly provided otherwise. Additionally, all such change orders must be approved by the CDBG staff prior to execution of same.

- (b) Except for the purpose of affording protection against any emergency endangering health, life, limb or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the improvements or supply additional labor, services or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the Owner authorizing the Contractor to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.
- (c) It is agreed that Contractor shall perform all Extra Work under the direction of the Owner when presented with a Written Work Order signed by the Owner: subject, however, to the right of Contractor to require a written confirmation of such Extra Work Order by the County Commissioners' Court. It is also agreed that the compensation to be paid Contractor for performing said Extra Work shall be determined by one or more of the following methods:

Method (a) - By agreed unit prices; or

Method (b) - By agreed lump sum: or

Method (c) - If Neither Method (a) nor Method (b) can be agreed upon before the Extra Work is commenced, then Contractor shall be paid the "Actual field cost" of the work plus fifteen (15) percent.

In the event said Extra Work be performed and paid for under Method (c), then the provisions of this paragraph shall apply and the "actual field cost" is hereby defined to include the cost of all workmen, such as foremen, timekeepers, merchants, and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment for time actually employed or used on such Extra Work plus actual transportation charges necessarily incurred, if the kind of equipment or machinery is not already on the job, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work including Social Security, Old Age Benefits and other payroll taxes, and a ratable proportion of premiums on Construction and Maintenance Bonds, Public Liability and Property Damage and Workmen's Compensation, and all other insurance as may be required by any law or ordinance, or directed by the Owner or by him agreed. The Owner may direct the form in which accounts of the "actual field cost" shall be kept and may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used, otherwise these matters shall be determined by Contractor. Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using the one hundred (100) percent of the actual hourly or daily rate (for the time used plus time in moving to and from Job) of the latest schedule of Equipment Ownership Expense adopted by the Association General Contractors of America. Where practicable the terms and prices for the use of Machinery and Equipment shall be incorporated in the Written Extra Work Order. The fifteen (15) percent of the "Actual Field Cost" to be paid Contractor shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the "actual field cost" as herein defined, save that where the Contractor's Camp or Field Office must be maintained primarily on account of such extra work, then the cost to maintain and operate same shall be included in the "actual field cost".

No claim for extra work of any kind will be allowed unless ordered in writing by the Owner. In case any orders or instructions, either oral or written appear to Contractor to involve extra work for which he should receive compensation, it shall make written request to the Program Administrator for written order authorizing Extra Work. Should a difference of opinion arise as to what does or does not constitute extra work, or as to the payment therefor, and the Owner insists upon its performance, Contractor shall proceed with the work after making written order and shall keep an

accurate account of the "actual field cost" thereof, as provided under Method (c) and by this action Contractor will thereby preserve the right to submit the matter of payment to litigation.

(d) Each change order shall include in its final form:

- 1) A detailed description of the change in the work.
- 2) The Contractor's proposal (if any) or a confirmed copy thereof.
- 3) A definite statement as to the resulting change in the contract price and/or time.
- 4) The statement that all work involved in the change shall be performed in accordance with contract requirements except as modified by the change order.
- 5) The procedures as outlined in this Section for a unit price contract also apply in any lump sum contract.

9. Claims for Extra Cost

- (a) If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the Owner, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.
- (b) Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.
- (c) Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall be reported at once to the Owner and work shall not proceed except at the Contractor's risk, until written instructions have been received by him from the Owner.
- (d) If, on the basis of the available evidence, the Owner determines that an adjustment of the Contract Price and/or time is justifiable, a change order shall be executed.

10. Liquated Damages

If the work is not completed within the time stipulated in the applicable bid for Lump Sum or Unit Price Contract provided, the Contractor shall pay to the Owner as fixed, agreed, and liquidated damages (it being impossible to determine the actual damages occasioned by the delay) the amount of **Five Hundred Dollars (\$500.00)** for each calendar day of delay, until the work is completed. The Contractor and his sureties shall be liable to the Owner for the amount thereof.

11. Disputes

- (a) All disputes arising under this Contract or its interpretation except those disputes covered by FEDERAL LABOR STANDARDS PROVISIONS whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10) days of commencement of the dispute, be presented by the Contractor to the Owner for decision. Any claim not presented within the time limit specified in this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its

commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt of the Owner.

- (b) The Contractor shall submit in detail his claim and his proof thereof.
- (c) If the Contractor does not agree with any decision of the Owner, he shall in no case allow the dispute to delay the work but shall notify the Owner promptly that he is proceeding with the work under protest.

12. Technical Specifications and Drawings

Anything mentioned in the Technical Specifications and not shown on the Drawings or vice versa, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Owner, without whose decision, said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

13. Shop Drawings

- (a) All required shop drawings, machinery details, layout drawings, etc. shall be submitted to the Engineer in 6 copies for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The Contractor may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said shop drawings, etc. until they are approved and no claim, by the Contractor, for extension of the contract time shall be granted by reason of his failure in this respect.
- (b) Any drawings submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment of contract price and/or time, otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.
- (c) If a shop drawing is in accordance with the contract or involves only a minor adjustment in the interest of the Owner not involving a change in contract price or time; the engineer may approve the drawing. The approval shall not relieve the Contractor from his responsibility for adherence to the contract or for any error in the drawing.

14. Requests for Supplementary Information

It shall be the responsibility of the Contractor to make timely requests of the Owner for any additional information not already in his possession which should be furnished by the Owner under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted from time to time as the need approaches, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Each request shall be in writing, and list the various items and the latest date by which each will be required by the Contractor. The first list shall be submitted within two weeks after Contract award and shall be as complete as possible at that time. The Contractor shall, if requested, furnish promptly any assistance and information the Engineer may require in responding to these requests of the Contractor. The Contractor shall be

fully responsible for any delay in his work or to others arising from his failure to comply fully with the provision of this section.

15. Materials and Workmanship

- (a) Unless otherwise specifically provided for in the technical specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the technical specifications as "equal to" any particular standard, the Engineer shall decide the question of equality.
- (b) The Contractor shall furnish to the Owner for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval full information concerning all other materials or articles which he proposes to incorporate.
- (c) Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.
- (d) Materials specified by reference to the number or symbol of a specific standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids, except as limited to type, class or grade, or modified in the technical specifications shall have full force and effect as though printed therein.
- (e) The Owner may require the Contractor to dismiss from the work such employee or employees as the Owner or the Engineer may deem incompetent, or careless, or insubordinate.

16. Samples, Certificates and Tests

- (a) The Contractor shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the contract documents or required by the Engineer, promptly after award of the contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.
- (b) Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Engineer in making a prompt decision regarding the acceptability of the sample. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.
- (c) Approval of any materials shall be general only and shall not constitute a waiver of the Owner's right to demand full compliance with Contract requirements. After actual deliveries, the Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Engineer will have the right to cause their removal and

replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.

- (d) Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
- 1) The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the Engineer;
 - 2) The Contractor shall assume all costs of re-testing materials which fail to meet contract requirements;
 - 3) The Contractor shall assume all costs of testing materials offered in substitution for those found deficient;
 - 4) The Owner will pay all other expenses.

17. Permits and Codes

- (a) The Contractor shall give all notices required by and comply with all applicable laws, ordinances, and codes of the Local Government. All construction work and/or utility installations shall comply with all applicable ordinances, and codes including all written waivers. Before installing any work, the Contractor shall examine the drawings and technical specifications for compliance with applicable ordinances and codes and shall immediately report any discrepancy to the Owner. Where the requirements of the drawings and technical specifications fail to comply with such applicable ordinances or codes, the Owner will adjust the Contract by Change Order to conform to such ordinances or codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price or stipulated unit prices.
- (b) Should the Contractor fail to observe the foregoing provisions and proceed with the construction and/or install any utility at variance with any applicable ordinance or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the drawings and technical specifications), the Contractor shall remove such work without cost to the Owner.
- (c) The Contractor shall at his own expense, secure and pay for all permits for street pavement, sidewalks, shed, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.
- (d) The Contractor shall comply with applicable local laws and ordinances governing the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements contained in this Contract.
- (e) The Contractor will be required to make arrangements for and pay the water, electrical power, or any other utilities required during construction.
- (f) During construction of this project, the Contractor shall use every means possible to control the amount of dust created by construction. Prior to the close of a day's work, the Contractor, if directed by the Owner, shall moisten the bank and surrounding area to prevent a dusty condition.

18. Care of Work

- (a) The Contractor shall be responsible for all damages to person or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.
- (b) The Contractor shall provide sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.
- (c) In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the Owner is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the Owner.
- (d) The Contractor shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.
- (e) The Contractor shall shore up, brace, underpin, secure, and protect as maybe necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the improvements included in this Contract. The Contractor shall be responsible for the giving of any and all required notices to any adjoining or adjacent property owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the Owner from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Owner may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

19. Accident Prevention

- (a) No laborer or mechanic employed in the performance of this Contract shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety as determined under construction safety and health standards promulgated by the Secretary of Labor.
- (b) The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work.
- (c) The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Owner with reports concerning these matters.
- (d) The Contractor shall indemnify and save harmless the Owner from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this contract.
- (e) The Contractor shall provide trench safety for all excavations more than five feet deep prior to excavation. All OSHA Standards for trench safety must be adhered to by the Contractor.

- (f) The contractor shall at all times conduct his work in such a manner as to insure the least possible inconvenience to vehicular and pedestrian traffic. At the close of the work each day, all streets where possible in the opinion of the Owner, shall be opened to the public in order that persons living in the area may have access to their homes or businesses by the use of the streets. Barricades, warning signs, and necessary lighting shall be provided to the satisfaction of the Owner at the expense of the Contractor.

20. Sanitary Facilities

The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

21. Use of Premises

- (a) The Contractor shall confine his equipment, storage of materials, and construction operations to the contract limits as shown on the drawings and as prescribed by ordinances or permits, or as may be desired by the Owner, and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.
- (b) The Contractor shall comply with all reasonable instructions of the Owner and all existing state and local regulations regarding signs, advertising, traffic, fires, explosives, danger signals, and barricades.

22. Removal of Debris, Cleaning, Etc.

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for work, and put the whole site of the work and public rights of way in a neat and clean condition.

23. Inspection

- (a) All materials and workmanship shall be subject to inspection, examination, or test by the Owner and Engineer at any and all times during manufacture or construction and at any and all places where such manufacture or construction occurs. The Owner shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge. If the Contractor fails to proceed at once with the correction of rejected workmanship or defective material, the Owner may by contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any Monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- (b) The Contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. All tests by the Owner will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the technical specifications.

- (c) The Contractor shall notify the Owner sufficiently in advance of back filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Owner, the Contractor shall uncover for inspection and recover such facilities at his own expense, when so requested by the Owner.
- (d) Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or his subcontractors, the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- (e) Inspection of materials and appurtenances to be incorporated in the improvements included in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the technical specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.
- (f) Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the Owner or its agents shall relieve the Contractor or his sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

24. Review by Owner

The Owner and its authorized representatives and agents shall have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however that all instructions and approval with respect to the work will be given to the Contractor only by the Owner through its authorized representatives or agents.

25. Final Inspection

When the Improvements included in this Contract are substantially completed, the Contractor shall notify the Owner in writing that the work will be ready for final inspection on a definite date which shall be stated in the notice. The Owner will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable.

26. Deduction for Uncorrected Work

If the Owner deems it not expedient to require the Contractor to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the Contractor and the Owner and subject to settlement, in case of dispute, as herein provided.

27. Warranty of Title

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which

an interest is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed by him to the Owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm, or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

28. Warranty of Workmanship and Materials

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of the improvements included in this Contract by the Owner or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within a period of 12 months from the date of final acceptance of the work.

29. Compliance with Air and Water Acts

(a) In compliance with the Clean Air Act, as amended, 41 U.S.C. Sec. 7401 et. seq., and the regulations of the Environmental Protection Agency with respect thereto, the Contractor agrees that:

- 1) Any facility to be utilized in the performance of this contract or any subcontract shall not be a facility listed on the EPA List of Violating Facilities pursuant to 40 CFR 15.20.
- 2) He will comply with all requirements of Section 114 of the Clean Air Act, as amended.
- 3) Materials utilized in the project shall be free of any hazardous materials, except as may be specifically provided for in the specifications.

(b) If the Contractor encounters existing material on sites owned or controlled by the Owner or in material sources that are suspected by visual observation or smell to contain hazardous materials, the Contractor shall immediately notify the Engineer and the Owner. The Owner will be responsible for testing for and removal or disposition of hazardous materials on sites owned or controlled by the Owner. The Owner may suspend the work, wholly or in part during the testing, removal or disposition of hazardous materials on sites owned or controlled by the Owner.

30. Section 109 of the Housing and Community Development Act of 1974

No person in the United States shall on the ground of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

31. The Provision of Local Training, Employment, and Business Opportunities

(a) To the greatest extent feasible opportunities for training and employment be given lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.

(b) The Contractor will include this clause in every subcontract for work in connection with the project.

32. Non Segregated Facilities

The Contractor certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments, or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise.

33. Job Offices

(a) The Contractor and his subcontractors may maintain such office and storage facilities on the site as are necessary for the proper conduct of the work. These shall be located so as to cause no interference to any work to be performed on the site. The Owner shall be consulted with regard to locations.

(b) Upon completion of the improvements, or as directed by the Owner, the Contractors shall remove all such temporary structures and facilities from the site, and leave the site of the work in the condition required by the Contract.

34. Partial Use of Site Improvements

The Owner may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the technical specifications and if in its opinion, each such section is reasonably safe, fit, and convenient for the use and accommodation for which it was intended, provided:

(a) The use of such sections of the Improvements shall in no way impede the completion of the remainder of the work by the Contractor.

(b) The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.

(c) The period of guarantee stipulated in the Section 29 hereof shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

PROPOSAL FORM

*

COUNTY OF GALVESTON, TEXAS

THE FIRM OF: _____

Address: _____

FEIN (TAX ID): _____

The following shall be returned with your proposal. Failure to do so may be ample cause for rejection of proposal as non responsive. It is the responsibility of the Proposer to ensure that Proposer has received all addenda.

- | Items: | Confirmed (X): |
|--|---------------------------------|
| 1. References | _____ |
| 2. Addenda, if any | #1_____ #2_____ #3_____ #4_____ |
| 3. One (1) original and eight (8) copies of submittal | _____ |
| 4. Proposal Form | _____ |
| 5. Vendor Qualification packet | _____ |
| 6. Debarment Certification | _____ |
| 7. Payment Terms: | _____ net 30 _____ Other |
| 8. Anti-Collusion Affidavit | _____ |

Person to contact regarding this proposal: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

Name of person authorized to bind the Firm: _____

Signature: _____ Date: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

PROPOSER MUST SIGN HERE BELOW:

By signing here, the firm does hereby attest that it has fully read the instructions, conditions and general and special provisions and understands them.

Firm Name: _____

Authorized Signature: _____

Name & Title Printed: _____

Telephone No.: _____ FAX No.: _____

E-Mail Address: _____

Date: _____

EXCEPTIONS (if no exceptions are taken, state NONE):

The remainder of this page intentionally left blank

PROPOSAL FORM

*

GALVESTON COUNTY, TEXAS

Proposer shall use this form to provide the information for notice.

- 1. Contact information for notice:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

- 2. If a copy of notice is requested, please complete below:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

- 3. If second or more copies are requested for notice, please supplement this form and clearly mark the supplement as "Supplementary Notice Information."

Proposer to submit reference information. Proposer shall use this form to provide minimum required reference information. If Proposer wishes to provide more than the minimum, Proposer should supplement this form and should clearly mark the supplement as "Supplementary Reference Information."

- 1. References who can attest to the Proposer's capability to carry out the requirements set forth in this proposal:

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

PROPOSAL FORM

*

GALVESTON COUNTY, TEXAS

References of major supplier of Proposer who can speak to the financial capability of the Proposer to carry out the requirements set forth in this proposal:

- 1. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

- 2. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

- 3. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

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BID PROPOSAL

The bidder hereby proposes to furnish all labor, material, equipment and incidentals for:
(Project Name Here)

Enclosed is a Cashier's Check or Bid Bond in the sum of 5% of the greatest amount bid.

Bidder agrees to perform in accordance with the requirements of the contract documents in consideration of payment by the County of the prices in this proposal.

IN CASE OF DISCREPANCY BETWEEN UNIT PRICES AND EXTENDED PRICES, UNIT PRICES WILL GOVERN.

This bid sheet must be completely filled out in ink or typewritten with any necessary supplemental information attached.

The undersigned hereby agrees to all of the foregoing terms and provisions and to all terms and provisions of the contract, if awarded, which includes all provisions of Sections I - VI of this bid package.

BIDDER _____

SIGNATURE _____

PRINT NAME _____

TITLE _____

ADDRESS _____

CITY, STATE _____

ZIP _____

TELEPHONE _____

FAX NO _____

DATE _____

TAX I.D. No. _____

Item No.	Section No.	Item Description ⁽⁴⁾	Unit	Unit Quantity	Unit Price ⁽¹⁾	Total
GENERAL SITE						
1	01502	Mobilization ⁽¹⁾	LS	1	\$109,000	\$109,000
2	02233	Clearing and Grubbing	AC	6	\$	\$
3	01570	Storm Water Pollution Prevention Implementation	MO	9	\$	\$
4	01570	Filter Fabric Fence	LF	2,660	\$	\$
5	02921	Hydromulch Seeding, Fertilizer, and Watering.	AC	7	\$	\$
6	01575	Stabilized Construction Roads, Parking Areas, Exits, and Truck Washing Areas	SY	220	\$	\$
7	01740	Site Restoration	LF	7,270	\$	\$
PAVING						
8	02221, 02741	Remove and Replace Existing Asphalt Pavement, all thicknesses, Complete in Place.	SY	95	\$	\$
WATER						
9	02511	Remove a Portion of the Existing 39" Water Line Along Avenue L and Replace It with a Two (2) - 39" Spool Pieces, Two (2) - 39" x 36" Reducers, One (1) - 39" x 24" Tee, and One (1) - Butt Strap Joint. Complete in Place.	LS	1	\$	\$

Item No.	Section No.	Item Description ⁽⁴⁾	Unit	Unit Quantity	Unit Price ⁽¹⁾	Total
10	02511	Furnish and Install 24-Inch PVC C905 Water Line, including Fittings, Restrained Joints, and Appurtenances by Open Cut, Complete in Place, in Accordance with Plans and Specifications.	LF	7,270	\$ _____	\$ _____
11	02447 / 02511 / 02517	Furnish and Install 24-inch PVC C905 Water Line, including Access Pits, Fittings, Restrained Joints, and Appurtenances, by Trenchless Construction in Tunnel Liner, Complete in Place, in Accordance with Plans and Specifications.	LF	730	\$ _____	\$ _____
12	02511	Furnish and Install 16-Inch PVC C905 Water Line, including Fittings, Restrained Joints, and Appurtenances by Open Cut, Complete in Place, in Accordance with Plans and Specifications.	LF	45	\$ _____	\$ _____
13	02522	Furnish and Install 36-Inch Butterfly Valve with Service Manhole, Complete in Place, in Accordance with Plans and Specifications.	EA	1	\$ _____	\$ _____
14	02522	Furnish and Install 24-Inch Butterfly Valve with Valve Box, Complete in Place, in Accordance with Plans and Specifications.	EA	4	\$ _____	\$ _____
15	02521	Furnish and Install 16-Inch Gate Valve with Valve Box, Complete in Place, in Accordance with Plans and Specifications.	EA	1	\$ _____	\$ _____

Item No.	Section No.	Item Description ⁽⁴⁾	Unit	Unit Quantity	Unit Price ⁽¹⁾	Total
16	02082	Furnish and Install Extra Depth for Service Manhole (>8' Depth) , Complete in Place, in Accordance with Plans and Specifications.	VF	2	\$ _____	\$ _____
17	02524	Furnish and Install 2-Inch Combination Vacuum Relief/Air Inlet and Air Release Valve w/Service Manhole, Vent Piping and Bollards. Complete in Place, in Accordance with Plans and Specifications.	EA	3	\$ _____	\$ _____
18	02081/ 02082	Furnish and Install 24-Inch Access Manway w/Service Manhole for 39" Water Line, Complete in Place, in Accordance with Plans and Specifications.	EA	2	\$ _____	\$ _____
19	02524	Furnish and Install 6-Inch Blow-Off Assembly, Complete in Place, in Accordance with Plans and Specifications.	EA	1	\$ _____	\$ _____
20	02520	Furnish and Install Flushing Hydrant, Complete in Place, in Accordance with Plans and Specifications.	EA	2	\$ _____	\$ _____
21	02511	Furnish and Install 16-Inch Wet Connection, Complete in Place, in Accordance with Plans and Specifications.	EA	1	\$ _____	\$ _____
22	02260	Furnish and Install Trench Safety System for Trench Excavations.	LF	7,270	\$ _____	\$ _____
23	02317	6" Overexcavation of Trench Bottom	LF	7,270	\$ _____	\$ _____
24	01578	Dewatering	LF	7,270	\$ _____	\$ _____
25	01555	Installation and Maintanance of Traffic Control Devices	LS	1	\$ _____	\$ _____

Item No.	Section No.	Item Description ⁽⁴⁾	Unit	Unit Quantity	Unit Price ⁽¹⁾	Total
26	01555	Flagmen	LS	1	\$ _____	\$ _____
27		Remove and Replace 30-Inch Storm Sewer	LF	10	\$ _____	\$ _____
28	02821	Furnish and Install 7-Ft Tall Perimeter Fencing and Swinging Vehicle Gate with 3 Strands of Barbed Wire at the Top, Complete in Place, in Accordance with Plans and Specifications.	LS	1	\$ _____	\$ _____
29	13120	Furnish and Install 8 Ft. x 8 Ft. Pre-Cast Concrete Building on Crushed Rock Bedding Foundation, Complete in Place, in Accordance with Plans and Specifications	LS	1	\$ _____	\$ _____
30	02521, 02526	Furnish and Install 12-Inch Standard Meter Station Slab on Grade, Including Concrete Slab, 10-Inch Strainers, and Appurtenances, Complete in Place, in Accordance with Plans and Specifications.	LS	1	\$ _____	\$ _____
31	02521, 02523	Furnish and Install 12-Inch Standard Pressure/Flow Control Station Slab on Grade, Including Concrete Slab, Valves, Piping, and Appurtenances, Complete in Place, in Accordance with Plans and Specifications.	LS	1	\$ _____	\$ _____
		TOTAL BASE BID				\$ _____

Item No.	Section No.	Item Description ⁽⁴⁾	Unit	Unit Quantity	Unit Price ⁽¹⁾	Total
EXTRA UNIT PRICES						
32	02951	Extra Removal and Replacement of Asphalt Pavement and Subgrade	SY	50	\$ _____ \$150.00 ⁽³⁾	\$ _____
33	02922	Extra Placement of Sodding	SY	100	\$ _____ \$10.00 ⁽³⁾	\$ _____
34	02922	Bedding and Backfill for Wet Conditions	LF	800	\$ _____ \$15.00 ⁽³⁾	\$ _____
35	02318	Extra Excavation Around Structures.	CY	100	\$ _____ \$25.00 ⁽³⁾	\$ _____
36	02318	Extra Hand Excavation	CY	100	\$ _____ \$25.00 ⁽³⁾	\$ _____
37	02318	Extra Machine Excavation	CY	100	\$ _____ \$15.00 ⁽³⁾	\$ _____
38	02318	Extra Placement of Backfill Material	CY	100	\$ _____ \$10.00 ⁽³⁾	\$ _____
39	02318	Extra Select Backfill	CY	100	\$ _____ \$25.00 ⁽³⁾	\$ _____
40	02318	Extra Cement Stabilized Sand	CY	100	\$ _____ \$20.00 ⁽³⁾	\$ _____
41	02501	Extra 24" Ductile Iron Compact Fittings in Place.	Ea	4	\$ _____ \$1,000.00 ⁽³⁾	\$ _____
42	02713	Crushed Stone Manhole Foundations for Wet Conditions	EA	5	\$ _____ \$150.00 ⁽³⁾	\$ _____
SUB-TOTAL EXTRA UNIT PRICE ITEMS						\$ _____

**Subtotal Extra Unit Price
Items** \$ _____

**Subtotal Cash Allowance
Items** \$ _____

TOTAL AMOUNT BID \$ _____
BASE BID PLUS SUBTOTAL
EXTRA UNIT PRICE ITEMS

Notes:

- (1) In the event of a discrepancy, this column shall govern.
- (2) Fixed Price determined prior to Bid. Cannot be adjusted by the Bidder.
- (3) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder by crossing out the Minimum and noting revised price on the line above.
- (4) The intent of the Contract Documents is for the Contractor to include all items necessary for the proper execution and completion of the Work described in the Contract Documents. No separate measurement and payment shall be made for any work unless identified as a pay item in the BID. Include the cost of work not identified as a separate pay item in Contract price bid for items of which this work is a component. In case of discrepancy between measurement and payment within the BID and Technical Specification Section, the BID shall govern.
- (5) Trenchless Construction is defined as any method other than open cut including methods that utilize primary tunnel liner or steel casing. Contractor shall determine, based on soil information, if a primary tunnel liner is required.

State of Texas Tax Statement of Materials and other charges:

The cost of in-place materials to be
incorporated into the project \$ _____

The cost of labor, profit, materials
not in-place and all other charges \$ _____

TOTAL: (Must agree with bid) \$ _____

CONTRACT AWARD

CONTRACT FOR: I-45/Hwy 6 Water Distribution System

THIS CONTRACT IS ENTERED INTO BETWEEN GALVESTON COUNTY AND THE CONTRACTOR NAMED BELOW PURSUANT TO SUBCHAPTER B, CHAPTER 271, TEXAS LOCAL GOVERNMENT CODE, AND THE REFERENCED INVITATION TO BID.

Contract No: 13-465-000-7974

Bid No: 228101-1-BID 10

Contractor: _____

The Specifications and Drawings are enumerated as follows:

Standard Specifications: I-45/Hwy 6 Water Distribution System Project Manual

Special Provisions: N/A

Special Items: Final Report, Geotechnical Investigation, Proposed I-45/Hwy 6 Water Distribution System

DRAWINGS: I-45/Hwy 6 Water Distribution System Sheets 1 – 36

ADDENDA: _____

Contract Award (continued)

Sections I (Invitation to Bid), II (General Contract Conditions; Bid Proposal; Contract Award), III (General Provisions), IV (Project Scope and General Notes), V (Specifications) and VI (Plans) attached to this Contract Award are all made a part of this Contract and collectively evidence and constitute the entire contract. Contractor shall furnish all materials, perform all of the work required to be done and do everything else required by these documents.

Time of Completion: The Contractor shall complete the work within 270 Calendar Days of the issuance of the notice to proceed. The time set forth for completion of the work is an essential element of the Contract.

The Contract Sum: The County shall pay the Contractor for performance of the Contract, the sum of _____ Dollars and No/100 (\$ _____), payments to be made as described herein.

Performance Bond required: (x) yes () no
Payment Bond required: (x) yes () no

This Contract is issued pursuant to award made by Commissioners' Court on _____, 20__.

EXECUTED this ____ day of _____, 20__.

COUNTY OF GALVESTON, TEXAS

BY: _____
MARK HENRY, County Judge

ATTEST:

DWIGHT SULLIVAN, County Clerk

CONTRACTOR

BY: _____
Signature - Title

Printed Name



County of Galveston

**ACKNOWLEDGMENT AND CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
AND OTHER INELGIBILITY
Executive Orders 12549 & 12689 Certification, Debarment and Suspension**

Solicitation Number: _____

Solicitation Title: _____

Contractor hereby CERTIFIES that:

Contractor, and all of its principals, is not presently debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and is not in any other way ineligible for participation in Federal or State assistance programs;

Contractor, and all of its principals, were not and have not been debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and were not and have not been in any other way ineligible for participation in Federal or State assistance programs at the time its' proposal was submitted in the procurement identified herein and at any time since submission of its' proposal;

Contractor has included, and shall continue to include, this certification in all contracts between itself and any sub-contractors in connection with services performed under this contract; **and**

Contractor shall notify Galveston County in writing immediately, through written notification to the Galveston County Purchasing Agent, if Contractor is not in compliance with Executive Order 12549 or 12689 during the term of its contract with Galveston County.

Contractor **Represents** and **Warrants** that the individual executing this Acknowledgment and Certification on its behalf has the full power and authority to do so and can legally bind the Contractor hereto.

Name of Business

Date

By: _____
Signature

Printed Name & Title

Federal Labor Standards Provisions

U.S. Department of Housing
And Urban Development

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage rate and fringe benefits therefore only when the following criteria have been met.

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140).

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140).

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of an laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140).

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract, in the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates or contributions or costs anticipated for bona fide fringe benefits or cash equivalents there of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017).

(ii)(a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-0014-1), U. S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149).

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5(a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A.3.(ii)(b) of this section.

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph A.3.(i) of this section available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.12.

(4) Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration. Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. the ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may be appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the David-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government

contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part "Whoever, for the purpose of ... influencing in any way the action of such Administration... makes, utters or publishes any statement, knowing the same to be false... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat.96).

(3) The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

CONTRACTOR'S LOCAL OPPORTUNITY PLAN

(name of company) agrees to implement the following specific affirmative action steps directed at increasing the utilization of lower income residents and businesses within the (City/County) of _____.

- A. To ascertain from the Grant Recipient's CDBG program official the exact boundaries of the project area and where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.
- B. To attempt to recruit from within the city the necessary number of lower income residents through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within and servicing the project area such as Service Employment and Redevelopment (SER), Opportunities Industrialization Center (OIC), Urban League, Concentrated Employment Program, Hometown Plan, or the U.S. Employment Service.
- C. To maintain a list of all lower income residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and if a vacancy exists.
- D. To insert this plan in all bid documents and to require all bidders on subcontracts to submit an affirmative action plan including utilization goals and the specific steps planned to accomplish these goals.
- E. To insure that subcontracts (greater than \$10,000), which are typically let on a negotiated rather than a bid basis in areas other than the covered project area, are also let on a negotiated basis, whenever feasible, in a covered project area.
- F. To formally contact unions, subcontractors, and trade associations to secure their cooperation in this effort.
- G. To insure that all appropriate project area business concerns are notified of pending sub-contractual opportunities.
- H. To maintain records, including copies of correspondence, memoranda, etc., which document that all of the above affirmative action steps have been taken.
- I. To appoint or recruit an executive official of the company or agency as Equal Opportunity Officer to coordinate the implementation of this plan.
- J. To maintain records concerning the amount and number of contracts, subcontracts, and purchases which contribute to objectives.
- K. To maintain records of all projected work force needs for all phases of the project by occupation, trade, skill level, and number of positions and to update these projections based on the extent to which hiring meets these Local Opportunity objectives.

As officers and representatives of (name of company), we the undersigned have read and fully agree to this Plan, and become a party to the full implementation of the program and its provisions.

Signature

Title

Date

PROPOSED CONTRACTS BREAKDOWN

Type of Contracts	No. of Contracts	Approx. Total Dollar Amount	Estimated No. to local Business	Estimated \$ Amount Local Business

ESTIMATED PROJECT WORKFORCE BREAKDOWN

Work Classifications	Total Estimated Positions	No. of Positions Currently Filled	No. of Positions not Filled	No. of Positions to fill with L/M Residents
Totals				

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires.

Name of Bidder: _____ Date Organized: _____

Address: _____ Date Incorporated _____

Number of Years in contracting business under present name _____ :

CONTRACTS ON HAND:

Contract	Amount \$	Completion Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

Type of work performed by your company: _____

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

Have you ever defaulted on a contract? _____

List the projects most recently completed by your firm (include project of similar importance):

Project	Amount \$	Mo/Yr Completed
_____	_____	_____
_____	_____	_____
_____	_____	_____

Major equipment available for **this** contract: _____

Attach resume(s) for the principal member(s) of your organization, including the officers as well as the proposed superintendent for the project.

Credit available: \$ _____ Bank reference: _____

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the _____ in verification of the recitals comprising this Statement of Bidder's Qualifications.

Executed this _____ day of _____, 19____.

By:(signature) _____ Title: _____

(print name) _____



Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

SECTION 3
RESIDENT EMPLOYMENT OPPORTUNITY DATA
ELIGIBILITY FOR PREFERENCE

Economic Opportunities for Low and Very Low-Income Persons

Grantee/Subrecipient:	Contract Number:	Date:
<input type="text"/>	<input type="text"/>	<input type="text"/>

ELIGIBILITY FOR PREFERENCE

A Section 3 Resident seeking the preference in training and employment provided by this part shall certify, or submit evidence to the Subrecipient, Grantee, Contractor or Subcontractor, if requested, that the person is a Section 3 Resident, as defined in Section CFR 135.5. (An example of evidence of eligibility for the preference is evidence of receipt of public assistance, or evidence of participation in a public assistance program.)

Section 3 Resident Certification
for Worker Seeking Preference in Training
and Employment

RESIDENT COMPLETES THIS SECTION:

I, _____, am a legal resident of the _____

_____ and meet the income eligibility guidelines for a low- or very-low-income person as published on HUD'S income limits www.huduser.org/portal/datasets/il.html and documented on the reverse side of this form.

My permanent address is: _____

I have attached the following documentation as evidence of my status:

Copy of Lease

Copy of receipt of public assistance

Copy of Evidence of participation in a public assistance program

Other Evidence

Resident Signature _____

Date _____

Print Name _____

SECTION 3 INCOME LIMITS

All residents of public housing developments of the Housing Authority of

Qualify as Section 3 Residents.

Alternatively, individuals residing in the

City of _____

or County of _____

Who meet the income limits set forth below, can also qualify for Section 3 status.

A picture identification card and proof that illustrates applicant is a current resident of the subject area.

HUD updates area median income (AMI) annually and income limits vary by county. To find the latest income limits visit HUD's website: www.huduser.org/portal/datasets/il.html

Eligibility Guideline

Number in Household	Very Low Income (50% AMI)	Low Income (80%)
1 Individual		
2 Individuals		
3 Individuals		
4 Individuals		
5 Individuals		
6 Individuals		
7 Individuals		
8 Individuals		

Signature Field

Date

Print Name



Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

CERTIFICATION FOR BUSINESS CONCERNS
Seeking Section 3 Preference in Contracting and
Demonstration of Capability

Economic Opportunities for Low and Very Low-Income Persons

Grantee/Subrecipient:	Contract Number:	Date:
<input type="text"/>	<input type="text"/>	<input type="text"/>

CONTRACTOR INFORMATION

Name of Business

Address of Business

- Type of Business: Corporation Partnership Non-Profit
 Sole Proprietorship Joint Venture Consortium

Attach the following documentation as evidence of Section 3 eligible status:
(Definition of "Section 3 Business Concern" in 24 CFR 135 describes the three alternative qualifications.)

For Business claiming status as a Section 3 resident-owned enterprise:

- | | |
|---|---|
| <input type="checkbox"/> Copy of resident lease | <input type="checkbox"/> Copy of receipt of public assistance |
| <input type="checkbox"/> Copy of evidence of participation in a public assistance program | <input type="checkbox"/> Other evidence |

For business entity as applicable:

- | | |
|---|---|
| <input type="checkbox"/> Copy of Articles of Incorporation | <input type="checkbox"/> Certificate of Good Standing |
| <input type="checkbox"/> Assumed Business Name Certificate | <input type="checkbox"/> Partnership Agreement |
| <input type="checkbox"/> List of owners/stockholders and % ownership of each appointed officers | <input type="checkbox"/> Corporation Annual Report |
| <input type="checkbox"/> Organization chart with names and titles and brief function statement | <input type="checkbox"/> Latest Board minutes |
| | <input type="checkbox"/> Additional documentation |

For business entity claiming Section 3 status by subcontracting 25 percent of the dollar awarded to qualified Section 3 business(es):

- List of subcontracted Section 3 business(es) and subcontract amount

For business claiming Section 3 status, by claiming at least 30 percent of their workforce are currently Section 3 residents or were Section 3 eligible residents within 3 years of date of first employment with the business:

- | | |
|---|---|
| <input type="checkbox"/> List of all current full-time employees | <input type="checkbox"/> List of employees claiming Section 3 status |
| <input type="checkbox"/> PHA/IHA Residential lease less than 3 years from day of employment | <input type="checkbox"/> Other evidence of Section 3 status less than 3 years from date of employment |

Evidence of ability to perform successfully under the terms and conditions of the proposed contract:

- | | |
|---|--|
| <input type="checkbox"/> Current financial statement | <input type="checkbox"/> Statement of ability to comply with public policy |
| <input type="checkbox"/> List of owned equipment | |
| <input type="checkbox"/> List of all contracts for the past two years | |

Authorized Name and Signature _____

Date _____

Attested By: _____

(Corporate Seal)



Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

**Contractor Certification of Efforts to Fully Comply
with Employment and Training Provisions of Section 3**

Economic Opportunities for Low and Very Low-Income Persons

THE BIDDER REPRESENTS AND CERTIFIES AS PART OF ITS BID/OFFER THAT IT:

- Is a Section 3 Business Concern. A Section 3 Business Concern means a business concern:
 1. That is 51% or more owned by Section 3 Resident(s); or
 2. Whose permanent, full-time employees include persons, at least 30% of whom are currently Section 3 Residents, or
 3. That provides evidence of a commitment to subcontract in excess of 25% of the dollar value of all subcontracts to be awarded to Section 3 Business Concerns, that meet the qualifications set forth in paragraphs 1 or 2 herein.
- Is **NOT** a Section 3 Business Concern, but who has and will continue to seek compliance with Section 3 by certifying the following efforts to be undertaken.

EFFORTS TO AWARD SUBCONTRACTOR TO SECTION 3 CONCERNS
(Check ALL that apply)

- By contacting business assistance agencies, minority contractors associations and community organizations to inform them of the contracting opportunities and requesting their assistance in identifying Section 3 businesses which may solicit bids for a portion of the work.
- By advertising contracting opportunities by posting notices, which provide general information about the work to be contracted and where to obtain additional information, in the common areas of the applicable development(s) owned and managed by the Housing Authority.
- By providing written notice to all known Section 3 Business Concerns of contracting opportunities. This notice should be in sufficient time to allow the Section 3 Business Concerns to respond to bid invitations
- By following up with Section 3 Business Concerns that have expressed interest in the contracting opportunities.
- By coordinating meetings at which Section 3 Business Concerns could be informed of specific elements of the work for which subcontract bids are being sought.
- By conducting workshops on contracting procedures and specific contracting opportunities in a timely manner so that Section 3 Business Concerns can take advantage of contracting opportunities.
- By advising Section 3 Business Concerns as to where to seek assistance to overcome barriers such as inability to obtain bonding, lines of credit, financing, or insurance and aiding Section 3 Businesses in qualifying for such bonding, financing, insurance, etc....
- Where appropriate, by breaking out contract work into economically feasible units to facilitate participation by Section 3 businesses.
- By developing and using a list of eligible Section 3 Business Concerns.
- By actively supporting and undertaking joint ventures with Section 3 Businesses.

EFFORTS TO PROVIDE TRAINING AND EMPLOYMENT TO SECTION 3 RESIDENTS

- By entering into a "first source" hiring agreements with organizations representing Section 3 Residents.
- By establishing training programs, which are consistent with the requirements of the Department of Labor, specifically for Section 3 Residents in the building trades.
- By advertising employment and training positions to dwelling units occupied by Category 1 and 2 residents.
- By contacting resident councils and other resident organizations in the affected housing development to request assistance in notifying residents of the training and employment positions to be filled.
- By arranging interviews and conducting interviews on the job site.
- By undertaking such continued job-training efforts as may be necessary to ensure the continued employment of Section 3 Residents previously hired for employment opportunities.
- By posting job vacancies in Work-In-Texas or with my local Workforce Solutions Center.

Contractor Name/Business Name:

Date:

Authorized Representative Name:

Signature:



Texas General Land Office
Community Development Block Grant (CDBG)
Disaster Recovery Program

Code of Federal Regulations
Title 24- Housing and Urban Development

Volume: 1

Date: 2003-04-01

Original Date: 2003-04-01

Title: Section 135.38- Section 3 Clause

Context: Title 24- Housing and Urban Development. Subtitle B- Relating to Housing and Urban Development . Chapter 1- Office of Assistant Secretary for Equal Opportunity, Department. Part 135 Economic Opportunities for Low-and Very Low-Income Persons. Subpart B- Economic Opportunities for Section 3 Residents and Section 3 Business Concerns.

§ 135.38 Section 3 clause.

All section 3 covered contracts shall include the following clause (referred to as the section 3 clause):

- A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.
- C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.
- D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

- E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.
- F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.
- G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

CONTRACTOR CERTIFICATIONS

U.S. Department of Housing and Urban Development CERTIFICATION OF BIDDER REGARDING CIVIL RIGHTS LAWS AND REGULATIONS	
INSTRUCTIONS	
CERTIFICATION OF BIDDER REGARDING Executive Order 11246 and Federal Laws Requiring Federal Contractor to adopt and abide by equal employment opportunity and affirmative action in their hiring, firing, and promotion practices. This includes practices related to race, color, gender, religion, national origin, disability, and veterans' rights.	
NAME AND ADDRESS OF BIDDER (include ZIP Code)	
CERTIFICATION BY BIDDER	
Bidder has participated in a previous contract or subcontract subject to Civil Rights Laws and Regulations. <input type="checkbox"/> Yes <input type="checkbox"/> No	
The undersigned hereby certifies that: <input type="checkbox"/> The <u>Provision of Local Training, Employment, and Business Opportunities</u> clause (Section 3 provision) is included in the Contract. A written Section 3 plan (Local Opportunity Plan) was prepared and submitted as part of the bid proceedings (if bid equals or exceeds \$100,000). <input type="checkbox"/> The <u>Non Segregated Facilities</u> clause (Section 109 provision) is included in the Contract. No segregated facilities will be maintained as required by Title VI of the Civil Rights Act of 1964. <input type="checkbox"/> The <u>Equal Employment Opportunity</u> clause is included in the Contract (if bid equals or exceeds \$10,000). <input type="checkbox"/> The <u>Affirmative Action for Handicapped Workers</u> clause is included in the contract.	
Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended? <input type="checkbox"/> Yes <input type="checkbox"/> No	
NAME AND TITLE OF SIGNER (Please type)	
SIGNATURE	DATE

SECTION 504 CERTIFICATION

**POLICY OF NONDISCRIMINATION ON THE BASIS
OF DISABILITY**

The _____ does not discriminate on the basis of disability in the admission or access to, or treatment or employment in, its federally assisted programs or activities.

(Name) _____

(Address) _____

City State Zip

Telephone Number () _____ - _____ Voice

() _____ - _____ TDD

has been designated to coordinate compliance with the nondiscrimination requirements contained in the Department of Housing and Urban Development's (HUD) regulations implementing Section 504 (24 CFR Part 8. dated June 2, 1988).

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
CONTRACTOR'S CERTIFICATION

CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

TO (appropriate recipient)	DATE
	PROJECT NUMBER (if any)
C/O	PROJECT NAME

1. The undersigned, having executed a contract with _____
_____ for the construction of the above-identified project, acknowledges that:

- (a) The Labor Standards provisions are included in the aforesaid contract,
- (b) Correction of any infractions of the aforesaid conditions, including infractions by any of his subcontractors and any lower tier subcontractors, is his responsibility.

2. He certifies that:

- (a) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended.
- (b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

3. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.

4. He certifies that:

(a) The legal name and the business address of the undersigned are:

(b) The undersigned is:

(1) A SINGLE PROPRIETORSHIP	(3) A CORPORATION ORGANIZED IN THE STATE OF
(2) A PARTNERSHIP	(4) OTHER ORGANIZATION (Describe)

(c) The name, title and address of the owner, partners or officers of the undersigned are:

NAME	TITLE	ADDRESS

(d) The names and addresses of all other persons having a substantial interest in the undersigned, and the nature of the interest are:

NAME	ADDRESS	NATURE OF INTEREST

(e) The names, addresses and trade classifications of all other building construction contractors in which the undersigned has a substantial interest are:

NAME	ADDRESS	TRADE CLASSIFICATION

Date _____

(Contractor)

By _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____ as PRINCIPAL, and _____, as SURETY are held and firmly bound unto _____ hereinafter called the "Owner", in the penal sum of _____ Dollars, (\$_____), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the Accompanying Bid, dated _____, for _____

NOW, THEREFOR, if the Principal shall not withdraw said Bid within the period specified therein after the opening of the same, or, if no period be specified, within thirty (30) days after the said opening, and shall within the period specified therefor, or if no period be specified, within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the Owner in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract; or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said Bid and the amount for which the local Public Agency may procure the required work or supplies or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS THEREOF, the above-bounded parties have executed this instrument under their several seals this _____ day of _____, the name and corporate seal of each corporate party being hereto affixed and these present signed by its undersigned representative, pursuant to authority of its governing body.

(SEAL)

(SEAL)

Attest:

By: _____

Affix
Corporate
Seal

Attest:

By: _____

Affix
Corporate
Seal

Attest:

By: _____

Countersigned

By _____

* Attorney-in-Fact, State of _____

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____, Secretary of the Corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to, for and in behalf of said corporation by authority of this governing body.

Corporate
Seal

Title: _____

* Power-of-attorney for person signing for surety company must be attached to bond.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor or Company)

(Address)

a _____, hereinafter called Principal,
(Corporation / Partnership)

and _____
(Name of Surety Company)

(Address)

hereinafter called Surety, are held and firmly bound unto

(Name of Recipient)

(Recipient's Address)

hereinafter called OWNER, in the penal sum of \$ _____

Dollars, \$ _____ in lawful money of the United States, for this payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONFIDENTIALITY OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, a copy of which is hereto attached and made a part hereof for the construction of:

(Project Name)

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUB-CONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUB-CONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its

obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counter-parts, each on of (Number) which shall be deemed an original, this the _____ day of _____.

ATTEST: _____
(Principal)

(Principal Secretary) By _____ (s)

(SEAL)

(Witness as to Principal) (Address)

(Address)

ATTEST: _____
(Surety)

(Witness as to Surety) By _____
(Attorney in Fact)

(Address) (Address)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor or Company)

(Address)

a _____ hereinafter called Principal, and

(Name of Surety Company)

(Address)

hereinafter called Surety, are held and firmly bound unto

(Name of Recipient)

(Recipient's Address)

hereinafter called OWNER, in the penal sum of \$ _____ Dollars (\$ ____) in lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, successors, and assigns, jointly and severally, firmly in these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties in all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____
counterparts, each one of which shall be deemed an original, this the _____ day of _____.

ATTEST: _____
(Principal)

_____ By _____ (s)
(Principal Secretary)

(SEAL)

_____ (Witness as to Principal) _____ (Address)

_____ (Address) _____

ATTEST: _____
(Surety)

_____ By _____
(Witness as to Surety) (Attorney in Fact)

_____ (Address) _____ (Address)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

ATTORNEY'S REVIEW CERTIFICATION

I, the undersigned, _____, the duly authorized and acting legal representative of the _____, do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and am of the opinion that each of the agreements may be duly executed by the proper parties, acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties; and that the agreements shall constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Attorney's signature: _____ Date: _____

Print Attorney's Name: _____

Disaster Recovery Projects

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

All contractors/subcontractors that are debarred, suspended or otherwise excluded from or ineligible for participation on federal assistance programs may not undertake any activity in part or in full under this project.

Funding for this project is covered under Section 3 of the Housing and Urban Development Act of 1968. All eligible bidders must comply with Section 3 requirements in regards to meeting or exceeding the required objectives for both hiring and subcontracting. In accordance with these objectives, contractors are required to direct their newly created employment and/or subcontracting opportunities to Section 3 Residents and Business Concerns.

SECTION III
General Provisions

INVITATION TO BID
*
GALVESTON COUNTY, TEXAS

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GENERAL PROVISIONS – INVITATION TO BID

*

GALVESTON COUNTY, TEXAS

1. BID PACKAGE

*The Invitation to Bid, general and special provisions, drawings, specifications/line item details, contract documents and the Bid sheet are all part of the Bid package. **BIDs must be submitted in sets of * (*), one (1) original and * (*) copies** on the forms provided by the County if County forms are provided, including the Bid sheets completed in their entirety and signed by an authorized representative by original signature. Failure to complete and sign the Bid sheets/contract page(s) may disqualify the Bid from being considered by the Commissioners' Court. Any individual signing on behalf of the Bidder expressly affirms that he or she is duly authorized to tender this Bid and to sign the Bid sheet/contract under the terms and conditions in this bid on behalf of the Bidder and to bind the Bidder to the terms and conditions of this bid and the Bidder's response hereto. Bidder further understands that its' signing of the contract shall be of no effect unless the contract is subsequently awarded by the Commissioners' Court and the contract properly executed by the Commissioners' Court. All figures must be written in ink or typed. Figures written in pencil or with erasures are not acceptable. However, mistakes may be crossed out, corrections inserted, and initialed in ink by the individual signing the bid. If there are discrepancies between unit prices quoted and extensions, the unit price shall prevail. Each Bidder is required to thoroughly review this entire Bid package to familiarize themselves with the Bid procedures, the plans and specifications for the requested work, as well as the terms and conditions of the contract the successful Bidder will execute with the County.*

2. BIDDER'S RESPONSIBILITY

The Bidder must affirmatively demonstrate its responsibility. The Bidder must also meet the following minimum requirements:

- A. have adequate financial resources or the ability to obtain such resources as required;
- B. be able to comply with all federal, state, and local laws, rules, regulations, ordinances and orders regarding this Invitation to Bid;
- C. have a satisfactory record of performance;
- D. have a satisfactory record of integrity and ethics; and
- E. be otherwise qualified and eligible to receive an award.

3. TIME FOR RECEIVING BIDS

Bids may be submitted by mail or hand delivery and **must be submitted to the Galveston County Purchasing Agent**. If by delivery, the Bidder must deliver to the reception desk in the County Purchasing Agent's Office. The delivery and mailing instructions for the Galveston County Purchasing Agent are the following:

**Rufus Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550**

Bids will **not** be accepted by facsimile transmission or by electronic mail (email) unless superseded by instructions within the Special Provisions sections of this solicitation. Bids must be received by the County Purchasing Agent on or before the deadline for the opening of the bids. For clarity, mailing date/postmark is **not** sufficient – bids **must be received** by the County Purchasing Agent on or before the deadline. Late bids will not be accepted and will be returned to the bidder unopened. Bids received prior to the submission deadline will be maintained unopened until the specified time for opening.

GENERAL PROVISIONS – INVITATION TO BID

*

GALVESTON COUNTY, TEXAS

The County Purchasing Agent will accept bids from 8:00 a.m. to 5:00 p.m. on each business day up to the submission deadline. Business days do not include Saturdays and Sundays, and do not include other days in which the County is closed for business in observance of holidays or for other reasons.

The time-stamp clock within the County Purchasing Agent's Office shall be the official time-clock for the purpose of this solicitation and thus shall be the determinant of whether the bid was timely received.

The bidder should prominently identify the procurement number and name on the outside of the envelope/mailing package. A label shall be provided for this purpose and usage of the label is preferred. If the bidder fails to identify the bid on the outside of the envelope as required, the Purchasing Agent will open the envelope for the sole purpose of identifying the bid number for which the submission was made. The envelope will then be resealed. No liability will attach to a County office or employee for the premature opening of a bid.

If a bid is not submitted, return this Invitation to Bid and state reason (s), otherwise your name may be removed from the Purchasing Agent's mailing list.

4. COMPETITIVENESS, INTEGRITY, INQUIRIES AND QUESTIONS

To prevent biased evaluations and to preserve the competitiveness and integrity of the procurement process, **bidders are to direct all communications regarding this invitation to bid only to the Galveston County Purchasing Agent**, unless otherwise specifically noted.

Do not contact the requesting department. Attempts by offering firms to circumvent this requirement will be viewed negatively and may result in rejection of the bid of the firm found to be in non-compliance.

All questions regarding this Invitation to Bid must be submitted in writing to:

Rufus Crowder, CPPO CPPB, Purchasing Agent
722 Moody
Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997
E-mail: rufus.crowder@co.galveston.tx.us

All questions received and the responses thereto will be mailed, emailed, or faxed to all prospective bidders by addendum. No inquiries except clarification of instructions will be addressed by telephone.

Bidder is advised to carefully review this Invitation to Bid – it provides specific information necessary to aid participating firms in formulating a thorough response. Bidder's failure to examine all documents shall not entitle the bidder to any relief from the conditions imposing in the Invitation to Bid and the resultant contract.

An authorized person from the bidder must sign the bid. This signatory must be a person from the submitting firm who is duly authorized to tender and sign the bid on behalf of the bidder and to bind the bidder to the terms and conditions of this Invitation to Bid, the bidder's response, and all other terms and conditions of the contract. By this signature, the bidder further acknowledges that the bidder has read the bid documents thoroughly before submitting a bid and will fulfill the obligations in accordance to the terms, conditions, and specifications detailed herein.

GENERAL PROVISIONS – INVITATION TO BID

*

GALVESTON COUNTY, TEXAS

5. BID OPENING

The Purchasing Agent shall open the bids on the date and time specified herein. Information read aloud at the bid opening is at the sole discretion of the Purchasing Agent. The Purchasing Agent will examine bids promptly and thoroughly.

6. WITHDRAWAL OF BID/FIRM BID RULE

Bidders may request withdrawal of their sealed bid prior to the scheduled bid opening time provided the request for withdrawal is submitted to the Purchasing Agent in writing. No bids may be withdrawn for a period of sixty (60) calendar days after opening of the bids.

7. COMMISSIONERS COURT

No contract is binding on the County until it is properly placed on the Commissioners Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

Department heads and elected officials are not authorized to enter into any type of agreement or contract on behalf of the County. Only the Commissioners' Court acting as a body may enter into a contract on behalf of and contractually bind the County. Additionally, department heads and elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being accepted and signed by the County's authorized representative.

8. REJECTION OF BIDS/DISQUALIFICATION

Galveston County, acting through its Commissioners' Court, reserves the right to:

- reject any and all Bids in whole or in part received by reason of this Invitation to Bid;
- waive any informality in the Bids received;
- disregard the Bid of any Bidder determined to be not responsible;
- disregard the Bid of any Bidder determined to have not submitted its Bid timely; and/or;
- discontinue its efforts for any reason under this Bid package at any time prior to actual execution of contract by the County.

Bidders may be disqualified and rejection of Bids may be recommended to the Commissioners' Court for any of (but not limited to) the following causes:

- A. Failure to use the bid forms furnished by the County, if applicable;
- B. Lack of signature by an authorized representative of bidder;
- C. Failure to properly complete the bid;
- D. Failure to meet the mandatory requirements of this invitation to bid; and/or
- E. Evidence of collusion among bidders.

9. RESTRICTIVE OR AMBIGUOUS SPECIFICATIONS

It is the responsibility of the prospective Bidder to review the entire Invitation to Bid packet and to notify the Purchasing Agent if the specifications are formulated in a manner that would restrict competition or appear ambiguous. Any protest or question(s) regarding the specifications or Bid procedures must be received in the

GENERAL PROVISIONS – INVITATION TO BID

*

GALVESTON COUNTY, TEXAS

Purchasing Agent's Office not less than seventy-two (72) hours prior to the time set for Bid opening. Bidders are to submit their Bid as specified herein or propose an approved equal.

10. SUBSTITUTES/DESCRIPTION OF MATERIALS AND EQUIPMENT

Any brand name or manufacturer reference used herein is intended to be descriptive and not restrictive, unless otherwise noted, and is used to indicate the type and quality of material. The term "or equal" if used, identifies commercially produced items that have the essential performance and salient characteristics of the brand name stated in the item description. All supplies, material, or equipment shall be new and of the most suitable grade for the purpose intended. For clarification, "new" includes products containing recovered materials that are EPA-designated items. It is not the County's intent to discriminate against any materials or equipment of equal merit to those specified. However, if Bidder desires to use any substitutions, prior written approval must be obtained from the Purchasing Agent and sufficiently in advance such that an addendum may be issued. All material supplied must be one hundred percent (100%) asbestos free. Bidder, by submission of its bid, certifies that if awarded any portion of this procurement, the bidder will supply only material and equipment that is 100% asbestos free.

11. EXCEPTIONS TO BID

The Bidder will list on a separate sheet of paper any exceptions to the conditions of the bid. This sheet will be labeled, "Exceptions to Bid Conditions", and will be attached to the bid. If no exceptions are stated, it will be understood that all general and special conditions will be complied with, without exception.

The Bidder must specify in its Bid any alternatives it wishes to propose for consideration by the County. Each alternative should be sufficiently described and labeled within the Bid and should indicate its possible or actual advantage to the program being offered.

The County reserves the right to offer these alternatives to other Bidders.

12. PRICING

Bids will be either lump sum or unit prices as shown on the Bid sheet. The net priced items will be delivered to Galveston County, including all freight, shipping, and delivery charges.

Cash discount must be shown on bid, otherwise prices will be considered net. Unless prices and all information requested are complete, Bid may be disregarded and given no consideration.

In case of default by the contractor, the County of Galveston may procure the articles or services from other sources and may deduct from any monies due, or that may thereafter become due to the contractor, the difference between the price named in the contract of purchase order and the actual cost thereof to the County of Galveston. Prices paid by the County of Galveston shall be considered the prevailing market price at the time such purchase is made. Periods of performance may be extended if the facts as to the cause of delay justify such extension in the opinion of the Purchasing Agent and the Commissioners' Court.

13. PROCUREMENT CARD (P-CARD) PROGRAM

The County of Galveston participates in a Procurement Card (P-Card) program that allows payments made to a vendor by credit card. This method typically results in substantially faster bill payments, sometimes within three (3) to five

GENERAL PROVISIONS – INVITATION TO BID

*

GALVESTON COUNTY, TEXAS

(5) days of the actual transaction date. All transaction fees from the card provider are to be paid by the successful contractor. If your company will accept payment via credit card (Visa, MasterCard), please notate this in your Bid submittal.

14. PASS THROUGH COST ADJUSTMENTS

Except in instances of extreme extenuating circumstances Contractor prices shall remain firm throughout the contract period and any renewals. Examples of extreme extenuating circumstances include such situations as a nationwide rail strike, oil shortage or oil embargo.

In extreme extenuating circumstances, Contractors may be allowed to temporarily “pass through” additional costs they are forced to incur through no fault of their own. A request for a pass through cost increase will not be considered unless a Contractor’s cost for the Contractor’s product exceeds 10% over the original cost for the product. Also, the increase in cost must be nationwide and consistent for a minimum period of sixty (60) days. Costs that historically are anticipated to rise over a period of time (for example only, such as wages or insurance costs) do not qualify for pass through. If a Contractor thinks he will be asking for a pass through cost adjustment during the term of the contract, then the original cost of the product to Contractor must be stated in Contractor’s original bid.

A request for a pass through cost does not guarantee that one will be granted. Contractors must submit such information on each request as required by the County Purchasing Agent. The County Purchasing Agent will review each request on a case-by-case basis and if valid, submit the request to Commissioners Court for authorization and determination of the appropriateness of each request as well as amount and duration of increase. Contractors will not be permitted any additional compensation for mark-ups or profits based on the increase in price. Rather, such additional compensation will be limited to the actual increase in original cost to the Contractor as such increase is reflected by the original cost stated in the bid. But in no event will the amount of additional compensation exceed 25% increase in Contractor’s original cost for the product as such cost is reflected in Contractor’s original Bid or the duration exceed a period of sixty (60) days. In addition should the cost, during the period of the pass through, return to normal or decrease to below pre pass through prices, appropriate downward adjustments shall be made. No more than one pass through adjustment will be permitted per year.

15. MODIFICATION OF BIDS

A Bidder may modify a bid by letter at any time prior to the submission deadline for receipt of Bids. Modification requests must be received prior to the submission deadline. Modifications made before opening time must be initialed by Bidder guaranteeing authenticity. Bids may not be amended or altered after the official opening with the single exception that any product literature and/or supporting data required by the actual specifications, if any, will be accepted at any time prior to the Commissioners’ Court considering of same.

16. SIGNATURE OF BIDS

Each Bid shall give the complete mailing address of the Bidder and be signed by an authorized representative by original signature with the authorized representative’s name and legal title typed below the signature line. Each bid shall include the Bidder’s Federal Employer Identification Number (FEIN). Failure to sign the Contract page(s) and bid response sheets may disqualify the bid from being considered by the County. The person signing on behalf of the Bidder expressly affirms that the person is duly authorized to tender the bid and to sign the bid sheets and contract under the terms and conditions of this Invitation to Bid and to bind the Bidder thereto and further understands that the signing of the contract shall be of no effect until it is properly placed on the Commissioners’ Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

GENERAL PROVISIONS – INVITATION TO BID

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GALVESTON COUNTY, TEXAS

17. AWARD OF BIDS – EVALUATION CRITERIA AND FACTORS

The award will be made to the responsible Bidder whose bid is determined to be the lowest and best evaluated offer demonstrating the best ability to fulfill the requirements set forth in this Invitation to Bid. **The proposed cost to the County will be considered firm and cannot be altered after the submission deadline.**

“Lowest and best” means a bid or offer providing the best value considering associated direct and indirect costs, including transport, maintenance, reliability, life cycle, warranties, and customer service after a sale.

In determining the lowest and best bid for a contract for the purchase of earth-moving, material-handling, road maintenance, or construction equipment, the Commissioners Court may also consider the information submitted under Section 262.0255 of the Local Government Code; and in determining the lowest and best bid for a contract for the purchase of road construction material, the Commissioners Court may consider the pickup and delivery locations of the bidders and the cost to the county of delivering or hauling the material to be purchased. The Commissioners Court may award contracts for the purchase of road construction material to more than one bidder if each of the selected bidders submits the lowest and best bid for a particular location or type of material.

Each Bidder, by submitting a bid, agrees that if its’ bid is accepted by the Commissioners’ Court, such Bidder will furnish all items and services upon which prices have been tendered and upon the terms and conditions in this bid and contract.

The contractor shall commence work only after the transmittal of a fully executed contract and after receiving written notification to proceed from the County Purchasing Agent. The contractor will perform all services indicated in the bid in compliance with this contract.

Neither department heads nor elected officials are authorized to sign any binding contracts or agreements prior to being properly placed on the Commissioners’ Court agenda and approved in open court. Department heads and other elected officials are not authorized to enter into any type of agreement or contract on behalf of Galveston County. Only the Commissioners’ Court, acting as a body, may enter into a contract on behalf of the County. Additionally, department heads and other elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being signed by the County’s authorized representatives.

The County of Galveston reserves the right to accept bids on individual items listed, or group items, or on the bid as a whole; to reject any and all bids; to waive any informality in the bids; to disregard the bids that are not submitted timely; to disregard the bids of bidders determined to be not responsible; and to accept the bid that appears to be in the best interest of the County. The selection process may, however, include a request for additional information or an oral presentation to support the written bid.

In determining and evaluating the best bid, the pricing may not necessarily be controlling, but quality, equality, efficiency, utility, general terms, delivery, suitability of the service offered, and the reputation of the service in general use will also be considered along with any other relevant items. The Commissioners’ Court shall be the sole judge in the determination of these matters.

The County reserves the right to reject any or all Bids in whole or in part received by reason of this Invitation to Bid and may discontinue its efforts under this Invitation to Bid for any reason or no reason or solely for the County’s convenience at any time prior to actual execution of the contract by the County.

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A Bidder whose bid does not meet the mandatory requirements set forth in this Invitation to Bid may be considered non-compliant.

The invitation to submit a bid which appears in the newspaper, or other authorized advertising mediums, these general provisions, the specifications which follow, the Bid sheets, and any addenda issued are all considered part of the Bid.

Each Bidder, by submitting a bid, agrees that if its bid is accepted by the Commissioners' Court, such Bidder will furnish all items and services upon the terms and conditions in this Invitation to Bid and the resultant contract.

Notice of contract award is anticipated to be made within ninety (90) days of opening of Bids to the lowest responsive and responsible contractor, whose bid complies with all the requirements in the Invitation to Bid.

Contractor shall submit to the County, for approval, within ten (10) days from notice of contract award, all Certificates of Insurance evidencing the required coverage as described under Section 35, Requirement of and Proof of Insurance, or if different, then as described within the Special Provisions or resultant contract.

The contractor shall not commence work under these terms and conditions of the contract until all applicable Purchase Orders, Certificates of Insurance, Performance and Payment Bonds, and Irrevocable Letters of Credit (if required) have been approved by the County of Galveston and the Contractor has received notice to proceed in writing and an executed copy of the contract from the County Purchasing Agent.

18. DISPUTE AFTER AWARD/PROTEST

Any actual or prospective Bidder who is allegedly aggrieved in connection with the solicitation of this Invitation to Bid or award of a contract resulting therefrom may protest. The protest shall be submitted in writing to the Purchasing Agent within seven (7) calendar days after such aggrieved person knows of or should have known of the facts giving rise thereto. If the protest is not resolved by mutual agreement, the Purchasing Agent will promptly issue a decision in writing to the protestant. If the protestant wishes to appeal the decision rendered by the Purchasing Agent, such appeal must be made to the Commissioners' Court through the Purchasing Agent. The decision of the Commissioners' Court will be final. The Commissioners' Court need not consider protests unless this procedure is followed.

19. PUBLIC INFORMATION ACT (f/k/a Open Records Act)

The bidder acknowledges that the County is a government body for purposes of the Public Information Act, codified as Chapter 552 of the Texas Government Code, and as such is required to release information in accordance with the provisions of the Public Information Act.

If bidder considers any of its submitted information to be proprietary in nature, trade secret, or otherwise confidential, then it must clearly and conspicuously mark such information as proprietary, trade, secret, or confidential. By the submission of its bid, Bidder expressly affirms that it has clearly and conspicuously marked any information within its submission that Bidder considers confidential, proprietary, and/or trade secret.

In the event the County receives a request for information under the Public Information Act seeking information that the Bidder has marked as confidential, proprietary, and /or trade secret, then the County agrees that it shall provide notice to the Bidder of the request for information and the request for decision process under the Public Information Act. Thus, the County will submit the initial correspondence to the Texas Attorney General – however, the burden is and shall be on the Bidder to submit correspondence to the Attorney General if the Bidder wishes its information to be

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withheld. Bidder is deemed to have knowledge of the Public Information Act. **By the submission of its bid, bidder expressly acknowledges that the burden to withhold its' information from public disclosure lays with the bidder;** thus, bidder further acknowledges and agrees that it shall submit comments to the Texas Attorney General in the request for decision process if bidder wishes to have its' information withheld from public disclosure.

20. BIDDER'S E-MAIL ADDRESSES – CONSENT TO DISCLOSURE

Notwithstanding the foregoing Section 19, Bidder acknowledges and agrees that the confidentiality of any and all email addresses Bidder uses or discloses in communicating with the County are **open** to the public in accordance with Section 552.137 of the Government Code and Bidder consents to the release of its email addresses.

21. RESULTANT CONTRACT

Bidder shall correctly and fully execute the resultant contract first. After this, the contract shall be set for consideration by the Commissioners' Court. If the Commissioners' Court authorizes the execution of the contract, the resultant contract shall become effective upon the Commissioners' Court execution of same, provided that the contract is executed by all parties to the contract. Contract documents shall consist of the contract, the General and Special Provisions, drawings, bid package (including best and final offer(s) if such is utilized), any addenda issued, and any change orders issued during the work. If applicable to the attached bid, bidder must sign three (3) original contracts and return all three with their bid submittal.

Bidder should submit a proposed contract with its Bid or its sample material terms and conditions for review and consideration.

22. CONTRACT TERM

The term of the resultant contract will begin on the date of full execution or the execution by the Commissioners' Court, whichever is later, and will terminate on the date specified in the resultant contract unless terminated earlier as herein set forth.

23. TERMINATION FOR DEFAULT

Failure of either party in the performance of any of the provisions of this contract shall constitute a breach of contract, in which case either party may require corrective action within ten (10) business days from date of receipt of written notice citing the exact nature of such breach. Failure of the party being notified to take corrective action within the prescribed ten (10) business days, or failure to provide written reply of why no breach has occurred, shall constitute a Default of Contract.

All notices relating to default by Bidder of the provisions of the contract shall be issued by the County through its Legal Department, and all replies shall be made in writing to the County Legal Department. Notices issued by or issued to anyone other than the County Legal Department shall be null and void and shall be considered as not having been issued or received.

Galveston County reserves the right to enforce the performance of this contract in any manner prescribed by law in the event of breach or default of this contract, and may contract with another party, with or without solicitation of bids or further negotiations. At a minimum, Bidder shall be required to pay any difference in service or materials, should it become necessary to contract with another source, plus reasonable administrative costs and attorney fees.

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In the event of Termination for Default, Galveston County, its agents or representatives shall not be liable for loss of any profits anticipated to be made by Bidder.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

No waiver by either party of any event of default under this agreement shall operate as a waiver of any subsequent default under the terms of this agreement.

County reserves the right to terminate this contract immediately in the event Bidder:

- A. Fails to meet delivery or completion schedules; and/or
- B. Fails to otherwise perform in accordance with the accepted Bid and the contract.

24. TERMINATION FOR CONVENIENCE

County may terminate this contract upon at least thirty (30) calendar days prior written notice for its convenience or for any reason deemed by the County to serve the public interest. As well, County may terminate this contract upon thirty (30) calendar days prior written notice for any reason resulting from any governmental law, order, ordinance, regulation, or court order. In no event shall County be liable for loss of any profits anticipated to be made hereunder by Bidder should this contract be terminated early.

25. FORCE MAJEURE

If by reason of Force Majeure either Party shall be rendered unable, wholly or in part, to carry out its responsibilities under this contract by any occurrence by reason of Force Majeure, then the Party unable to carry out its responsibility shall give the other Party notice and full particulars of such Force Majeure in writing within a reasonable time after the occurrence of the event, and such notice shall suspend the Party's responsibility for the continuance of the Force Majeure claimed, but for no longer period.

Force Majeure means acts of God, floods, hurricanes, tropical storms, tornadoes, earthquakes, or other natural disasters, acts of a public enemy, acts of terrorism, sovereign conduct, riots, civil commotion, strikes or lockouts, and other causes that are not occasioned by either Party's conduct which by the exercise of due diligence the Party is unable to overcome and which substantially interferes with operations.

26. ESTIMATED QUANTITIES

Any reference to quantities shown in the Invitation to Bid is an estimate only. Since the exact quantities cannot be predetermined, the County reserves the right to adjust quantities as deemed necessary to meet its requirements.

27. CONTRACTOR INVESTIGATION

Before submitting a bid, each Bidder shall make all investigations and examinations necessary to ascertain all site conditions and requirements affecting the full performance of the contract and to verify any representations made by the County upon which the contractor will rely. Bidder shall exercise due diligence and is further charged with knowledge of the local, State, and Federal laws, rules, and regulations applicable to this contract. If the bidder

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receives an award as a result of its bid submission in this procurement, the bidder's failure to have made such investigations and examinations will in no way relieve the bidder from its obligation to comply in every detail with all provisions and requirements of the contract, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim whatsoever by the contractor for additional compensation and/or for excused nonperformance.

28. NO COMMITMENT BY COUNTY OF GALVESTON

This Invitation to Bid does not commit the County of Galveston to award any costs or pay any costs, or to award any contract, or to pay any costs associated with or incurred in the preparation of a bid in response to this Invitation to Bid and does not commit the County of Galveston to procure or contract for services or supplies.

29. BID COSTS BORNE BY BIDDER

Galveston County shall not be liable for any costs incurred by Bidder in preparation, production, or submission of a bid, including but not limited to best and final offer if applicable. As well, Galveston County shall not be liable for any work performed by Bidder prior to issuance of fully executed contract and properly issued notice to proceed. Galveston County shall not be liable for any costs incurred by Bidder by reason of attending a pre-Bid conference. Galveston County shall not be liable for any costs incurred by Bidder by reason of the County invoking use of best and final offers.

30. SINGLE BID RESPONSE

If only one bid is received in response to the Invitation to Bid, a detailed cost bid may be requested of the single bidder. A cost/price analysis and evaluation and/or audit may be performed of the cost bid in order to determine if the price is fair and reasonable.

31. CHANGES IN SPECIFICATIONS

If it becomes necessary to revise any part of this bid, a written notice of such revision will be provided to all Bidders in the form of addenda. The County is not bound by any oral representations, clarifications, or changes made in the written specifications by the County's employees or officials, unless such clarification or change is provided to Bidders in a written addendum from the Purchasing Agent. Bidders are advised to inquire prior to the submission deadline as to whether any addenda to this invitation to bid have been issued, as the successful bidder will be required to abide by such addenda.

The County of Galveston reserves the right to revise or amend the specifications up to the time set for opening of bids. Such revisions and amendments, if any, shall be announced by form of addenda. Copies of such addenda (or addendum in the event only one addendum is issued in the procurement) shall be furnished to all prospective contractors. Prospective contractors are defined as those contractors listed on the County's Invitation to Bid list for this material/service or those who have obtained documents from the Purchasing Agent's Office subsequent to the advertisement. If revisions and amendments require changes in quantities or prices proposed, or both, the date set for opening of bids may be postponed by such number of days as in the opinion of the County shall enable contractors to revise their bids. In any case, the bid opening shall be at least seven (7) business days after the last revising or amendment addendum and the addendum shall include an announcement of the new date, if applicable, for the opening of bids.

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32. BID IDEAS AND CONCEPTS

The County reserves to itself the right to adopt or use for its benefit, any concept, plan, or idea contained in any bid.

33. BID DISCLOSURES

While this procurement is pending, the names of those who submitted bids will not be made public unless in conformity with the County Purchasing Act. Likewise, no pricing or staffing information will be released unless in conformity with the County Purchasing Act. Bidders are requested to withhold all inquiries regarding their bid or other submissions until after an award is made. No communication is to be had with any County employee or official, other than the County Purchasing Agent, regarding whether a bid was received - violations of this provision may result in the rejection of a bid.

34. INDEMNIFICATION

The contractor shall agree to assume all risks and responsibility for, and agrees to indemnify, defend, and save harmless, the County of Galveston, its elected and appointed officials and department heads, and its agents and employees from and against all claims, demands, suits, actions, recoveries, judgments, and costs and expenses including reasonable attorney's fees for the defense thereof in connection therewith on account of the loss of life, property or injury or damage to the person which shall arise from contractor's operations under this contract, its use of County facilities and/or equipment or from any other breach on the part of the contractor, its employees, agents or any person(s), in or about the County's facilities with the expressed or implied consent of the County. Contractor shall pay any judgment with cost which may be obtained against Galveston County resulting from contractor's operations under this contract.

Contractor agrees to indemnify and hold the County harmless from all claims of subcontractors, laborers incurred in the performance of this contract. Contractor shall furnish satisfactory evidence that all obligations of this nature herein above designated have been paid, discharged or waived. If Contractor fails to do so, then the County reserves the right to pay unpaid bills of which County has written notice direct and withhold from Contractor's unpaid compensation a sum of money reasonably sufficient to liquidate any and all such lawful claims.

35. REQUIREMENT OF AND PROOF OF INSURANCE

The successful Bidder shall furnish evidence of insurance to the County Purchasing Agent and shall maintain such insurance as required hereunder or as may be required in the Special Provisions or resultant contract, if different. Contractor shall obtain and thereafter continuously maintain in full force and effect, commercial general liability insurance, including but not limited to bodily injury, property damage, and contractual liability, with combined single limits as listed below or as may be required by State or Federal law, whichever is greater.

- A. For damages arising out of bodily injury to or death of one person in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.
- B. For damages arising out of bodily injury to or death of two or more persons in any one accident:
THREE HUNDRED THOUSAND AND NO/100 (\$300,000.00) DOLLARS.
- C. For any injury to or destruction of property in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.

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Insurance shall be placed with insurers having an A.M. Best's rating of no less than A. Such insurance must be issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from loss or damage that may arise to any person or property by reason of services rendered by Contractor.

Galveston County shall be listed as the additional insured on policy certificates and shall be provided with no less than thirty (30) calendar days prior notice of any changes to the policy during the contractual period.

Certificates of Insurance, fully executed by a licensed representative of the insurance company written or countersigned by an authorized Texas state agency, shall be filed with the County Purchasing Agent within ten (10) business days of issuance of notification from the County Purchasing Agent to Bidder that the contract is being activated as written proof of such insurance and further provided that Bidder shall not commence work under this contract until it has obtained all insurance required herein, provided written proof as required herein, and received written notice to proceed issued from the County Purchasing Agent.

Proof of renewal/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy and Galveston County shall be named as an additional insured on any such renewal/replacement coverage and a certificate of insurance showing such shall be provided to the Purchasing Agent. Said insurance shall not be cancelled, permitted to expire, or changed without at least thirty (30) days prior written notice to the County.

Insurance required herein shall be maintained in full force and effect during the life of this contract and shall be issued on an occurrence basis. Contractor shall require that any and all subcontractors that are not protected under the Contractor's own insurance policies take and maintain insurance of the same nature and in the same amounts as required of Contractor and provide written proof of such insurance to Contractor. Proof of renewed/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy. Contractor shall not allow any subcontractor to commence work on the subcontract until such insurance required for the subcontractor has been obtained and approved.

Workers' Compensation Insurance: Successful Bidder shall carry in full force Workers' Compensation Insurance Policy(ies), if there is more than one employee, for all its' employees, including but not limited to full time, part time, and emergency employees employed by the successful Bidder. Current insurance certificates certifying that such policies as specified above are in full force and effect shall be furnished by successful Bidder to the County.

Insurance is to be placed with insurers having a Best rating of no less than A. The Bidder shall furnish the County with certificates of insurance and original endorsements affecting coverage required by these insurance clauses within ten (10) business days of receiving notification from the County Purchasing Agent that the contract is being activated. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. The Bidder shall be required to submit annual renewals for the term of this contract prior to expiration of any policy.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

The County agrees to provide Bidder with reasonable and timely notice of any claim, demand, or cause of action made or brought against the County arising out of or related to utilization of the property. Bidder shall have the right to defend any such claim, demand, or cause of action at its sole cost and expense and within its sole and exclusive discretion. The County agrees not to compromise or settle any claim or cause of action arising out of or related to the utilization of the property without the prior written consent of the Bidder.

In no event shall the County be liable for any damage to or destruction of any property belonging to the Bidder.

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Subrogation Waiver. Bidder and Bidder's insurance carrier waive any and all rights to subrogation against Galveston County in regard to any suit or claim arising out of personal injury or property damage resulting from Bidder's performance under this agreement.

36. BID GUARANTEE

Unless specified differently within the Special Provisions of this procurement, each Bidder shall be required to submit a bid guarantee with its bid as required within this Section.

Evidencing its firm commitment to engage in contract if Bidder is selected for award of contract, each Bidder is required to furnish with their bid a cashier's check or an acceptable Bidder's bond in the amount of five percent (5%) of the total contract price. If Bidder is using a bond, then the Bidder bond must be executed with a surety company authorized to do business in the State of Texas. Failure to furnish the bid guarantee in the proper form and amount, by the time set for opening of bids may be cause for rejection of the bid.

The cashier's check or Bidder/bid bond (as applicable) will be returned to each respective unsuccessful Bidder(s) subsequent to the Commissioners Court award of contract, and shall be returned to the successful Bidder upon the completion and submission of all contract documents. Provided however, that the cashier's check or Bidder bond will be forfeited to the County as liquidated damages should successful Bidder fail to execute the contract within thirty (30) days after receiving notice of the acceptance of its bid.

37. PERFORMANCE AND PAYMENT BONDS (if required)

Successful Bidder, before beginning work, shall execute a performance bond and a payment bond, each of which must be in the amount of the contract. The required payment and performance bonds must each be executed by a corporate surety authorized to write surety bonds in the State of Texas and in accordance with Chapter 3503 of the Insurance Code (codified in 2005 and originally within Section 1, Chapter 87, Acts of the 56th Leg., R.S., 1959, and in Article 7.19-1, Vernon's Texas Insurance Code).

The performance and payment bonds must each clearly and prominently display on the bond or on an attachment to the bond:

- a.) The name, mailing address, physical address, and telephone number, including the area code, of the surety company to which any notice of claim should be sent; or
- b.) The toll-free telephone number maintained by the Texas Department of Insurance under Subchapter B, Chapter 521, Insurance Code, and a statement that the address of the surety company to which any notice of claim should be sent may be obtained from the Texas Department of Insurance by calling the toll free-telephone number.

The performance bond shall be solely for the protection of Galveston County, in the full amount of the contract, and conditioned on the faithful performance of the work in accordance with the plans, specifications, and contract documents. The payment bond is solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the prime contractor or a subcontractor to supply labor or material, and in the amount of the contract.

The payment and performance bonds required to be furnished herein must be furnished before the contractor begins work and are a requirement for issuance of a Notice to Proceed. Such bonds must be furnished to the Galveston County Purchasing Agent within thirty (30) calendar days after the date of the full execution of the contract or, if applicable, as required under Chapter 2253, Government Code, whichever is earlier. Contractor's failure to provide the required payment and performance bonds within such time period shall constitute an event of default under this

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contract. Contractor shall not commence work until all applicable certificates of insurance, performance bonds, and payment bonds have been received and approved by the County Purchasing Agent and the Contractor receives notice to proceed in writing that has been issued by the County Purchasing Agent.

Additionally, if this request for bid is for the award of a public works contract, then compliance with Chapter 2253 of the Texas Government Code, which is known as the McGregor Act, is mandatory. Performance and payment bonds are required to be furnished in accordance with Chapter 2253 of the Texas Government Code. Bidder should familiarize itself with the entire provisions of Chapter 2253 of the Texas Government Code.

38. PATENT AND COPYRIGHT PROTECTION

The Bidder agrees at its sole expense to protect the County from claims involving infringement of patents, copyright, trademark, trade secret, or other intellectual property rights. **Bidder shall indemnify and save harmless the County of Galveston, its officers, employees, and agents, from liability of any nature and kind whatsoever, including without limitation cost and expenses, for or on account of any copyrighted, trademarked, trade secret, patented or un-patented invention, process, or article manufactured or used in the performance of the contract, or other intellectual property rights, including its use by the County.** Bidder also agrees that if Bidder is awarded this contract, that no work performed hereunder shall be subject to patent, copyright, or other intellectual property by Bidder.

39. CONFLICT OF INTEREST DISCLOSURE REPORTING (FORM CIQ)

Bidder may be required under Chapter 176 of the Texas Local Government Code to complete and file a conflict of interest questionnaire (CIQ Form). The CIQ Form pertains to business relationship, gift giving and family relationship reporting. If bidder is required to file a CIQ Form, then the completed CIQ Form must be filed with the County Clerk of Galveston County, Texas.

Business relationship. If Bidder has an employment or other business relationship with a local government officer of Galveston County or with a family member of a local government officer of Galveston County that results in the officer or family member of the officer receiving taxable income that exceeds \$2,500.00 during the preceding 12-month period, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Gift-giving. If Bidder has given a local government officer of Galveston County or a family member of a local government officer of Galveston County one or more gifts with an aggregate value of more than one-hundred dollars (\$100.00) during the preceding 12-months, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Family member. For purposes of the business relationship and gift giving reporting requirements, a “family member” means a person related to another person with the first degree of consanguinity or affinity, as described by Subchapter B, Chapter 573, Texas Government Code. Examples of persons within the first degree by consanguinity or affinity include a son, daughter, father, mother, spouse, son-in-law, daughter-in-law, father-in-law, mother-in-law, stepson, stepdaughter, stepmother, and stepfather.

Family relationship. If Bidder has a “family relationship” with a local government officer of Galveston County then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County, regardless of whether Bidder has a business relationship or has given gifts to the local government officer or a family member of the local government officer. For this purpose, “family relationship” means Bidder is related within the third degree by consanguinity or the second degree by affinity, as those terms are defined under Chapter 573 of the Texas Government Code, to a local government officer of Galveston County. Examples of such relationships include a son, daughter, mother, father, brother, sister, grandchild, great-grandchild, grandparent, great-grandparent, niece,

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nephew, uncle, aunt, spouse, mother-in-law, father-in-law, daughter-in-law, son-in-law, spouse's grandchild, spouse's grandparent, grandparent's spouse, grandchild's spouse, stepson, stepdaughter, stepmother, and stepfather.

Bidder must file its original CIQ Form with the Galveston County Clerk. The Galveston County Clerk has offices at the following locations:

Galveston County Clerk

Galveston County Justice Center, Suite 2001
600 59th Street
Galveston, Texas 77551

Galveston County Clerk

North County Annex, 1st Floor
174 Calder Road
League City, Texas 77573

Again, if Bidder is required to file a CIQ Form, the original completed form is filed with the Galveston County Clerk (**not the Purchasing Agent**).

For Bidder's convenience, a blank CIQ Form is enclosed with this bid package. Blank CIQ Form(s) may also be obtained by visiting the Purchasing Agent's website – this website is linked from the Galveston County homepage, at <http://www.co.galveston.tx.us>.

Chapter 176 specifies deadlines for the filing of CIQ Forms (both initial filings and updated filings).

It is Bidder's sole responsibility to file a true and complete CIQ Form with the Galveston County Clerk if Bidder is required to file by the requirements of Chapter 176 of the Local Government Code. Bidder is advised that it is an offense to fail to comply with the disclosure reporting requirements dictated under Chapter 176 of the Texas Local Government Code, and the failure to file may be grounds to void the contract, if Bidder is awarded a contract.

If bidder has any questions about compliance with Chapter 176, Bidder may wish to consult its' legal counsel. Compliance is the individual responsibility of each person, business, and agent who is subject to Chapter 176 of the Texas Local Government Code.

40. DISCLOSURE OF INTERESTED PARTIES/FORM 1295

Under Section 2252.908 of the Government Code, any business entity that enters into a contract with Galveston County that requires the approval of the Commissioners Court must submit a "Disclosure of Interested Parties" to the County prior to the execution of the contract. This form, the "Disclosure of Interested Parties" form was promulgated by the Texas Ethics Commission, and is the "Form 1295". **This procurement is subject to these requirements.**

The Texas Ethics Commission was charged with promulgating rules to implement Section 2252.908 of the Government Code. The rules adopted by the Texas Ethics Commission are located at Sections 46.1, 46.3, and 46.5 of Title 1 of the Texas Administrative Code. Thus, the law covering these requirements is located at Section 2252.908 of the Government Code, and in Title 1, Sections 46.1, 46.3, and 46.5 of the Texas Administrative Code.

The Texas Ethics Commission's website is: www.ethics.state.tx.us. The area of the Texas Ethics Commission website pertaining to Form 1295 is:

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www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm.

Form 1295 must be completed electronically through the Texas Ethics Commission website (handwritten forms are not allowable). Once the business entity has completed their electronic filing of Form 1295, then the business entity must print out the electronically completed form, and sign and notarize the Form 1295. Once Form 1295 is signed and notarized, the business entity must submit their completed, signed, and notarized Form 1295 to the Galveston County Purchasing Agent.

Successful Proposer is and shall be subject to these requirements, and no resultant contract may be executed by the Commissioners Court until the completed, signed, and notarized Form 1295 is on file with the County Purchasing Agent.

No portion of the Form 1295 process commits the County to any type of award of contract whatsoever.

After the Purchasing Agent's Office receives the completed, signed, and notarized Form 1295, the Purchasing Agent's Office will, within 30 days, go the Texas Ethics Commission website to submit electronic confirmation of the County's receipt of the completed, signed, and notarized Form 1295.

41. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS & REQUIREMENT TO REGISTER IN SAM

Bidder certifies that neither it, nor any of its Principals, are presently debarred, suspended, proposed for debarment, disqualified, excluded, or in any way declared ineligible for the award of contracts by any Federal agency. Contractor agrees that it shall refund Galveston County for any payments made to Contractor while ineligible. Contractor acknowledges that Contractor's uncured failure to perform under this Agreement, if such should occur, may result in Contractor being debarred from performing additional work for the County, the respecting State Agency administering the grant funding the contract, if applicable, the State, FEMA or HUD (as applicable), and other Federal and State entities. Further, Bidder has executed the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters and returned the fully completed and executed original certification with the submission of its bid. **The truthful and fully completed and executed original of the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters must be included with the submission of Bidder's Bid and is a mandatory requirement of this Invitation to Bid. Bidder's failure to include the fully completed and executed original of this Certification shall be considered non-compliance with the requirements of this Invitation to Bid and grounds for the rejection of Bidder's Bid.** Proposer shall immediately notify the County Purchasing Agent if it becomes debarred or suspended, placed on the Consolidated List of Debarred Contractors, or in any other way becomes ineligible for award of contract by any Federal agency. This Certification is a material fact relied upon by Galveston County; if it is later determined that the contractor did not comply with 2 C.F.R. Part 180 and 2 C.F.R. Part 3000, in addition to the remedies available to Galveston County and the State agency administering this grant, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment of contractor.

If the contract to be awarded pursuant to this procurement involves the use of Federal funds, then bidder must also be registered in the Federal Contractor Registry through the System for Award Management (SAM) to be eligible for award of contract pursuant to this procurement.

Information regarding the SAM is available at:

<http://www.federalcontractorregistry.com/?gclid=CIG1hf2rr8wCFYkCaQoducANZw> or at
<https://www.sam.gov/portal/SAM/#1>.

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No contract involving the use of Federal funds may be awarded to any bidder unless and until such registration is current and in good standing under SAM. Successful bidder must maintain SAM registration throughout the entire term of the agreement with the County. If this contract involves the use of Federal funds, then bidder must enclose proof of such SAM registration within its response, which is also a mandatory requirement of this procurement; failure to enclose such proof shall be considered non-compliance with the requirements of this procurement and grounds for the rejection of bidder's response to this procurement (i.e., bid, proposal, or qualifications statement, as applicable).

42. SOVEREIGN IMMUNITY

The County specifically reserves any claim it may have to sovereign, qualified, or official immunity as a defense to any action arising in conjunction with this contract.

43. CONTROLLING LAW AND VENUE

Bidder acknowledges and agrees that the contract is and shall be governed and construed by the laws of the State of Texas and that venue shall lie exclusively in a court of competent jurisdiction in Galveston County, Texas.

44. MERGERS, ACQUISITIONS

The Bidder shall be required to notify the County of any potential for merger or acquisition of which there is knowledge at the time that a bid is submitted.

If subsequent to the award of any contract resulting from this Invitation to Bid the Bidder shall merge or be acquired by another firm, the following documents must be submitted to the County:

- A. Corporate resolutions prepared by the awarded Bidder and the new entity ratifying acceptance of the original contract, terms, conditions and prices;
- B. New Bidder's Federal Identification Number (FEIN) and;
- C. New Bidder's proposed operating plans.

Moreover, Bidder is required to provide the County with notice of any anticipated merger or acquisition as soon as Bidder has actual knowledge of the anticipated merger or acquisition. The New Bidder's proposed plan of operation must be submitted prior to merger to allow time for submission of such plan to the Commissioners' Court for its approval.

45. DELAYS

The County reserves the right to delay the scheduled commencement date of the contract if it is to the advantage of the County. There shall be no additional costs attributed to these delays should any occur. Bidder agrees it will make no claims for damages, for damages for lost revenues, for damages caused by breach of contract with third parties, or any other claim by Bidder attributed to these delays, should any occur. In addition, Bidder agrees that any contract it enters into with any third party in anticipation of the commencement of the contract will contain a statement that the third party will similarly make no claim for damages based on delay of the scheduled commencement date of the contract.

GENERAL PROVISIONS – INVITATION TO BID

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46. ACCURACY OF DATA

Information and data provided through this Invitation to Bid are believed to be reasonably accurate.

47. SUBCONTRACTING/ASSIGNMENT

Bidder shall not assign, sell, or otherwise transfer its contract in whole or in part without prior written permission of the County acting by and through its Commissioners' Court. Such consent, if granted, shall not relieve the Bidder of any of its responsibilities under this contract.

48. INDEPENDENT CONTRACTOR

Bidder expressly acknowledges that it is an independent contractor. Nothing in this agreement is intended nor shall be construed to create an agency relationship, an employer/employee relationship, a joint venture relationship, or any other relationship allowing County to exercise control or direction over the manner or method by which Bidder or its subcontractors perform in providing the requirements stated in the Invitation to Bid.

49. MONITORING PERFORMANCE

The County shall have the unfettered right to monitor and audit the Bidder's work in every respect. In this regard, the Bidder shall provide its full cooperation and insure the cooperation of its employees, agents, assigns, and subcontractors. Further, the Bidder shall make available for inspection and/or copying when requested, original data, records, and accounts relating to the Bidder's work and performance under this contract. In the event any such material is not held by the Bidder in its original form, a true copy shall be provided.

50. SUBJECT TO APPROPRIATION OF FUNDS

State law prohibits the obligation and expenditure of public funds beyond the fiscal year for which a budget has been approved by the Commissioners' Court. Galveston County anticipates this to be an integral part of future budgets to be approved during the periods of this contract, except for unanticipated needs or events which may prevent such payments against this contract. However, Galveston County cannot guarantee the availability of funds, and enters into this contract only to the extent such funds are made available through appropriation (allocation) by the Commissioners' Court. This contract shall not be construed as creating any debt on behalf of the County of Galveston in violation of TEX. CONST. art. XI, § 7, and it is understood that all obligations of Galveston County are subject to the availability of funds.

51. CONTRACTS SUBJECT TO GRANT FUNDING

Notwithstanding the foregoing, if the contract to be awarded by this procurement is funded with Federal or State grant funds, the bidder acknowledges that the obligations of the County under the contract are contingent upon the continued availability of grant funding to meet the County's obligations. If the grant(s) to the County is reduced, de-obligated, or otherwise discontinued or terminated, Contractor agrees that the County may immediately terminate the contract without penalty or any liability whatsoever on the part of the County, the State, or the Federal awarding agency.

GENERAL PROVISIONS – INVITATION TO BID

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52. PROCUREMENT ETHICS

Galveston County is committed to the highest ethical standards. Therefore, it is a serious breach of the public trust to subvert the public purchasing process by directing purchases to certain favored vendors, or to tamper with the competitive bidding process, whether it's done for kickbacks, friendship or any other reason. Since misuse of the purchasing power of a local government carries criminal penalties, and many such misuses are from a lack of clear guidelines about what constitutes an abuse of office, the Code of Ethics outlined below must be strictly followed.

Galveston County also requires ethical conduct from those who do business with the County.

CODE OF ETHICS – Statement of Purchasing Policy:

Public employment is a public trust. It is the policy of Galveston County to promote and balance the objective of protecting the County's integrity and the objective of facilitating the recruitment and retention of personnel needed by Galveston County. Such policy is implemented by prescribing essential standards of ethical conduct without creating unnecessary obstacles to entering public office.

Public employees must discharge their duties impartially so as to assure fair competitive access to governmental procurement by responsible contractors. Moreover, they should conduct themselves in such a manner as to foster public confidence in the integrity of the Galveston County procurement organization.

To achieve the purpose of this Article, it is essential that those doing business with Galveston County also observe the ethical standards prescribed herein.

General Ethical Standards:

It shall be a breach of ethics to attempt to realize personal gain through public employment with Galveston County by any conduct inconsistent with the proper discharge of the employee's duties.

It shall be a breach of ethics to attempt to influence any public employee of Galveston County to breach the standards of ethical conduct set forth in this code.

It shall be a breach of ethics for any employee of Galveston County to participate directly or indirectly in a procurement when the employee knows that:

- The employee or any member of the employee's immediate family, has a financial interest pertaining to the procurement;
- A business or organization in which the employee or any member of the employee's immediate family, has a financial interest pertaining to the procurement; or
- Any other person, business, or organization with which the employee or any member of the employee's immediate family is negotiating or has an arrangement concerning prospective employment is involved in the procurement.

Gratuities:

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

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Kickbacks:

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

Contract Clause:

The prohibition against gratuities and kickbacks prescribed above shall be conspicuously set forth in every contract and solicitation by Galveston County.

Confidential Information:

It shall be a breach of ethics for any employee or former employee of Galveston County to knowingly use confidential information for actual or anticipated personal gain, or for the actual or anticipated gain of any other person.

Prohibition against Contingent Fees:

It shall be a breach of ethical standards for a person to be retained, or to retain a person, to solicit or secure a Galveston County contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies for the purpose of securing business. Failure to abide by this section constitutes a breach of ethical standards.

Representation:

Bidder represents and warrants, by signing and submitting its bid, that it has not retained anyone in violation of this section prohibiting contingent fees.

Contract Clause:

The representation prescribed above shall be conspicuously set forth in every contract and solicitation thereof.

53. NON-COLLUSION AFFIDAVIT

Bidder certifies, by signing and submitting a bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the contractor has not directly or indirectly induced or solicited another contractor to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any contractor or anyone else to put in a sham bid or that anyone shall refrain from bidding; that the contractor has not in any manner, directly or indirectly, sought by agreement, communications, or conference with anyone to fix the bid price of the contractor of any other bidder, or to fix any overhead, profit or cost element of the bid price, or that of any other contractor, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the contractor has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any cooperation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

A blank Non-Collusion Affidavit is included with this Bid packet. Bidder must enclose a truthful and fully executed original Non-Collusion Affidavit with the submission of its bid. This is a mandatory requirement of this Invitation to Bid. Failure to include the truthfully and fully executed Non-Collusion Affidavit in the submission of its Bid shall be considered non-compliance with the requirements of this Invitation to Bid by the Bidder and grounds for the rejection of Bidder's submission.

No negotiations, decisions, or actions shall be initiated by any company as a result of any verbal discussion with any County employee prior to the opening of responses to this Invitation to Bid.

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No officer or employee of the County of Galveston, and no other public or elected official, or employee, who may exercise any function or responsibilities in the review or approval of this undertaking shall have any personal or financial interest, direct or indirect, in any contract or negotiation process thereof. The above compliance request will be part of all County of Galveston contracts for this service.

54. CERTIFICATION REGARDING LOBBYING

Bidder certifies that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the bidder, to any person for influencing or attempting to influence a department or employee of an agency, a member of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.
- b. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence a department or employee of any agency, a member of Congress, a department or employee of congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the bidder shall complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying”, in accordance with its instructions.
- c. Bidder shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

The truthful and fully completed and executed original of the Certification Regarding Lobbying (included with bid packet) must be included with the submission of Bidder’s Bid and is a mandatory requirement of this Invitation to Bid. Bidder’s failure to include the fully completed and executed or original of this Certification shall be considered non-compliant with the requirements of this Invitation to Bid and grounds for the rejection of the Bidder’s Bid. Submission of the certification is a prerequisite for making or entering into a contract with Bidder and is imposed by Section 1352, Title 31, United States Code. Further, any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

55. NON-DISCRIMINATION

- a. **Equal Employment Opportunity:** Bidder will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, disability, genetic information or veteran status. Bidder will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, sex, disability, genetic information or veteran status. Such action shall include, but not be limited to, the following: employment; upgrading; demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Bidder agrees to post in conspicuous places, available to employees and applicants for employment, notices of employment.

Bidder will, in all solicitation or advertisements for employees placed by or on behalf of Bidder, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, disability, genetic information, or veteran status.

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Bidder will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Agreement so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

Bidder will include the provisions herein in every subcontract or purchase order unless exempted.

- b. Drug Free Work Place Act: Bidder shall comply with all applicable requirements of the Drug-Free Workplace Act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. § 8102, et seq.) and implementing regulations thereunder.
- c. Americans with Disabilities Act: Bidder shall comply with all applicable provisions of the Americans with Disabilities Act of 1990 (Public Law 101-136) and implementing regulations thereunder.
- d. OSHA Regulations: Bidder agrees to maintain and to display any applicable materials for its employees in accordance with OSHA regulations.
- e. Compliance with Immigration Laws and Use of E-Verify: Bidder agrees to comply with all requirements of the U.S. Immigration Reform and Control Act of 1986, as amended, and any implementing regulations thereto. Bidder further agrees to utilize the E-Verify system through the Department of Homeland Security on its employees. Bidder shall not employ unauthorized aliens, and shall not assign services to be performed to any supplier or subcontractor who are unauthorized aliens. If any personnel performing any services hereunder are discovered to be an unauthorized alien, then Bidder will immediately remove such personnel from performing services hereunder and shall replace such personnel with personnel who are not unauthorized alien(s).
- f. State and Federal Law Compliance: Bidder agrees to comply with all other State and Federal laws and regulations applicable to the provision of services under this contract.

56. RECORD RETENTION AND RIGHT TO AUDIT

Bidder shall keep and maintain all records associated with this contract for a minimum of five (5) years from the close of the contract or as required by Federal or State law or regulation, whichever period is longer. If awarded this contract, Bidder shall allow the County reasonable access to the records in Bidder's possession, custody, or control that the County deems necessary to assist it in auditing the services, costs, and payments provided hereunder. If this contract involves the use of Federal or State funds, then Bidder shall also allow reasonable access to representatives of the Office of Inspector General, the General Accounting Office, and the other Federal and/or State agencies overseeing the funds that such entities deem necessary to facilitate review by such agencies and Bidder shall maintain fiscal records and supporting documentation for all expenditures in a manner that conforms with OMB Circular A-87 (relocated to 2 C.F.R. Part 225) and this contract.

57. TITLE VI ASSURANCES/TxDOT

The County is subject to Title VI of the Civil Rights Act of 1964 and the Federal and State laws and regulations of the United States Department of Transportation and Texas Department of Transportation (TxDOT). Pursuant to these requirements, the County must have its contractors provide required assurances on compliance with non-discrimination by itself and its subcontractors. The Title VI Assurances within this Subsection are not exhaustive – whenever any Federal, State, or Local requirement requires additional clauses, this list shall not be construed as limiting. Contractor agrees as follows:

- (1) **Compliance with Regulations:** The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, DOT)

GENERAL PROVISIONS – INVITATION TO BID

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Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are incorporated herein by reference and made a part of this contract.

- (2) **Non-discrimination:** The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the basis of race, color, national origin, religion, sex, age, disability or Veteran status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
- (3) **Solicitations for Subcontractors, Including Procurement of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, religion, sex, age, disability or Veteran status.
- (4) **Information and Reports:** The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Galveston County or the Texas Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of the Contractor is in the exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to Galveston County or the Texas Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.
- (5) **Sanctions for Non-compliance:** In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, Galveston County shall impose such contract sanctions as it or the Texas Department of Transportation may determine to be appropriate, including, but not limited to:
 - (a) withholding of payments to the Contractor under the contract until the Contractor complies, and/or;
 - (b) cancellation, termination, or suspension of the contract, in whole or in part.
- (6) **Incorporation of Provisions.** The Contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as Galveston County or the Texas Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request Galveston County to enter into such litigation to protect the interests of Galveston County, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

58. SECTION 231.006, FAMILY CODE/DELINQUENT CHILD SUPPORT

Pursuant to Title 5, Section 231.006 of the Texas Family Code, as applicable, Bidder certifies that it, including all of its principals, is/are current in child support payments and that it is eligible to receive payments from State funds under a contract for property, materials, or services. Bidder acknowledges and agrees that if it is awarded this contract, then the ensuing agreement may be terminated and payment withheld if this certification is inaccurate. Finally, by the submission of its bid, the Bidder certifies that it has included the names and social security numbers of each person with at least 25% ownership interest in Bidder within its response to the Invitation to Bid and that all such persons are current in child support payments.

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59. ANTITRUST

Pursuant to 15 U.S.C. § 1, et seq., and Texas Business and Commerce Code, Chapter 15, Contractor, by the submission of its bid, certifies that neither Contractor nor any natural person, proprietorship, firm, corporation, partnership, association, or institution represented by Contractor or anyone acting for such natural person, proprietorship, firm, corporation, partnership, association, or institution has violated any Federal or State antitrust laws or communicated the nature of the offer, directly or indirectly, to any competitor or other person engaged in a similar line of business.

60. LABOR STANDARDS

On contracts funded under a federal grant: Bidder acknowledges that the contract to be awarded pursuant to this solicitation is on a grant program funded with Federal funds. Bidder shall comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled “Equal Employment Opportunity”, Copeland, “Anti-Kickback” Act (40 U.S.C. 3145, 29 C.F.R. Part 3), the Davis-Bacon and Related Acts (40 U.S.C. 3141-3148, 29 C.F.R. Parts 1,3, and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement. Bidder is also responsible for ensuring that all subcontractors comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled “Equal Employment Opportunity”, Copeland “Anti-Kickback” Act, the Davis-Bacon and Related Acts (29 CFR Parts 1, 3 and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement.

61. PROCUREMENT LAWS

- a. Bidder shall comply with all applicable local, State, and Federal procurement laws, rules, and regulations.
- b. If this contract is made pursuant to a federal award, then Contractor acknowledges that the contract is subject, without limitation, to applicable provisions within 2 C.F.R. Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. Contractor shall comply with applicable provisions within 2 C.F.R., Sections 200.319 through 200.326, including but not limited to the following:
 - 1.) **Equal Employment Opportunity**, 41 C.F.R. Part 60-1.4(b) (applicable to federally assisted construction contracts).
 - (a) During the performance of this contract, the contractor agrees as follows:
 - (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national original, disability, or veteran status. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national original, disability or veteran status. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

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- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national original, disability, or veteran status.
 - (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and by rules, regulations, and relevant orders of the Secretary of Labor.
 - (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to contractor's books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
 - (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 - (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.
- 2.) **Small and minority business, women's business enterprises, and labor surplus area firms (2 C.F.R. § 200.321).** The County is required to take affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. This includes requiring the prime contractor, if subcontracts are to be let in the performance of this contract, to itself take affirmative steps in letting the subcontract. Accordingly, if subcontracts are to be let in the performance of this contract, the contractor must take affirmative steps in the letting of the subcontract(s), which must include:
- (a) placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 - (b) assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 - (c) dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises; and
 - (d) using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

In accordance with FEMA procurement guidance:

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A small business is a business that is independently owned and operated, not dominant in the field of operation in which it is bidding on Galveston County contracts, and qualified as a small business under the Small Business Administration criteria and size standards at 13 C.F.R. Part 121.

A women's business enterprise is a business enterprise that is: (a) at least 51 percent owned by one or more women or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more women; and (b) whose management and daily operations are controlled by one or more women.

A minority business is a business that is (a) at least 51 percent owned by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more minority group members; and (b) whose management and daily operations are controlled by one or more minority group members.

- 3.) **Davis-Bacon Act as amended (40 U.S.C. 3141-3148).** When required by Federal program legislation, all prime construction contracts in excess of \$2,000 must include a provision for compliance with the Davis-Bacon Act as supplemented by the Department of Labor regulations (29 C.F.R. Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractor must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity (the County) must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be condition upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contract must also include a provision for compliance with the Copeland Anti-Kickback Act (40 U.S.C. § 3145) as supplemented by the Department of Labor regulations (29 C.F.R. Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States").
- 4.) **Compliance with the Copeland "Anti-Kickback" Act.** Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which the person is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. "Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined under this title [Title 18, U.S.C.] or imprisoned not more than five years, or both." 18 U.S.C. § 874.
 - (a) Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. Part 3 as may be applicable, which are incorporated by reference into this contract.
 - (b) The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as the Federal awarding agency may be appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
 - (c) Breach. A breach of the contract clause above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.
- 5.) **Contract Work Hours and Safety Standards Act.**

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- (a) Where applicable, all contracts awarded by the County in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by the Department of Labor regulations at 29 C.F.R. Part 5. Under 40 U.S.C. 3702 of the Contract Work Hours and Safety Standards Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.S. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchase of supplies or material or articles ordinarily available on the open market, or contractors for transportation or transmission of intelligence.
- (b) Compliance with the Contract Work Hours and Safety Standards Act.
- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this subsection the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this subsection, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this subsection.
- (3) Withholding for unpaid wages and liquidated damages. The awarding Federal agency, State agency, or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this subsection.
- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this subsection and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this subsection.
- 6.) Rights to Inventions Made Under a Contractor Agreement.**
- (a) If the Federal award meets the definition of “funding agreement” under 37 C.F.R. § 401.2(a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under the “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 C.F.R. Part 401,

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“Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

- (b) Stafford Act Disaster Grants. This requirement does not apply to Public Assistance, Hazard Mitigation Grant Program, Crisis Counseling Assistance and Training Grant program, Disaster Case Management Grant Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program, as FEMA awards under these programs do not meet the definition of “funding agreement.”
 - (c) The regulations and 37 C.F.R. § 401.2(a) currently defines “funding agreement” as any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal government. This term also includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as defined in the first sentence of this paragraph.
- 7.) **Clean Air Act (42 U.S.C. §§ 7401 – 7671q) and the Federal Water Pollution Control Act 933 U.S.C. §§ 1251-1387), as amended.**
- (a) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401, et seq., and agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Contract Act, as amended, 33 U.S.C. § 1251, et seq.
 - (b) The contractor agrees to report each violation of the Clean Air Act and/or the Federal Water Pollution Control Act to the Federal awarding agency, the State agency administering the grant, and the Regional Office of the Environmental Protection Agency (EPA) and understands and agrees that the Federal awarding agency, the State agency, and the EPA will, in turn, report each violation as required to assure notification to Galveston County, the Federal Emergency Management Agency, and the appropriate EPA Regional Office.
- 8.) **Debarment and Suspension (Executive Orders 12549 and 12689).** A contract award must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. Part 180 that implement Executive Orders 12549 and 12689. The Contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- Contractor must comply with 2 C.F.R. Part 180, Subpart C and 2 C.F.R. Part 3000, Subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into. Bidder agrees to comply with the requirements of 2 C.F.R. Part 180, Subpart C, and 2 C.F.R. Part 3000, Subpart C, while this offer is valid and through the period of any contract that may arise from this offer. The bidder further agrees to include a provision requiring such compliance in its lower tier covered transactions.
- 9.) **Procurement of Recovered Materials.**
- (a.) A non-Federal entity that is a State agency or agency of a political subdivision of the State and its contractors must comply with Section 6002 of the Solid Waste Disposal Act, Public Law No. 89-272 (1965) (codified as amended by the Resource Conservation and Recovery Act at 42 U.S.C. § 6962).
 - (b.) In the performance of this contract, the contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—
 - (1) Competitively within a timeframe providing for compliance with the contract performance schedule;

GENERAL PROVISIONS – INVITATION TO BID

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- (2) Meeting contract performance requirements; or
 - (3) At a reasonable price.
- (c) Information about this requirement is available at EPA's Comprehensive Procurement Guidelines website, <http://www.epa.gov/cpg/>. The list of EPA-designated items is available at <https://www.epa.gov/cpg/products.htm>.

In the event of any discrepancy between the provisions in this Section 61 of General Provisions and provisions on the same subject elsewhere within this procurement, the most stringent shall control.

62. ENTIRETY OF AGREEMENT AND MODIFICATION

This contract contains the entire agreement between the parties. Any prior agreement, promise, negotiation or representation not expressly set forth in this contract has no force or effect. Any subsequent modification to this contract must be in writing, signed by both parties.

An official representative, employee, or agent of the County does not have the authority to modify or amend this contract except pursuant to specific authority to do so granted by the Galveston County Commissioners' Court.

63. NOTICE

All notices or other communications required or permitted under this contract shall be in writing and shall be deemed to have been duly given if delivered personally in hand, transmitted by facsimile, or mailed certified mail, return receipt requested with proper postage affixed and addressed to the appropriate party at the following address or at such other address as may have been previously given in writing to the parties (Bidder shall provide its notice information with its Bid submission). If mailed, the notice shall be deemed delivered when actually received, or if earlier, on the third day following deposit in a United States Postal Service post office or receptacle, duly certified, return receipt requested, with proper postage affixed. If delivered in person, notice shall be deemed delivered when receipted for by, or actually received by, the receiving Party. If transmitted by facsimile, notice shall be deemed delivered when receipt of such transmission is acknowledged.

To the County at:

Hon. Mark Henry,
County Judge of Galveston County
722 Moody (21st Street), Second (2nd) Floor
Galveston, Texas 77550
Fax: (409) 765-2653

With copies to:

Rufus Crowder, CPPO CPPB,
Galveston County Purchasing Agent
722 Moody (21st Street), Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997

Robert Boemer, Director,
Galveston County Legal Department
722 Moody (21st Street), Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 770-5560

To the Contractor at:

(Bidder to provide its contact name, address, and facsimile number for notice under the contract.)

GENERAL PROVISIONS – INVITATION TO BID

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GALVESTON COUNTY, TEXAS

64. USE OF DHS SEAL, LOGO, AND FLAGS PROHIBITED WITHOUT PRIOR APPROVAL

Contractor must obtain permission from the U.S. Department of Homeland Security financial assistance office (DHS FAO) **prior** to using DHS seals(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials, including use of the United States Coast Guard seal, logo, crests or reproductions of flags or likenesses of Coast Guard Officials.

65. FEDERAL GOVERNMENT NOT A PARTY

Contractor acknowledges that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to Galveston County, contractor, or any other party pertaining to any matter resulting from the contract.

66. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS

In contracts funded through Federal grants, Contractor acknowledges that 31 U.S.C. Chapter 38, Administrative Remedies for False Claims and Statements (31 U.S.C. § 3801, et seq.) and the implementing regulations thereunder, 49 C.F.R. Part 79, apply to Contractors actions pertaining to the contract.

67. LEAD AND ASBESTOS

If this invitation to bid involves remediation, demolition, reconstruction, rehabilitation, repair, or construction, or other applicable activities, the Contractor shall be responsible for performing investigations of lead and asbestos containing materials, and any required lead and asbestos abatement in compliance with Federal, State, and local laws, rules, regulations, ordinances and orders, relating to lead abatement and asbestos abatement as applicable, including but not limited to the Texas Asbestos Health Protection Act, codified as Chapter 1954 of the Occupations Code; the Texas Asbestos Health Protection Regulations, located at Title 25, Part 1, Chapter 295, Subchapter C of the Texas Administrative Code; Chapter 1955 of the Texas Occupations Code (lead-based paint abatement); the Texas Environmental Lead Reduction regulations, located at Title 25, Part 1, Chapter 295, Subchapter I of the Texas Administrative Code; the federal National Emission Standards for Asbestos regulations, located at Title 40, Part 61, Subpart M of the Code of Federal Regulations, and the National Emission Standards for Hazardous Air Pollutants. Contractor shall perform such inspections, encapsulation, remediation or other actions as required by federal, State, or local requirements in accordance with the federal Environmental Protection Agency (EPA), Texas Department of State Health Services (TXDHS), and Texas Commission on Environmental Quality (TCEQ) requirements.

End of General Provision Section

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BID # 228101-1-BID 10
OPEN DATE
TIME 2:00 P.M.

End of General Provision Section

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Title 29 - LABOR

Subtitle A - Office of The Secretary of Labor

**PART 3 - CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK
FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES**

- ✓ Sec.
 - ✓ 3.1 Purpose and scope
 - 3.2 Definitions
 - ✓ 3.3 Weekly statement with respect to payment of wages
 - 3.4 Submission of weekly statements and the preservation and inspection of weekly payroll records.
 - ✓ 3.5 Payroll deductions permissible without application to or approval of the Secretary of Labor.
 - ✓ 3.6 Payroll deductions permissible with the approval of the Secretary of Labor.
 - ✓ 3.7 Applications for the approval of the Secretary of Labor
 - ✓ 3.8 Action by the Secretary of Labor upon applications.
 - ✓ 3.9 Prohibited payroll deductions.
- 3.10 Methods of payment of wages.
- 3.11 Regulations part of contract.

AUTHORITY: The provisions of this Part 3 issued under R.S. 161, sec. 2, 48 Stat. §48; Reorg. Plan No. 14 of 1950, 64 Stat. 1267, 5 U.S.C. Appendix; 5 U.S.C. 301; 40 U.S.C. 276c.

SOURCE: The provisions of this Part 13 appear at 29 F.R. 97, Jan. 4, 1964, unless otherwise noted.

Section 3.1 Purpose and Scope

This part prescribes "anti-kickback" regulations under section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States. The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with Federally-assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payment permissible on such work.

Section 3.2 Definitions.

As used in the regulations in this part:

(a) The terms "building" or "work" generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges) dams, plants) highways, parkways, streets) subways, tunnels, sewers, mains, power lines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the foregoing *sentence*, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires

title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a "building" or "work" within the meaning of the regulations in this part.

(b) The terms "construction," "prosecution," "completion," or "repair" mean all types of work done on a particular building or work at the site thereof, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

(c) The terms "public building" or "public work" include building or work for whose construction, prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.

(d) The term "building or work financed in whole or in part by loans or grants from the United States" includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment or part payment is made directly or indirectly from funds provided by loans or grants by a Federal agency. The term includes building or work for which the Federal assistance granted is in the form of loan guarantees or insurance.

(e) Every person paid by a contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is "employed" and receiving "wages," regardless of any contractual relationship alleged to exist between him and the real employer.

(f) The term "any affiliated person" includes a spouse, child, parent, or other close relative of the contractor or subcontractor; a partner or officer of the contractor or subcontractor; a corporation closely connected with the contractor or subcontractor as parent, subsidiary or otherwise, and an officer or agent of such corporation.

(g) The term "Federal agency" means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentality's of the United States and of the District of Columbia, including corporations, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentality's.

{29 FR 97, Jan. 4, 1964, as amended at 33 FR 32575, Nov. 27, 1973}

Section 3.3 Weekly statement with respect to payment of wages.

(a) As used in this section, the term "employee" shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors of such employees.

(b) Each contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States) shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by 29 CFR Parts 3 and 5 during the preceding weekly payroll period. This statement shall be executed by the contractor or subcontractor or by an authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, and, shall be on form WH 348, "Statement of Compliance," or on an identical form on the back of WH 347, "Payroll (For Contractors Optional Use)" or on any form with identical wording. Sample copies of WH 347 and WH 348 may be obtained from the Government contracting or sponsoring agency, and copies of these form may be purchased at the Government Printing Office.

(c) The requirements of this section shall not apply to any contract of \$2,000 or less.

(d) Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitations, variations, tolerances, and exemptions from the requirements of this section subject to such conditions as the Secretary of Labor may specify.

{29 F.R. 95, Jan. 4, 1964, as amended at 33 FR. 10186, July 17, 1968}

Section 3.4 Submission of weekly statements and the preservation and inspection of weekly payroll records.

(a) Each weekly statement required under §3.3 shall be delivered by the contractor or subcontractor, within seven days after the regular payment date of the payroll period, to a representative of a Federal or State agency in charge at the site of the building or work, or if there is no representative of a Federal or State agency at the site of the building or work, the statement

shall be mailed by the contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing the building or work. After such examination and check as may be made, such statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.

(b) Each contractor or subcontractor shall preserve his weekly payroll records for a period of three years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Such payroll records shall be made available at all times for inspection by the contracting officer or his authorized representative, and by authorized representatives of the Department of Labor.

Section 3.5 Payroll deductions permissible without application to or approval of the Secretary of Labor.

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor:

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A "bona fide prepayment of wages" is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court process to be paid to another, unless, the deduction is in favor of the contractor, subcontractor or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing either from principal or income, or both, medical or hospital care, pensions, or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: Provided, however, That the following standards are met: (1) The deduction is not otherwise prohibited by law; (2) it is either: (i) Voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or

(ii) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; (3) no profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and (4) the deductions shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to re]lay loans to or to purchase shares in. credit unions organized and operated in accordance with Federal and State credit union statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: Provided, however, that a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

(j) Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and Part 531 of this title. When such a deduction is made the additional records required under §516.27(a) of this title shall be kept.

(k) Any deduction for the cost of safety equipment of nominal value purchased by the employee as his own property for his personal protection in his work, such as safety shoes, safety glasses, safety gloves, and hard hats, if such equipment is not required by law to be furnished by the employer, if such deduction is not violative of the Fair Labor Standards Act or prohibited by other law, if the cost on which the deduction is based does not exceed the actual cost to the employer where the equipment is purchased from him and does not include any direct or indirect monetary return to the employer where the

equipment is purchased from a third person, and if the deduction is either (1) voluntarily consented to be the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance; or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees.

{36F.R. 9770, May 28, 1971.}

Section 3.6 Payroll deductions permissible with the approval of the Secretary of Labor.

Any contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under §3 .5. The Secretary may grant permission whenever he finds that:

(a) The contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;

(b) The deduction is not otherwise prohibited by law;

(c) The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; and

(d) The deduction serves the convenience and interest of the employee.

Section 3.7 Applications for the approval of the Secretary of Labor.

Any application for the making of payroll deductions under §3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application need not identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions on all current and future contracts of the applicant for a period of 1 year. A renewal of permission to make such payroll deduction will be granted upon the submission of an application which makes reference to the original application, recites the date of the Secretary of Labor's approval of such deductions) states affirmatively that there is continued compliance with the standards set forth in the provisions of §3 .6, and specifies any conditions which have changed in regard to the payroll deductions.

{36 F.R. 9770, May 28, 1971.}

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of §3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made,

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

Section 3.8 Action by the Secretary of Labor upon applications.

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions of §3.6; and shall notify the applicant in writing of his decision.

Section 3.9 Prohibited payroll deductions.

Deductions not elsewhere provided for by this part and which are not found to be permissible under §3.6 are prohibited.

Section 3.10 Methods of payment of wages.

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

Section 3.11 Regulations part of contract.

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see §5.5(a) of this subtitle.

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OPEN DATE
TIME 2:00 P.M.

SECTION IV

Project Scope
General Notes

BID # 228101-1-BID 10
OPEN DATE
TIME 2:00 P.M.

SECTION V

Project Specifications

GALVESTON COUNTY
I-45/HWY 6 WATER DISTRIBUTION SYSTEM

TECHNICAL SPECIFICATIONS

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02527	Polyurethane Coatings on Steel or Ductile Iron Pipe.....	8
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02621	Geotextile	4
02712	Cement Stabilized Base Course	8
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02716 (LD)	Cement Stabilized Sand Base.....	6
02741	Asphaltic Concrete Pavement	10
02821	Chain Link Fences and Gates.....	6
02911	Topsoil.....	2
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13110	Cathodic Protection System	30
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END OF DOCUMENT

Section 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 DEFINITIONS

- A. Large Diameter Lines: Water lines 24-inch in diameter and larger. References to large diameter water lines apply to pipe, valves, and appurtenances 24-inches in diameter and larger associated with projects involving water line, plant, and facility construction.
- B. Small Diameter Lines: Water lines 20-inch in diameter and smaller. Unless otherwise noted in the Contract Documents, requirements pertaining to large diameter water lines do not apply to pipe, valves, and appurtenances 20-inches in diameter and smaller.

1.02 SECTION INCLUDES

- A. Summary of the Work including work by the County, Work sequence, future Work, Contractor use of Premises, and special conditions for substantial completion.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of Contract is for construction of approximately 8,180 linear feet of 16-inch, 24-inch and 39-inch diameter water lines with all necessary valves and appurtenances, including connection to existing 16-inch and 39-inch water lines. The proposed water line installation will consist of primarily open cut construction; however, trenchless methods are required at crossings of Avenue L, wetlands, and to avoid existing structures.
- B. The proposed 24-inch water line shall be installed in an existing 20-foot waterline easement adjacent to the Gulf Coast Water Authority (GCWA) Canal.

1.04 CASH ALLOWANCES

- A. A cash allowance is included in the bid proposal for a radio antenna for the SCADA communications, as necessary, as directed by the Engineer.
- B. Contractor's cost for administering services, overhead, profit and other expenses contemplated for the allowance shall be included in the Contract Price and not in the allowance.
- C. Whenever costs are more or less than the stipulated allowance, the Contract Price shall be adjusted accordingly via Change Order, see Specification Section 01255 – Change Order Procedures. The amount of the Change Order shall be the difference between actual costs and the amount of the allowance stated in the Bid.

1.05 WORK SEQUENCE

- A. Construction of this project may require using multiple labor crews working concurrently in order to complete the project within the specified Contract Time.

- B. Due to overall project complexity and numerous active utility interface requirements, submit a sequence of construction of water lines for review by the Project Manager. Proposed sequence of construction to address proposed method and timing of all major construction activities to be undertaken. Refer to Specification Section 01325 – Construction Schedule for specific details.
- C. Data for all facilities and utilities shown were taken from available plans, record drawings, and/or utility maps made available from several sources. Actual field locations of facilities and utilities may vary from that shown on the plans. Contractor shall make a complete and independent verification of utility locations prior to submittal of subsequent shop drawings. Unless otherwise approved by the Project Manager, work shall not continue at locations where there is a conflict with existing utilities.
- D. Construction disrupting traffic shall be conducted during off-peak hours, 9:00 a.m. to 4:00 p.m. weekdays and/or weekends 7:00 p.m. Friday to 4:00 a.m. Monday. If work is not completed, plates shall be placed over excavations and normal traffic flow shall be reestablished no later than 4:00 p.m. on weekdays and 4:00 a.m. the Monday following weekend work. Continue work in area using same construction schedule during following, consecutive days and/or weekends until work is completed.
- E. Construction in or near residential areas shall be during the hours of 8:00 a.m. to 5:00 p.m. on weekdays and 9:00 a.m. to 4:00 p.m. on Saturdays. No construction activities shall take place on Sundays except with the approval of the Project Manager. Contractor must obtain approval from the Project Manager to work 24 hours per day in any area.
- F. Maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Provide temporary driveway access in accordance with Specification Sections 01555 - Traffic Control and Regulation and 01145 - Use of Premises. Coordinate work and schedule with impacted business owners and residents.
- G. Notify Project Manager a minimum of two (2) weeks prior to making any system connections to existing sections of the GCWA and Texas City's Water Transmission Systems.
- H. Construct the Work in Phases during the construction period. Contractor shall coordinate construction schedule and operations with the Project Manager.
- I. For projects with no Phases, do not disturb rights-of-way and/or easements for more than fifty (50) percent of the total project linear footage. Disturbed portions shall be restored in accordance with applicable Specification Sections prior to proceeding with work in the event that fifty (50) percent of total project length is disturbed.
- J. Hand dig within one (1) foot of underground service lines (public or private).
- K. Work associated with disinfection, flushing, or cleaning of the new water line shall not begin without prior approval from the Project Manager.

- 1.06 COORDINATION OF WORK
- A. Refer to Specification Section 01312 - Coordination and Meetings.
 - B. Coordinate activity schedule and extend full cooperation to other contractors who have responsibilities either concurrent with, proceeding, or following this Contractor's time along work site. Ensure availability of access to selected portions of this project area to others and provide appropriate information for planning purposes to other contractors. No compensation or time extensions will be allowed as a result of conflicting construction activities.
 - C. PRIVATE RESIDENCES
 - 1. Residents must be notified fourteen (14) days prior to beginning construction on their property. Notification must include type of construction planned and duration of construction activities.
 - 2. Open trenches in or near residential areas must be enclosed with 6 foot chain link fencing. Fencing must be secured in such a manner as to reasonably prevent child access. This fencing is incidental to construction of the water line and shall have no separate pay item.
 - 3. Restore sod and landscaping immediately following construction on each property.
 - D. Coordinate work with the following construction activities by others:
 - 1. Any work being done within the boundaries of the GCWA Canal shall be coordinated with representatives of the GCWA.
 - 2. Any work being done within the Ave. L right-of-way shall be coordinated with representatives of the City of Santa Fe.
 - E. Coordinate work with CenterPoint Energy and verify the relocation of buried facilities in conflict with, parallel to, or in the vicinity of the proposed 24 and 39-inch diameter water line construction.
 - 1. Contact CenterPoint Energy by calling the Utility Coordinating Committee at (713) 233-4567 or (800) 669-8344 a minimum of forty-eight (48) hours prior to construction to have main and/or service lines field located. Contractor is fully responsible for any damages caused by failure to exactly locate and preserve these underground utilities.
 - a. When excavating within eighteen (18) inches of CenterPoint Energy facilities, all excavations must be accomplished using non-mechanized procedures.
 - b. Brace and support CenterPoint Energy facilities when working in close proximity as required. Avoid disturbing or damaging CenterPoint facilities. No separate pay for this work.
 - F. Contact Verizon at (800) 483-2000 a minimum of forty-eight (48) hours prior to construction to have main and/or service lines field located. Contractor is fully

responsible for any damages caused by failure to exactly locate and preserve these underground facilities.

1. When excavating within eighteen (18) inches of Verizon facilities, all excavations shall be accomplished using non-mechanized procedures.
2. When boring, contractor shall expose Verizon facilities.
3. Brace and support Verizon facilities when working in close proximity as required. Avoid disturbing or damaging Verizon facilities. No separate pay for this work.

G. Place a call to all three (3) One-Call centers in the state of Texas a minimum of seventy-two (72) hours prior to construction within twenty-five (25) feet of a private pipeline. Contact numbers for such centers are as follows:

1. TESS (Texas) One Call (800) 344-8377
2. Texas One-Call (800) 245-4545
3. Texas (Lone Star) One Call (800) 669-8344

1.07 CONTRACTOR USE OF PREMISES

- A. Comply with procedures for access to the site and Contractor's use of rights-of-way as specified in Specification Section 01145 - Use of Premises.
- B. Construction Operations: Limited to Road right-of-ways, easements, and areas shown or described in the Contract documents and Construction Plans.
- C. Use of Easements/Sites

1. THERE ARE UNIQUE TERMS IN THE EASEMENTS, RIGHT OF ENTRY, (COLLECTIVELY, THE "EASEMENT DOCUMENTS") WHICH MAY BE SITE SPECIFIC, AND THE CONTRACTOR SHALL FAMILIARIZE ITSELF WITH ALL EASEMENT DOCUMENTS, WHICH ARE ATTACHED HERETO AS EXHIBITS TO THIS AGREEMENT. THE CONTRACTOR, AT ITS SOLE EXPENSE, SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL TERMS OF ALL EASEMENT DOCUMENTS FOR THE PROJECT AND THE EASEMENT RIGHTS DESCRIBED THEREIN. CONTRACTOR SHALL SAFELY, PROPERLY, AND ADEQUATELY ASSUME AND PERFORM ALL OF THE DUTIES, INDEMNITIES, RESPONSIBILITIES, AND LIABILITIES OF OWNER UNDER THE EASEMENT DOCUMENTS. CONTRACTOR SHALL ALSO, AT ITS COST, PROVIDE ALL INSURANCE REQUIRED BY THE EASEMENT DOCUMENTS. (GENERALLY, OWNER IS REFERRED TO AS "GRANTEE" AND THE LANDOWNER IS REFERRED TO AS "GRANTOR" IN THE EASEMENT DOCUMENTS.) ALL LAND INCLUDED WITHIN THE TRACTS COVERED BY THE EASEMENT DOCUMENTS AND EASEMENTS DESCRIBED HEREIN SHALL BE RESTORED TO ITS ORIGINAL CONDITION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION (INCLUDING, WITHOUT

LIMITATION, REPAIR OR REPLACEMENT OF PAVEMENT, CONCRETE, SIGNS, FENCING, TREES, SIDEWALKS, LANDSCAPING, SHRUBBERY, GRASS) UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

- D. Utility Outages and Shutdown: Provide notification to the Project Manager and private utility companies (when applicable) a minimum of forty-eight (48) hours, excluding weekends and holidays, in advance of required utility shutdown. Coordinate all work as required. Contractor's failure or inability to coordinate such utility shutdowns shall not warrant time extensions on Contract.
- E. Existing structures along the vicinity of the proposed alignment shall be closely monitored prior to, during, and for a length of time after construction in all areas. Several conditions including, but not limited to, soil type, construction methods, weather conditions, surrounding construction, personnel experience, and supervision may impact the amount of ground movement within and surrounding the alignment. Survey and adequately document conditions of existing structures within the vicinity of proposed alignment. Monitoring program for proposed trenchless construction operations should be in accordance with Specification Sections 02425(LD) – Tunnel Excavation and Primary Liner for Water Mains and 02447 – Augering Pipe and Conduit.
- F. All work to be done to lines, grades, elevations, and locations shown on Drawings.
- G. Prevent overstress of any structure and any part or member of it during construction. This applies to existing work and structures affected by operations. Check effect of operations in this regard and provide temporary supports and connections required to assure safety and stability of both new and existing work and to prevent overstress of any part.
- H. Contractor shall restore and hydromulch areas damaged during construction per Specification Sections 02922 – Sodding and 02921 – Hydro-Mulch Seeding as described on plans.
- I. Traffic Control:
 - 1. Traffic control plan shall conform to Texas Manual on Uniform Traffic Control Devices (TMUTCD) and sealed by a Licensed Professional Engineer registered in the State of Texas is incorporated into the Drawings. If traffic control will be implemented without modification to plan provided, submit letter confirming that decision. If traffic control will be modified from that shown, submit traffic control plan in conformance with TMUTCD and sealed by a Licensed Professional Engineer registered in the State of Texas.
 - 2. Traffic control plan provided is based on the assumption that there is no conflict with traffic control from separate projects within construction limits. Coordinate work to prevent traffic control conflicts or submit revised traffic control plans to Project Manager for approval. Submitted plans shall be sealed by a Licensed Professional Engineer registered in the

State of Texas and shall be prepared in conformance with TMUTCD at no additional cost to the Owner.

3. Work pertaining to any tunneling operation is allowed twenty-four (24) hours per day, provided aboveground activities do not conflict with provisions of local ordinances and regulations for activity within City rights-of-way, and work does not occur on a Sunday or holiday without prior written approval. No night work shall occur in residential areas without prior written approval. A non-inclusive list of work pertaining to tunneling operations is as follows:
 - a. Tunnel Excavation and incidental work such as muck removal and hauling, ventilation, lighting, survey control of tunnel line and grade, etc.;
 - b. Tunnel Primary Liner;
 - c. Ground Water Control and Ground Stabilization;
 - d. Pipe Installation; and,
 - e. Tunnel Grouting.

Refer to Project Manager to determine if specific tasks pertain to tunneling operations. Submit all tunnel shaft locations, including proposed dimensions and ultimate depths to Project Manager for approval prior to commencement of such work.

1.08 INTERPRETATION OF CONFLICTS

- A. Should conflicts occur in Contract Documents, request interpretation before proceeding with Work by submitting a Request for Information (RFI). Such requests shall first be preceded by a diligent investigation into Contract documents. Contain evidence of such investigation in all requests for interpretation.

1.09 TREE PROTECTION REQUIREMENTS

- A. None.

1.10 ALTERNATE CONSTRUCTION METHODS

- A. Alternate construction methods will be allowed in accordance with applicable details and specifications in Contract Documents at no additional cost to the Owner provided the Owner will receive substantial benefit from alternate construction method(s). Contractor accepts full responsibility for all additional costs of geotechnical investigations and incidental items, including any re-design that may be necessary. Submit the following for review by Project Manager prior to commencement of any construction activity if such alternate construction methods are to be considered; all modifications as listed below must be signed and sealed by a Licensed Professional Engineer registered in the State of Texas prior to submittal to Project Manager.

1. Revisions to horizontal or vertical alignment;

2. Revisions to access manhole details, if applicable;
 3. Revisions to line valve and operator manhole details, if applicable;
 4. Revisions to vacuum relief valve vault details, if applicable;
 5. Revisions to cathodic protection system, if applicable;
 6. Proposed construction method and detailed plan of approach;
 7. Location of access shafts, if applicable;
 8. Proposed traffic control plan; and
 9. Revisions to material specifications.
- B. If alignment revisions are incorporated, inform the Owner of any impact the revised alignment may have on the hydraulic surge potential of the line segment in question and all adjacent line segments, existing or proposed. Failure of agreement between the Contractor and the Owner over proposed alternate construction method(s) will require construction to vertical and horizontal alignment and details as set forth in the original contract documents.
- 1.11 UTILITY SERVICE LINES
- A. Public utility service lines (water, sprinkler systems, sanitary, storm, and all types of dry utilities) are not shown on the drawings. Anticipate that such service lines exist and repair them if damaged during construction. Cost for such repairs shall be considered incidental to the Project.
- 1.12 WARRANTY
- A. Comply with warranty requirements in accordance with the General Conditions.
- PART 2 P R O D U C T S
- 2.01 TYPE OF PIPE FOR CONSTRUCTION OF WATER LINE
- A. Except where otherwise shown on Drawings:
1. Provide Prestressed Concrete Cylindrical pipe for construction of proposed 39-inch diameter water line.
 2. Provide Polyvinyl Chloride pipe for construction of proposed 24-inch diameter water line and smaller.
- B. Pipe shall be the product of one (1) manufacturer that has not less than five (5) years successful experience manufacturing pipe of the particular type and size indicated with proposed type joint. Pipe manufacturer must have a certified quality assurance program. Certified program shall be ISO 9001: 2000 or other equivalent nationally recognized program as approved by Project Manager.
- C. Where Carnegie joints are used in thrust restraint areas, weld bell and spigot ring onto steel cylinder, inside and outside unless otherwise approved by the Project Manager.

- D. Manufacturer and subcontractor selection are within Contractor's control; therefore, extension of Contract time due to delays in delivery of Contractor's choice of pipe material shall not warrant time extensions.
- E. It is Contractor's responsibility to ensure length of pipe sections provided and to ensure means and methods comply with requirements and limitations set forth in Contract Documents.
- F. Drawings for water transmission lines have been prepared on the basis of Polyvinyl Chloride Pipe (PVCP) except where specific pipe material is otherwise identified. Certain details pertaining to all types of pipe have been included when a specific difference exists. Include costs associated with changes in installation and construction, tie-ins, valves, vaults, and all other appurtenances to accommodate other pipe in unit cost of water line construction.
- G. Provide bends and fittings as required to comply with invert elevations shown in profile view of Drawings.
- H. Clearly identify different pipe classes of the same pipe material using colored concrete, or similar marking, as approved by Project Manager.
- I. When adjoining proposed large diameter water line to existing large diameter water line of different pipe material and/or coating, provide a flanged connection with insulating kit.
- J. Provide electrical isolation when adjoining to pipe with different material or coating. Coating on welded restrained portions of piping shall be identical to coating on the adjoining pipe sections.
- K. Submit pipe design to Project Manager for review and approval.

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01145

USE OF PREMISES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

General use of site including properties inside and outside rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

1.02 MEASUREMENT AND PAYMENT

No payment will be made for this item. Include cost of work activities specified in this section in overhead cost of this project.

1.03 RIGHTS-OF-WAY

- A. Confine access, operations, and storage areas to rights-of-way provided by Owner; trespassing on abutting lands or other lands in the area is not allowed.
- B. Make arrangements, at no cost to the Owner, for temporary use of private properties. Contractor and Contractor's surety shall indemnify and hold harmless the Owner and Project Manager against claims or demands arising from use of properties outside rights-of-way. Submit notarized copy of agreement between private property owner and Contractor prior to use of area.
- C. Restrict total length of distributed materials along route of construction to 1,000 linear feet unless approved in writing by Project Manager.

1.04 PROPERTIES OUTSIDE OF RIGHTS-OF-WAY

- A. Do not alter condition of properties adjacent to and along rights-of-way.
- B. Do not use ways, means, methods, techniques, sequences, and procedures that result in damage to properties or improvements.
- C. Restore damaged properties outside of rights-of-ways at no cost to Owner.

1.05 USE OF SITE

- A. Obtain approvals from governing authorities prior to impeding or closing public roads and streets. Do not close more than two consecutive intersections at one time.
- B. Notify Project Manager at least 72 hours prior to closing street or street crossing. Obtain permits for street closures in advance.

- C. Maintain 10-foot-wide minimum access lane for emergency vehicles including access to fire hydrants.
- D. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of Work, provide grading and temporary drainage structures to maintain unimpeded flow.
- E. Locate and protect private lawn sprinkler systems which may exist within site. Test existing irrigation systems prior to construction. Repair or replace damaged systems to condition existing at start of Work, or better.
- F. Perform daily clean up in affected construction areas in order to restore site to existing or better conditions. Areas should be free of debris, scrap material, dirt, mud, and other items identified by Project Manager. Do not leave buildings, roads, streets, and other construction areas unclean.
- G. Restore damaged landscaping to condition existing at start of Work, or better.
- H. Beware of overhead power lines existing in area and in close proximity of project. When 10 feet of clearance between energized overhead power line and construction-related activity cannot be maintained, request CenterPoint Energy (CNP) de-energize or move conflicting overhead power line. Contact CNP representatives at (713) 207-7777. Schedule, coordinate and pay costs associated with de-energizing or moving conflicting overhead power lines. There is no separate pay item for this effort. Include these costs in various items of bid that make such work necessary.

1.06 NOTIFICATION TO ADJACENT OCCUPANTS

- A. Notify individual occupants in areas to be affected by Work of proposed construction and time schedule. Notify not less than 72 hours or more than 2 weeks prior to work performed within 200 feet of homes or businesses. Follow form and content of sample door hanger provided by Project Manager.
- B. Include in notification names and telephone numbers of two company representatives for resident contact available on 24-hour call. Include precautions taken to protect private property and identify potential access, utility inconvenience, and disruption.
- C. Contractor shall provide door hangers to notify the residents within the residential areas near construction.
- D. Submit proposed notification to Project Manager for approval. Consider ethnicity of neighborhood where English is not dominant language. Provide notice in understandable language.

1.07 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS

- A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of Work.
- B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment, large tandem axle trucks or equipment that will damage existing roadway surface.
- C. Construct and maintain access roads and parking areas as specified in Section 01504 -Temporary Facilities and Controls.

1.08 EXCAVATION IN STREETS AND DRIVEWAYS

- A. Avoid hindering or inconveniencing of public travel on streets or intersecting alleys for more than two blocks at one time, except by permission of Project Manager.
- B. Obtain necessary permits and Project Manager's approval when nature of Work requires closing entire street. Permits required for street closure are Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners.
- C. Remove surplus materials and debris and open each block for public use when work in that block is complete.
- D. Acceptance of any portion of Work is not based on return of street to public use.
- E. Avoid obstructing driveways or entrances to private property.
- F. Provide temporary crossing or complete excavation and backfill in one continuous operation to minimize duration of obstruction when excavation is required across drives or entrances.
- G. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices.

1.09 TRAFFIC CONTROL

Comply with traffic regulation as specified in Section 01555 - Traffic Control and Regulation.

1.10 SURFACE RESTORATION

- A. Restore site to condition existing before construction.

- B. Repair paved area per requirements of Section 02951 - Pavement Repair and Resurfacing.
- C. Repair damaged turf areas, level with bank run sand conforming to Section 02317 - Excavation and Backfill for Utilities, or topsoil conforming to Section 02911 - Topsoil, and re-sod in accordance with Section 02922 - Sodding. Water and level newly sodded areas with adjoining turf using appropriate steel wheel rollers for sodding. Do not use spot sodding or sprigging. Where indicated on drawings, reseed in accordance with Section 02921-Hydromulch Seeding.

1.11 LIMITS OF CONSTRUCTION

- A. Confine operations to lands within construction work limits shown on Drawings. Unless otherwise noted on Drawings adhere to the following:
 - 1. Where utility alignment is within esplanade, and construction limits are shown on Drawings to extend to edge of esplanade, keep equipment, materials, stockpiles, a minimum of 5 feet from back of curb.
 - 2. Where construction limits are shown on Drawings to extend to property line, keep equipment, materials, stockpiles, a minimum of 5 feet away from sidewalks.

1.12 EQUIPMENT AND MATERIAL SALVAGE

Upon completion of Work, carefully remove salvageable equipment and material. Deliver them as directed by Project Manager. Dispose of equipment offsite at no additional cost to Owner when Project Manager deems equipment unfit for further use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Section 01255

CHANGE ORDER PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Procedures for processing Change Orders, including:

1. Assignment of responsible individual for approval and communication of changes in Work
2. Documentation of change in Contract Price and Contract Time.
3. Change procedures, using proposals and construction contract modifications, Work Change Directive, Unit Price Change Order, Lump Sum Change Order and Actual Field Cost Change Order.
4. Execution of Change Orders.
5. Correlation of Contractor submittals.

1.02 REFERENCES

Rental Rate Blue Book for Construction Equipment (Data Quest Blue Book). Rental Rate is defined as full unadjusted base rental rate for appropriate item of construction equipment.

1.03 RESPONSIBLE INDIVIDUAL

- A. Electronically submit a letter indicating name and address of individual authorized to execute change documents and responsible for informing others in Contractor's employ and Subcontractors of changes to Work. Information shall be provided at Preconstruction Conference.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Submit detailed records of changes in Work in Change Item Module. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in Work.
- B. Document each proposal for change in cost or time with sufficient data to allow evaluation of proposal.

- C. All project documentation is to be transmitted electronically. Documents received by means may not be accepted by Owner.

- D. Documents are to be submitted electronically in *.PDF format. No printed copies will be accepted for review unless original signature is required.

- E. Proposals shall include the following minimum information:
 - 1. Quantities of items in original Bid with additions, reductions, deletions, and substitutions.

 - 2. Quantities and cost of items in original schedule of values with additions, reductions, deletions, and substitutions.

 - 3. Provide unit prices for items not included in Schedule of Unit Prices with supporting information when absent from Schedule of Unit Price Work.

 - 4. Justification for changes in Contract Time.

 - 5. Additional data upon request.

- F. For changes in Work performed on a actual field cost basis, provide the following additional information:
 - 1. Quantities and description of products and equipment.

 - 2. Taxes, insurance and bonds.

 - 3. Overhead and profit as noted in General Conditions.

 - 4. Dates, times, and by whom work was performed.

 - 5. Time records and certified copies of applicable payrolls.

 - 6. Invoices, receipts for products, rented equipment, and subcontracts, similarly documented.

- G. For changes in Work performed on a actual field cost basis, payment for rental equipment will be as follows:
 - 1. Actual invoice cost for duration required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of rental invoice where equipment would otherwise be on site, compute hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and 1 week equals 40 hours.)

 - 2. Do not exceed estimated operating costs given in Blue Book for items of equipment. Overhead and profit will be allowed on operating cost.

- H. For changes in Work performed on a actual field cost basis using Contractor-owned equipment, use Blue Book rates as follows:
 - 1. Contractor-owned equipment will be paid at Blue Book Rental Rate for duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly, or monthly rates. Use 150 percent of Rental Rate for double shifts (one extra shift per day) and 200 percent of Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of appropriate Rental Rate shown in Blue Book. No other rate adjustments apply.
 - 2. Do not exceed estimated operating costs given in Blue Book. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.
 - 3. Contractor owned equipment includes equipment rented from subsidiaries of the company or any company affiliated with the contractor's interest.

1.05 CHANGE PROCEDURES

- A. Changes to Contract Price or Contract Time can only be made by issuance of Change Order. Issuance of Work Change Directive will be formalized into a Change Order. Changes will be in accordance with requirements of the General Conditions.
- B. Project Manager will advise of minor changes in Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.
- C. Request clarification of Drawings, Specifications, Contract Documents, or other information by using Request for Information. Response by Project Manager to Requests for Information does not authorize Contractor to perform tasks outside scope of Work. Changes must be authorized as described in this section.

1.06 PROPOSALS AND CONTRACT MODIFICATIONS

- A. Project Manager may issue Request for Proposal, which includes detailed description of proposed change with supplementary or revised Drawings and Specifications. Project Manager may also request a proposal in response to Request for Information. Prepare and submit proposal within 7 days or as specified in request.
- B. Submit request for Contractor changes to Project Manager describing proposed change and its full effect on Work, with a statement describing reason for change and effect on Contract Price and Contract Time including full documentation.
- C. The Owner may use Design Consultant to review change orders.

1.07 WORK CHANGE DIRECTIVE

- A. Project Manager may issue a signed Work Change Directive instructing Contractor to proceed with a change in Work. Work Change Directive will subsequently be incorporated in Change Order.
- B. Document will describe changes in Work and designate method of determining change in Contract Price or Contract Time.
- C. Proceed promptly to execute changes in Work in accordance with Work Change Directive.

1.08 UNIT PRICE CHANGE ORDER

- A. Where Unit Prices for affected items of Work are included in Bid, unit price Change Order will be based on unit prices, subject to the General Conditions.
- B. Where unit prices of Work are not pre-determined in the Bid Proposal, Work Change Directive or accepted proposal will specify unit prices to be used.

1.09 LUMP SUM CHANGE ORDER

- A. Lump sum change order will be based on accepted proposal.

1.10 ACTUAL FIELD COST CHANGE ORDER

- A. Provide itemized account and supporting data after completion of change, within time limits indicated for claims in the General Conditions.
- B. Project Manager will determine change allowable in Contract Price and Contract Time as provided in the General Conditions.
- C. Maintain detailed records of work done on time-and-material basis as specified in Paragraph 1.04, Documentation of Change in Contract Price and Contract Time.
- D. Provide full information required for evaluation of changes and substantiate costs for changes in Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

Project Manager will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in the General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

- A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record authorized Change Orders as separate line item.

- B. For Unit Price Contracts, next monthly estimate of Work after acceptance of a Change Order will be revised to include new items not previously included and appropriate unit rates.
- C. Promptly revise progress schedules to reflect change in Contract Time, and to adjust time for other items of work affected by change, and resubmit for review.
- D. Promptly enter changes to on-site and record copies of Drawings, Specifications, or Contract Documents as required in Section 01785 - Project Record Documents.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.02 AUTHORITY

- A. Measurement methods delineated in Specification sections are intended to complement criteria of this section. In event of conflict, requirements of the Specification section shall govern.
- B. Project Manager will take measurements and compute quantities accordingly.
- C. Assist by providing necessary equipment, workers, and survey personnel.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantity and measurement estimates stated in Agreement are for contract purposes only. Quantities and measurements supplied or placed in Work and verified by Project Representative shall determine payment as stated in the General Conditions.
- B. When actual Work requires greater or lesser quantities than those quantities indicated in Bid, provide required quantities at unit prices contracted.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement by Weight: Reinforcing steel, rolled or formed steel or other metal shapes are measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies are measured by CRSI or AISC Manual of Steel Construction or scale weights.
- B. Measurement by Volume:
 - 1. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.
 - 2. Excavation and Embankment Materials: Measured by cubic dimension using average end area method.
- C. Measurement by Area: Measured by square dimension using mean length and width or radius.

- D. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
- E. Stipulated Price Measurement: By unit designated in Agreement.
- F. Other: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of Work.
- G. Measurement by Each: Measured by each instance or item provided.
- H. Measurement by Lump Sum: Measure includes all associated work.
- I. Extra work items must be authorized by the Engineer and will be measured as described in each unit of work on the bid form.

1.05 PAYMENT

- A. Payment Includes: Full compensation for required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of Work; and Contractor's overhead and profit.
- B. Total compensation for required Unit Price Work shall be included in Unit Price bid in Bid. Claims for payment as Unit Price Work, but not specifically covered in list of unit prices contained in Bid, will not be accepted.
- C. Interim payments for stored materials will be made only for materials to be incorporated under items covered in unit prices, unless disallowed in General Conditions.
- D. Progress payments will be based on Project Representative's observations and evaluations of quantities incorporated in Work multiplied by unit price.
- E. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities determined by Project Representative multiplied by unit price for Work which is incorporated in or made necessary by the Work.

1.06 NONCONFORMANCE ASSESSMENT

- A. Remove and replace Work, or portions of Work, not conforming to Contract Documents.
- B. When not practical to remove and replace Work, Project Manager will direct one of the following remedies:
 - 1. Nonconforming Work will remain as is, but Unit Price will be adjusted lower at discretion of Project Manager.

2. Nonconforming Work will be modified as authorized by Project Manager, and Unit Price will be adjusted lower at discretion of Project Manager, when modified Work is deemed less suitable than specified.
 - C. Specification sections may modify above remedies or may identify a specific formula or percentage price reduction.
 - D. Authority of Project Manager to assess nonconforming work and identify payment adjustment is final.
- 1.07 NONPAYMENT FOR REJECTED PRODUCTS
- A. Payment will not be made for the following:
 1. Products wasted or disposed of in unacceptable manner.
 2. Products determined as nonconforming before or after placement.
 3. Products not completely unloaded from transporting vehicle.
 4. Products placed beyond lines and levels of required Work.
 5. Products remaining on hand after completion of Work, unless specified otherwise.
 6. Loading, hauling, and disposing of rejected products.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01292

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SECTION INCLUDES

Preparation and submittal of Schedule of Values for stipulated price contracts or for major lump sum items on unit price contracts for progress payments.

1.02 MEASUREMENT AND PAYMENT

No separate payment will be made for this item. Include cost of preparing Schedule of Values in overhead cost for this project.

1.03 DEFINITION

- A. Schedule of Values is itemized list that establishes value of each part of Work for stipulated price contract and for major lump sum items in unit price contract. Schedule of Values is used as basis for preparing applications for payments. Quantities and unit prices may be included in schedule when designated by Project Manager.
- B. Major lump sum item is a lump sum item in Schedule of Unit Price Work which qualifies as Major Unit Price Work as defined in the General Conditions. Break down costs to list major products or operations for each line item which has an installed value of more than \$2000.

1.04 PREPARATION

- A. For stipulated price contracts, subdivide Schedule of Values into logical portions of Work, such as major work items or work in contiguous geographic areas. Use Section 01325 - Construction Schedule to guide subdivision of work items. Items in Schedule of Values will correlate directly with tasks enumerated in Construction Schedule. Organize each portion using Table of Contents of Project Manual as an outline for listing value of Work by Sections. A pro rata share of mobilization, bonds, and insurance may be listed as separate items for each portion of Work.
- B. For unit price contracts, items should include proportional share of Contractor's overhead and profit so that total of all items will equal Contract Price.
- C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include separate item for equipment operation and maintenance data submittal valued at 5 percent of lump sum amount for each equipment item and separate item for testing and adjusting valued at 5 percent of lump sum amount for each equipment item.

- D. Round off figures for each listed item to nearest \$100 except for value of one item, when necessary, to make total of items in Schedule of Values equal Contract Price for stipulated price contracts or lump sum amount in Schedule of Unit Price Work.
- E. Submit Schedule of Values electronically in approved electronic spreadsheet file or *.PDF.

1.05 SUBMITTAL

- A. Submit Schedule of Values in accordance with requirements of Section 01330 - Submittal Procedures. Submit at least 10 days prior to submitting first application for progress payment.
- B. Revise Schedule of Values and resubmit for items affected by contract modifications, Change Orders, and Work Change Directives. After changes are reviewed without exception by Project Manager, make submittal at least 10 days prior to submitting next application for progress payment.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

Section 01312

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

General coordination including preconstruction conference, site mobilization conference, and progress meetings.

1.02 MEASUREMENT AND PAYMENT

No payment will be made for this item. Include cost of meetings and project coordination in overhead cost for this project.

1.03 RELATED DOCUMENTS

Coordination is required throughout documents. Refer to Contract Documents, coordinate as necessary.

1.04 CONTRACTOR COORDINATION

- A. Coordinate scheduling, submittals, and Work of various Specification sections to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and clean up of Work for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
- C. Coordinate access to site for correction of nonconforming Work to minimize disruption of Owner's activities where Owner is in partial occupancy.
- D. Coordination shall be tracked using WHCRWA FTP site.

1.05 PRECONSTRUCTION CONFERENCE

- A. Project Manager will schedule preconstruction conference.
- B. Attendance Required: Project Manager's representatives, Design Consultant, Special Consultants as required by Project Manager, Contractor, and major Subcontractors.
- C. Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Designation of personnel representing parties in Contract, and Design

Consultant.

3. Review of insurance.
4. Discussion of formats for Schedule of Values and Construction Schedule.
5. Procedures and processing of shop drawings, substitutions, pay estimates or applications for payment, Requests for Information, Request for Proposal, Change Orders, and Contract closeout, other submittals
6. Scheduling of Work and coordination with other contractors.
7. Review of Subcontractors.
8. Appropriate agenda items listed for Site Mobilization Conference, Paragraph 1.06C, when preconstruction conference and site mobilization conference are combined.
9. Procedures for testing.
10. Procedures for maintaining record documents.

1.06 SITE MOBILIZATION CONFERENCE

- A. When required by Contract Documents, Project Manager will schedule conference at Project site prior to Contractor occupancy.
- B. Attendance Required: Owner's representatives, Project Manager, Design Consultant, Special Consultants, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 1. Use of premises by Owner and Contractor.
 2. Safety and first aid procedures.
 3. Construction controls provided by Project Manager.
 4. Temporary utilities.
 5. Survey and layout.
 6. Security and housekeeping procedures.
 7. Field office requirements.

1.07 PROGRESS MEETINGS

- A. Hold project meetings at Project field office or other location as designated by Project Manager. Hold meetings at monthly intervals, or more frequently when directed by Project Manager. Schedule all meetings with email verification.
- B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Project Manager's representatives, and Design Consultant as appropriate to agenda topics for each meeting.
- C. Project Manager or representative will make arrangements for meetings, and recording minutes. Minutes will be available within seven days of meeting being conducted.
- D. Project Manager or representative will prepare agenda and preside at meetings.
- E. Provide required information and be prepared to discuss each agenda item.
- F. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress schedule, pay estimates, cash flow curve, payroll, and compliance submittals.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittal schedule and status of submittals.
 - 6. Review of RFI and RFP status.
 - 7. Change Order status.
 - 8. Review of off-site fabrication and delivery schedules.
 - 9. Maintenance of progress schedule.
 - 10. Corrective measures to regain projected schedule.
 - 11. Planned progress during succeeding Work period.
 - 12. Coordination of projected progress.
 - 13. Maintenance of quality and Work standards.
 - 14. Effect of proposed changes on progress schedule and coordination.
 - 15. Other item relating to Work.

PART 2 PRODUCTS (NOT USED)

ART 3 EXECUTION (NOT USED)

END OF SECTION

Section 01321

CONSTRUCTION PHOTOGRAPHS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Photographic requirements for construction photographs and submittals.

1.02 MEASUREMENT AND PAYMENT

No payment will be made for this item. Include cost of construction photographs in overhead cost for this project.

1.03 SUBMITTALS

- A. Refer to Section 01330 for submittal requirements.
- B. Photographs: Electronically submit all photographs in *.JPEG or *.JPG format. Photograph must be submitted of each view and submitted electronically within 7 days of taking photographs. Retain one print in field office at Project site and available for reference.
- C. Extra Prints: When requested by Project Manager, submit extra prints of photographs, with distribution directly to designated parties who will pay costs for extra prints directly to photographer.
- D. Electronically submit photographs taken prior to start of construction to show original site conditions.
- E. Submit photographs monthly, with Pay Estimate. Submit all photographs electronically in *.JPEG or *.JPG format.

1.04 QUALITY ASSURANCE

Responsible for timely execution of photographs, their vantage point, and quality.

PART 2 P R O D U C T S

2.01 PRECONSTRUCTION PHOTOGRAPHS

- A. Prior to commencement of any construction, take digital color photographs of entire route of project and streets proposed to detour traffic. Submit all photographs electronically to Project Manager for use in contract administration and inspection.

- B. Digital Photographs: Minimum picture quality of 2.1 megapixels at a minimum image size (resolution) of 1600 x 1200.

- C. Photographs shall show on readable non-reflective chalkboard:
 - 1. Job number
 - 2. Project number
 - 3. Date and time photographs were taken (Automatic date/time in negative is acceptable)
 - 4. Baseline station, direction of view (e.g., N, S, NW, etc.) and house number or street address and street name on chalkboard.

- D. Indicate condition of the following:
 - 1. Esplanades and boulevards
 - 2. Yards (near side and far side of street)
 - 3. Housewalk and sidewalk
 - 4. Curb
 - 5. Area between walk and curb
 - 6. Particular features (for example, yard light, shrubs, fences, and trees)
 - 7. Provide notation of vantage point marked for location and direction of shot, onkey plan of site

- E. Take sufficient number of photographs to show structural condition of concrete and condition of trees, shrubs, and grass.

- F. In submittal of photographs, include identification of each photograph in approved electronic spreadsheet or *.PDF with following information:
 - 1. Name of Project
 - 2. Name and address of photographer (if professional photographer is used)
 - 3. Name of Contractor
 - 4. Date photograph was taken

- G. Include photographs of streets not previously included in detour.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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Section 01325

CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 GENERAL

- A. Provide Construction Schedules for the Work included in this Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plan. Provide printed activity listings and bar charts in formats described in this Section.
- B. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Project Manager.

1.02 SCHEDULING STAFF

- A. Employ or retain services of individual experienced in CPM scheduling for duration of the Contract. Individual shall cooperate with Project Manager and update schedule monthly as required to indicate current status of the Work.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures. Submit electronic Schedule (in *.PDF format).
- B. During preconstruction meeting, as described in Section 01312 - Coordination and Meetings, provide sample bar charts and activity listings produced from scheduling software proposed. Scheduling software is subject to review by Project Manager and must meet requirements provided in this Section. Project Manager will provide review of samples within 7 days of submittal.
- C. Within 21 days of receipt of approval of Contractor's format, or 30 days of Notice to Proceed, whichever is later, submit proposed Construction Schedule for review. Base Construction Schedule submittal on the following:
 - 1. Level of detail and number of activities required in schedule are dependent on project type.
 - a. For wastewater projects, categorize work type and area code in schedule.
 - 1) For wastewater rehabilitation projects, there are six work-type categories. An area code will be assigned for each Meter Service Area or Basin. Include at least one activity for each unique combination of work type and area code. Normal schedules of wastewater rehabilitation projects

- contain between 35 and 100 activities, depending on number of basins and work types involved in each basin.
- 2) For wastewater relief projects (line work), area codes will be assigned geographically.
 - 3) For wastewater plant or facility work, other criteria may apply to assignment of area codes, such as a combination of geographical and craft categories.
- b. For projects with multiple types of tasks within scope, indicate types of work separately within schedule.
 - c. For projects with work at different physical locations or service areas, or different facilities within a site, indicate each location or facility separately within schedule. Show work on each floor of multi-story building as separate tasks.
 - d. For projects with multiple crafts or significant Subcontractor components, indicate elements separately within schedule. Unless permitted by Project Manager, tasks shall consist of work covered by only one division of Project Manual.
2. Unless permitted by Project Manager, each scheduled task shall be same as Schedule of Values line item, and vice versa.
 3. For projects with Major Unit Price Work, indicate Shop Drawing submittal and review, purchase, delivery, and installation dates on Project schedule. Include activities for testing, adjustment, and delivering O&M manuals.
 4. No task except the acquisition of Major Unit Price Work shall represent more than one percent of Original Contract Price for facility projects and three percent of Original Contract Price for other projects. Duration of tasks may not exceed 40 calendar days.
 5. For projects where operating facilities are involved, identify each period of work which will impact any process or operation in the schedule and that must be agreed to by Project Manager and facility operator prior to starting work in the area.
- D. Construction Schedule submittals shall include:
1. Printed bar charts that meet criteria outlined in this Section and are produced by Contractor's approved scheduling software.
 2. Activity listings that meet criteria outlined in this Section and are produced by Contractor's approved scheduling software.
 3. A predecessor/successor listing sorted by Activity ID that meets criteria outlined in this Section and is produced by Contractor's scheduling software.

4. A logic network diagram is required with first Construction Schedule submittal for facilities projects.
 5. Prepare and submit graphic or tabular display of estimated monthly billings (i.e. a cash flow curve for the Work) with the first schedule submittal. This information is not required in monthly updates, unless significant changes in work require re-submittal of schedule for review. Display shall allocate units indicated in bid schedule or Schedule of Values to Construction Schedule activities. Weighted allocations are acceptable, where appropriate. Dollar value associated with each allocated unit will be spread across the duration of that activity on a monthly basis. Total for each month and cumulative total will be indicated. These monthly forecasts are only for Project Manager's planning purposes. Monthly payments for actual work completed will be made in accordance with the General Conditions.
 6. Narrative Report that provides the information outlined in this Section.
- E. No payment will be made until Project Manager approves Construction Schedule and billing forecast.
 - F. If Contractor desires to make changes in his method of operating and scheduling, after Project Manager has reviewed original schedule, notify Project Manager in writing, stating reasons for changes. When Project Manager considers these changes to be significant, Contractor may be required to revise and resubmit for review all or affected portion of Contractor's Construction Schedule to show effect on the Work.
 - G. Upon written request from Project Manager, revise and submit for review all or any part of Construction Schedule submittal to reflect changed conditions in the Work or deviations made from original schedule.
 - H. Updated Construction Schedule with actual start and actual finish dates, percent complete, and remaining duration of each activity shall be submitted monthly. Data date used in updating monthly Construction Schedule shall be the same date as used in monthly Payment Application. Monthly update of Construction Schedule is required for monthly Payment Application to be processed for payment.
- 1.04 SCHEDULING COMPUTER SOFTWARE REQUIREMENTS
- A. Contractor's scheduling software shall be capable of creating bar charts and activity listings, which can be sorted by various fields (i.e. Activity ID, Early Start, Total Float, Area Code, Specification Section number, and Subcontractor). Use software capable of producing logic network diagram.

- B. Use scheduling software capable of producing activity listings and bar charts with the following information for each activity in the schedule:
1. Activity ID
 2. Activity Description
 3. Estimated (Original) Duration
 4. Remaining Duration
 5. Actual Duration
 6. Early Start Date
 7. Late Start Date
 8. Early Finish Date
 9. Late Finish Date
 10. Free Float
 11. Total Float
 12. Activity Codes (such as Area Code, Work Type, Specification Section, Subcontractor)
- C. Use scheduling software capable of printing calendars using mathematical analysis of schedule, indicating standard workdays of week and scheduled holidays.
- D. Use scheduling software capable of printing activity listing that indicates predecessors and successors, lag factors and lag relationships used in creating logic of the schedule.
- E. Use scheduling software to provide monthly time in Bar Chart format and scale with 12-month scale not to exceed one page width. Bar charts may be printed or plotted on 8-1/2 by 11-inch, 8-1/2 by 14-inch or 11 by 17-inch sheet sizes. Over-size plots are not acceptable.

1.05 NARRATIVE SCHEDULE REPORT

- A. Narrative schedule report shall list activities started this month, activities completed this month, activities continued this month, activities scheduled to start or complete next month, problems encountered this month, and actions taken to solve these problems.

- B. Narrative schedule report shall describe changes made to Construction Schedule logic (i.e. changes in predecessors and lags), activities added to schedule, activities deleted from schedule, any other changes made to the schedule other than addition of actual start dates and actual finish dates and changes of data date and remaining durations for re-calculation of mathematical analysis.
- C. Submit electronic Narrative Schedule Report (in the form of approved word processor or *.PDF format).

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

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Section 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures for:

1. Schedule of Values
2. Construction Schedules and Cash Flow Curve (billing forecast).
3. Shop Drawings, Product Data, and Samples
4. Operations and Maintenance Data
5. Manufacturer's Certificates
6. Construction Photographs
7. Project Record Documents and monthly certification.
8. Video Tapes
9. Design Mixes

1.02 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. Submit shop drawings, data, and samples for related components as required by Owner's Representative in electronic format.
2. Schedule submittals well in advance of need for material or equipment for construction. Allow time to make delivery of material or equipment after submittal is approved.
3. Develop submittal schedule that allows sufficient time for initial review, correction, resubmission, and final review of all submittals. Owner's Representative will review and return submittals to Contractor as expeditiously as possible but amount of time required for review will vary depending on complexity and quantity of data submitted. In no case will submittal schedule be acceptable that allows less than 30 days for initial review by Owner's Representative. This time for review is not justification for delays or additional compensation to Contractor.
4. Owner's Representative's review of submittals covers only general conformity to Drawings, Specifications and dimensions that affect layout.

Contractor is responsible for quantity determination. No quantities will be verified by Owner's Representative. Contractor is responsible for errors, omissions, or deviations from Contract requirements; review of submittals in no way relieves Contractor from the obligation to furnish required items according to Drawings and Specifications.

5. Submit electronic copies of documents unless otherwise specified.
6. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
7. Assume risk for material or equipment which is fabricated or delivered prior to approval. No material or equipment shall be incorporated into Work or included in periodic progress payments until approval has been obtained in specified manner.

B. Transmittal Form and Numbering:

1. Transmit each submittal to Owner's Representative with Transmittal letter which includes:
 - a. Date and submittal number
 - b. Project title and number
 - c. Names of Contractor, Subcontractor, Supplier, and Manufacturer
 - d. Identification of product or material being supplied
 - e. Location of where product or material is being installed
 - f. Specification section number
2. Identification of deviations from contract documents must be clouded on submitted drawings, and itemized and detailed on separate 8½- by 11-inch sheet titled "DEVIATIONS FOR _____." When deviations do not exist, this sheet must state so.
3. Design deviations must be signed and sealed by Professional Engineer registered in State of Texas.
4. Sequentially number each transmittal letter beginning with number 1. Resubmittals use original number with alphabetic suffix (e.g., 2A for first resubmittal of Submittal 2 or 15C for third resubmittal of Submittal 15). Each submittal shall only contain one type of work, material, or equipment. Mixed submittals will not be accepted.

C. Contractor's Stamp:

1. Apply Contractor's Stamp, certifying that items have been reviewed in detail and are correct in accordance with Contract, except as noted by any requested variance.
2. As a minimum, Contractor's Stamp shall include:
 - a. Contractor's name
 - b. Job number
 - c. Submittal number
 - d. Certification statement Contractor has reviewed submittal and it is in compliance with Contract
 - e. Signature line for Contractor

D. Submittal Response:

1. Submittal will be returned marked "REVIEWED AS SUBMITTED" when no response is required or when sufficient information is supplied to determine item described is equal to that specified. Resubmittal is not required.
2. Submittal will be returned marked "REVIEWED, EXCEPTIONS NOTED" when sufficient information is supplied to determine that item will be acceptable when certain changes are made. Changes, or exceptions, will be clearly stated. When exceptions require other changes, additional changes must be submitted for approval. Resubmittal is not required, when exceptions do not require other changes.
3. When submittal does not contain sufficient information or when information provided does not meet contract requirements, submittal will be returned "REVISE AND RESUBMIT" or "REJECTED". A dditional data or details as requested by Owner's Representative for approval must be formulated and resubmitted as required.

1.03 MANUFACTURER'S CERTIFICATES

- A. When specified in Specification sections, submit manufacturers' certificate of compliance for review by Owner's Representative.
- B. Place Contractor's Stamp on front of certification.
- C. Submit supporting reference data, affidavits, and certifications as appropriate.

- D. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner's Representative.

1.04 DESIGN MIXES

- A. When specified in Specifications, submit design mixes for review.
- B. Place Contractor's Stamp, as described, on front of each design mix.
- C. Mark each design mix to identify proportions, gradations, and additives for each class and type of design mix submitted. Include applicable test results on samples for each mix. All tests and certifications shall have been performed within the last 12 months prior to date of submittal
- D. Maintain copy of approved design mixes at mixing plant.

1.05 CHANGES TO CONTRACT

Change to contract may be initiated by submitting a Request for Information. Owner's Representative will provide response to Contractor by completing form and returning it to Contractor. When Contractor signs form and checks block indicating that response will result in no increase in cost or time, inquiry is complete. When Contractor and Owner's Representative agree that an increase in time or cost is warranted, Owner's Representative will forward Request for Proposal so that Change Order may be negotiated and approved.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

Section 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

Methods, schedule, and process followed for shop drawings, product data, and sample submittals.

1.02 REQUIREMENT

- A. Submit electronic shop drawings, product data and samples as required by General Conditions and as designated in Specifications using procedures specified in Section 01330 - Submittal Procedures and requirements of this Section.
- B. Shop drawings, product data, and samples are not considered Contract Documents.
- C. Registered Professional Engineer licensed by State of Texas must sign and seal design deviations from contract documents.

1.03 SHOP DRAWING/SUBMITTAL SCHEDULE

Submit separate Shop Drawing/Submittal schedule at same time Construction Schedule is submitted. List products, materials, and equipment for which Shop Drawings and other submittals are required in the order in which they appear in Specifications. Include product data and sample submittals in schedule. Application for payment will not be processed until schedule of shop drawing submittals is approved by Project Manager.

1.04 SHOP DRAWINGS

- A. Submit electronic copy of Shop Drawings and product data in *.PDF format. Review and sign Shop Drawings indicating compliance with Contract.
- B. Place Contractor's Stamp on each drawing as described in Section 01330 - Submittal Procedures.
- C. Show the following accurately and distinctly:
 - 1. Field and erection dimensions
 - 2. Arrangement and section views
 - 3. Relation to adjacent materials or structure, including complete information for making connections between work under this Contract and work under other contracts

4. Types of materials and finishes
5. Parts list and descriptions
6. Assembly drawings of equipment components and accessories showing respective positions and relationships to complete equipment package
7. Identify details by reference to drawing sheet and detail numbers, schedule or room numbers as shown on Contract Drawings where necessary for clarity.

- D. Scale drawings to provide true representation of specific equipment or item furnished.
- E. Coordinate and submit components, necessary for Engineer to adequately review submittal, as complete package. Reproduction of design drawings for use of shop drawings is not allowed.
- F. For major changes to original documents, submit CAD drawings in original CAD format.

1.05 PRODUCT DATA

- A. Submit product data for review as required in Specification sections.
- B. Place Contractor's Stamp, on each data item submitted, as described in Section 01330 - Submittal Procedures.
- C. Mark each copy to identify applicable products, models, and options to be used in this Project. Supplement manufacturers' standard data to provide information unique to this Project, where required by Specifications.
- D. Give manufacturers' trade name, model, or catalog designation and applicable reference standard for products specified only by reference standard.
- E. Submit revised data and samples for resubmittal in manner required for initial submission.

1.06 SAMPLES

- A. Submit samples for review as required by Specifications. Have samples reviewed and signed by Registered Professional.
- B. Place Contractor's Stamp on each sample or firmly attached sheet of paper, as described in Section 01330 - Submittal Procedures.
- C. Submit number of samples specified in Specifications; one will be retained by Project Manager.

- D. Reviewed samples that may be used in Work are identified in Specifications.
- E. Provide mark up as identified in Specifications.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01410

TPDES REQUIREMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Documentation to be prepared and signed by Contractor before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR150000 issued March 5, 2003 (the Construction General Permit).
- B. Implementation, maintenance inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other appropriate practices shown on the Drawings or specified elsewhere in the Contract.
- C. Review of the Storm Water Pollution Prevention Plan (SWP3) implementation in a meeting with Project Manager prior to start of construction.

1.02 DEFINITIONS

- A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavating.
- B. Large Construction Activity: Project that:
 - 1. Disturbs 5 acres or more, or
 - 2. Disturbs less than 5 acres but is part of a larger common plan of development that will disturb 5 acres or more of land.
- C. Small Construction Activity: Project that:
 - 1. Disturbs 1 or more acres but less than 5 acres, or
 - 2. Disturbs less than 1 acre but is part of a larger common plan of development that will ultimately disturb 1 or more acres but less than 5 acres.
- D. TPDES Operator:

The person or persons who have day-to-day operational control of the construction activities which are necessary to ensure compliance with the SWP3 for the site or other Construction General Permit conditions.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N

3.01 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWP3)

- A. A SWP3 has been prepared for this project following Part III of the Construction General Permit and A Guidance Manual for Identifying and Eliminating Illicit Connections to Municipal Separate Storm Sewer Systems (MS4) by the Galveston County Health District Pollution Control Division.
- B. Update or revise the SWP3 as needed during the construction following Part III, Section E of the Construction General Permit.
- C. Submit the SWP3 and any updates or revisions to Project Manager for review and address comments prior to commencing, or continuing, construction activities.

3.02 NOTICE OF INTENT FOR LARGE CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date TCEQ Form 20022 (02/03) Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR150000), **ATTACHMENT 1** of this Section 01410.
- B. Transmit the signed Contractor's copy of TCEQ Form 20022 (02/03), along with a \$100.00 check, made out to Texas Commission on Environmental Quality, and the completed Payment Submittal Form to Project Manager.
- C. Project Manager will complete a separate TCEQ Form 20022 (02/03) for NOI, and will submit both Notices, along with checks for application fees, to the TCEQ.
- D. Submission of the Notice of Intent form by Contractor to TCEQ is required a minimum of 2 days before Commencement of Construction Activities.

3.03 CONSTRUCTION SITE NOTICE FOR SMALL CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date the Construction Site Notice, Attachment 2 to TPDES General Permit TXR150000, "Construction Site Notice," **ATTACHMENT 2** of this Section 01410.
- B. Transmit the signed Construction Site Notice to Project Manager at least 7 days prior to Commencement of Construction Activity.

3.04 CERTIFICATION REQUIREMENTS

- A. Fill out TPDES Operator's Information form, **ATTACHMENT 3** of this Section 01410, including Contractor's name, address, and telephone number and the names of persons or firms responsible for maintenance and inspection of

erosion and sediment control measures. Use multiple copies as required to document full information.

- B. Contractor and Subcontractors shall sign and date the Contractor's/Subcontractor's Certification for TPDES Permitting, **ATTACHMENT 4** of this Section 01410. Include this certification with other Project certification forms.
- C. Submit properly completed certification forms to Project Manager for review before beginning construction operations.
- D. Conduct inspections in accordance with TCEQ requirements. Ensure persons or firms responsible for maintenance and inspection of erosion and sediment control measures read, fill out, sign, and date the Erosion Control Contractor's Certification for Inspection and Maintenance. Use the EPA NPDES Construction Inspection Form, **ATTACHMENT 5** of this Section 01410; to record maintenance inspections and repairs.

3.05 RETENTION OF RECORDS

Keep a copy of this document and the SWP3 in a readily accessible location at the construction site from Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR150000). Contractors with day-to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWP3. Upon submission of the NOT, submit all required forms and a copy of the SWP3 with all revisions to Project Manager.

3.06 REQUIRED NOTICES

Post the following notices from the effective date of the SWP3 until the date of final site stabilization as defined in the Construction General Permit:

- 1. Post the TPDES permit number for Large Construction Activity, or a signed TCEQ Construction Site Notice for Small Construction Activity. Signed copies of the Contractor's NOI must also be posted.
- 2. Post notices near the main entrance of the construction site in a prominent place for public viewing. Post name and telephone number of Contractor's local contact person, brief project description and location of the SWP3.
 - a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with Project Manager to conform to requirements of the Construction General Permit.

- b. If Project is a linear construction project (e.g., road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.
3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction exit area.
4. Post a notice of waste disposal procedures in a readily visible location on site.

3.07 ON-SITE WASTE MATERIAL STORAGE

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

3.08 NOTICE OF TERMINATION

- A. Submit a NOT, **ATTACHMENT 6** of this Section 01410, to Project Manager within 10 days after:
 1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or
 2. Another operator has assumed control over all areas of the site that have not been stabilized; and
 3. All silt fences and other temporary erosion controls have either been removed scheduled to be removed as defined in the SWP3, or transferred to a new operator, if the new operator has sought permit coverage.
- B. Project Manager will complete NOT and submit Contractor's notices to the TCEQ and MS4 entities.

ATTACHMENT 1

	<p>Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR150000)</p> <p>For help completing this application, read the TXR150000 NOI Instructions (TCEQ-20022-Instructions).</p>	<p>TCEQ Office Use Only TPDES Permit Number: TXR15** ** ** ** ** NO GIN Number: ** ** ** ** ** ** ** ** ** **</p>
<p>A. Construction Site Operator <input type="checkbox"/> New <input type="checkbox"/> No Change Customer Reference Number: CN _____</p> <p>Name: _____</p> <p>Mailing Address: _____ City: _____ State: _____ Zip Code: _____</p> <p>Country Mailing Information (if outside USA) Territory: _____ Country Code: _____ Postal Code: _____</p> <p>Phone Number: _____ Extension: _____ Fax Number: _____</p> <p>E-mail Address: _____</p> <p>Type of Operator: <input type="checkbox"/> Individual <input type="checkbox"/> Sole Proprietorship - D.B.A. <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation <input type="checkbox"/> Federal Government <input type="checkbox"/> State Government <input type="checkbox"/> County Government <input type="checkbox"/> City Government <input type="checkbox"/> Other: _____</p> <p>Independent Operator? <input type="checkbox"/> Yes <input type="checkbox"/> No Number of Employees: <input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 or higher</p> <p>Federal Tax ID: _____ State Franchise Tax ID Number: _____ DUNS Number: _____</p>		
<p>B. Billing Address</p> <p>Name: _____</p> <p>Mailing Address: _____ City: _____ State: _____ Zip Code: _____</p> <p>Country Mailing Information (if outside USA) Territory: _____ Country Code: _____ Postal Code: _____</p>		
<p>C. Project / Site Information <input type="checkbox"/> New <input type="checkbox"/> No Change Regulated Entity Reference Number: RN _____</p> <p>Name: _____</p> <p>Mailing Address: _____ City: _____ State: _____ Zip Code: _____</p> <p>Physical Address: _____ City: _____ County: -- _____ Zip Code: _____</p> <p>Location Access Description: _____</p> <p>Latitude: ____° ____' ____" N Longitude: ____° ____' ____" W Degrees (°), Minutes ('), and Seconds (") Latitude: _____ Longitude: -- _____ Decimal Form</p> <p>Standard Industrial Classification (SIC) code: _____ Also, describe the construction activity at this site (do not repeat the SIC code): _____</p> <p>Has a storm water pollution prevention plan been prepared as specified in the general permit (TXR150000)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Estimated area of land disturbed (to the nearest acre): _____ Is the project / site located on Indian Country Lands? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Does this project / site discharge storm water into a municipal separate storm sewer system (MS4)? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide the name of the MS4 operator: _____</p> <p>Provide the name or segment number of the water body that receives storm water from this project / site: _____</p>		
<p>D. Contact - If the TCEQ needs additional information regarding this application, who should be contacted?</p> <p>Name: _____ Title: _____</p> <p>Phone Number: _____ Extension: _____ Fax Number: _____</p> <p>E-mail Address: _____</p>		
<p>E. Payment Information - Check / Money Order Number: _____ Name on Check / Money Order: _____</p>		
<p>F. Certification</p> <p>I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</p> <p>Construction Site Operator Representative:</p> <p>Prefix: _____ First: _____ Middle: _____</p> <p>Last: _____ Suffix: _____ Title: _____</p> <p>Signature: _____ Date: _____</p> <p>If you have questions on how to fill out this form or about the storm water program, please contact us at (512) 239-4671. Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at (512) 239-3282.</p> <p style="text-align: center;">The completed NOI must be mailed to the following address. Use the attached document to submit the \$100 application fee. Please note that the NOI and application fee are submitted separately to different addresses.</p> <p style="text-align: center;">Texas Commission on Environmental Quality Storm Water & General Permits Team; MC - 228 P.O. Box 13087 Austin, Texas 78711-3087</p>		
TCEQ-20022 (02/03)		Page 1 of 2

ATTACHMENT 1

**Texas Commission on Environmental Quality
Payment Submittal Form**

The storm water application fee shall be sent under separate cover to the Texas Commission on Environmental Quality.

This form must be used to submit your Storm Water Application Fee. Please complete the following information, staple your check in the space provided at the bottom of this document, and mail it to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, TX 78711-3088

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, TX 78753

Fee Code: GPA Storm Water General Permit: TXR150000
Check / Money Order No: _____ Amount of Check/Money Order: _____
Date of Check or Money Order: _____
Name on Check or Money Order: _____
Facility / Site Name: _____
Facility / Site Physical Address: _____
City: _____ Zip Code: _____

Staple Check In This Space

ATTACHMENT 1

Completing the Notice of Intent for Storm Water Discharges
Associated with Construction Activity
under the TPDES Construction General Permit (TXR150000)

A. Construction Site Operator Information

Check boxes and Customer Reference Number

These boxes designate the operator's status as a TCEQ "customer"—in other words, an individual or business that is involved in an activity that we regulate. We assign each customer a number that begins with "CN," followed by nine digits. **This is not a permit number, registration number, or license number.** In the remainder of this section, we will use "this customer" to mean the operator for Part A of the form.

- If this customer has not been assigned a Customer Reference Number, check "New" and leave the space for the Customer Reference Number blank.
- If this customer has already been assigned this number, enter the operator's Customer Reference Number and:
 - Check "No Change" if all the remaining customer information is the same as previously reported. However, you must still complete most blanks in this form for this notice of intent to be valid.
 - If this customer's information has changed since the last time it was reported to the TCEQ, check neither box and complete the remainder of this notice of intent.
- **Do not enter a permit number, registration number, or license number in place of the Customer Reference Number.**

Name

Enter the legal name of this customer as authorized to do business in Texas. Include any abbreviations (LLC, Inc., etc.).

Mailing Address

Enter a central and general mailing address for this customer to receive mail from the TCEQ. For example, if this customer is a large company, this address might be the corporate or regional headquarters. On the other hand, for a smaller business, this address could be the same as the site address.

If this is a street address, please follow US Postal Service standards. In brief, these standards require this information in this order:

- the "house" number—for example, the 1401 in 1401 Main St
- if there is a direction before the street name, the one- or two-letter abbreviation of that direction (N, S, E, W, NE, SE, SW, or NW)
- the street name (if a numbered street, do not spell out the number—for example, 6th St, not Sixth St)
- an appropriate abbreviation of the type of street—for example, St, Ave, Blvd, Fwy, Exwy, Hwy, Cr, Ct, Ln
- if there is a direction after the street name, the one- or two-letter abbreviation of that direction (N, S, E, W, NE, SE, SW, or NW)
- if there is a room number, suite number, or company mail code

City, State, and ZIP Code

Enter the name of the city, the two-letter USPS abbreviation for the state (for example, TX), and the ZIP Code. (Enter the full ZIP+4 if you know it.)

Country Mailing Information

If this address is *outside* the United States, enter the territory name, country code, and any non-ZIP mailing codes or other non-U.S. Postal Service features here. If this address is *inside* the United States, leave these spaces blank.

Phone Number and Extension

This number should correspond to this customer's mailing address given earlier. Enter the area code and phone number here. Leave "Extension" blank if this customer's phone system lacks this feature.

Fax Number

This number should correspond to this customer's mailing address given earlier. Enter the area code and fax number here.

E-mail Address

As with the mailing address, this should be a general address that is appropriate for e-mail to this customer's central or regional headquarters, if applicable.

If "No Change" was checked for this customer, you may skip the rest of the fields in this part of the form and continue to the next part of the NOI.

Type of Operator

Check **only one** box.

Check ...	if this customer...
Individual	is a person and has not established a business to do whatever causes them to be regulated by us.
Sole Proprietorship—D.B.A.	is a business that is owned by only one person and has not been incorporated. This business may: <ul style="list-style-type: none"> • be under the person's name • have its own name ("doing business as," or d.b.a.) • have any number of employees
Partnership	is a business that is established as a partnership as defined by the Texas Secretary of State's Office.
Corporation	meets all of these conditions: <ul style="list-style-type: none"> • is a legally incorporated entity under the laws of any state or country • is recognized as a corporation by the Texas Secretary of State • has proper operating authority to operate in Texas.
Federal, state, county, or city government (as appropriate)	is either an agency of one of these levels of government or the governmental body itself (if a utility district, water district, tribal government, college district, council of governments, or river authority, check "Other" and write in the specific type of government.)
Other	fits none of the above descriptions. Enter a short description of the type of customer in the blank provided.

Independent Operator?

Check "No" if this customer is a subsidiary or part of a larger company. Otherwise, check "Yes."

Number of Employees

Check one box to show the number of employees for this customer's entire company, at all locations. **This is not necessarily the number of employees at the site named in this NOI.**

Federal Tax ID

All businesses, except for some small sole proprietors, should have a federal taxpayer identification number (TIN). Enter this number here. Use no prefixes, dashes, or hyphens. If you do not have a TIN because you are an individual or a small sole proprietor, enter your Social Security number here. Individuals and sole proprietors do not need to provide a federal tax ID.

State Franchise Tax ID

Corporations and limited liability companies that operate in Texas are issued a franchise tax identification number. If this customer is a corporation or limited liability company, enter this number here.

DUNS Number

Most businesses have a DUNS (Data Universal Numbering System) number issued by Dun and Bradstreet Corp. If this customer has one, enter it here.

B. Billing Address

We will mail the annual fee invoice for this site to the address entered in this section.

Name

Enter the legal name of the person or business to which we should mail this site's fee invoice each year.

Mailing Address

Enter the specific mailing address to which we should mail this site's fee invoice each year. If this is a street address, please follow the US Postal Service standards as described under "A. Construction Site Operator Information" on page 1 of these instructions.

City, State, and ZIP Code

Enter the name of the city, the two-letter USPS abbreviation for the state (for example, TX), and the ZIP Code. (Enter the full ZIP+4 if you know it.)

ATTACHMENT 1

Country Mailing Information

If this address is *outside* the United States, enter the territory name, country code, and any non-ZIP mailing codes or other non-U.S. Postal Service features here. If this address is *inside* the United States, leave these spaces blank.

C. Project / Site Information

Check boxes and Regulated Entity Reference Number

These boxes designate this site's status as a TCEQ "regulated entity"—in other words, a location where an activity that we regulate occurs. We assign each regulated entity a number that begins with "RN," followed by nine digits. *This is not a permit number, registration number, or license number.*

- If this site has not been assigned a Regulated Entity Reference Number, check "New" and leave the space for the Regulated Entity Reference Number blank.
- If this site has already been assigned this number, enter the Regulated Entity Reference Number and:
 - Check "No Change" if all the remaining information is the same as previously reported. However, even if there has been no change, you must complete this section at least through "E-mail Address" for this NOI to be valid.
 - If this site's information has changed since the last time it was reported to the TCEQ, check neither box and complete the remainder of this notice of intent.
- **Do not enter a permit number, registration number, or license number in place of the Regulated Entity Reference Number.**

Name

Enter the name by which you want this site to be known to the TCEQ.

Mailing Address

Enter the specific mailing address for this site. If this is a street address, please follow the US Postal Service standards as described under "A. Construction Site Operator Information" on page 1 of these instructions.

City, State, and ZIP Code

Enter the name of the city, the two-letter USPS abbreviation for the state (for example, TX), and the ZIP Code. (Enter the full ZIP+4 if you know it.)

Physical Address

Enter the physical address of the site itself. TCEQ staff should be able to use this address to find the site.

City, County, and ZIP Code

Enter the name of the city, the county, and the ZIP Code. (Enter the full ZIP+4 if you know it.)

Location Access Description

Enter a physical description of the location of the site based on highway intersections and/or permanent landmarks.

Latitude and Longitude

Enter the latitude and longitude of the site in *either* degrees, minutes, and seconds *or* decimal form.

For help obtaining the latitude and longitude, go to:

<http://www.tnrc.state.tx.us/gis/drgview.html>

Standard Industrial Classification (SIC) Code and Activity Description

Provide the SIC code that best describes the construction activity being conducted at the site.

For help with SIC codes, go to:

<http://www.osha.gov/oshstats/sicser.html>

In addition to the SIC code, you must also provide a description of the construction activity being conducted at the site. This may include such descriptions as: "Apartment Building Construction" or "Shopping Center Construction."

Storm Water Pollution Prevention Plan

This plan identifies the areas and activities that could produce contaminated runoff at your site and then tells how you will ensure that this contamination is mitigated. For example, in describing your mitigation measures, your site's plan might identify the devices that collect and filter storm water, tell how those devices are to be maintained, and tell how frequently that maintenance is to be carried out. **You must develop this plan before you complete this NOI.** This plan must be available for a TCEQ investigator to review on request. Specific requirements for the

development of the plan can be found in the *Texas Pollutant Discharge Elimination System Construction General Permit (TXR150000)*.

Estimated Area of Land Disturbed

Provide the approximate number of acres that the construction site will disturb. "Disturb" means any clearing, grading, excavating, or other similar activities.

Is the site located on Indian Country Lands?

Check "Yes" only if the site is on a reservation or other areas designated by the federal government as Indian Country Lands. If not, check "No."

Destination of Storm Water Discharge

The storm water from your site eventually reaches a receiving water body such as a local stream or lake, possibly via a drainage ditch. The discharge may initially be into a municipal separate storm sewer system (MS4). Check the appropriate boxes for whether storm water is discharged into an MS4. If you checked "Yes" to "An MS4?", then enter the name of the entity that operates the storm sewer—often a city, town, or utility district, but possibly another form of government.

You must also provide the name of the water body that receives the discharge from the construction site (a local stream or lake). Storm water may be discharged directly to a receiving stream or via a storm sewer system. If known, please include the segment number if the discharge is to a classified water body.

For a map that includes segment numbers, go to:

<http://www.tnrc.state.tx.us/water/quality/data/index.html>

D. Contact

Give all the relevant information for the person whom TCEQ can contact if there are questions about any of the information on this form—perhaps the same person who completed the form.

E. Payment Information

Provide the number and name from the check or money order used to pay the \$100 application fee.

F. Certification

The operator must sign and date this statement to validate this NOI. Be sure to enter the full legal name of the person signing the form and the relevant title—for example, "Operator," "Operator's attorney," or "Senior Site Manager." Use the "Prefix" blank for such titles as Dr., Mr., or Ms., as desired. Use the "Suffix" blank for such designations as Ph.D., Jr., Sr., III, or J.D., if applicable.

For a corporation, the application shall be signed by a responsible corporate officer. A responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this application, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g. regional administrator of the United States Environmental Protection Agency).

Questions?

If you have questions about any of the information on this form, contact our Storm Water Program at 512/239-4671 or look for "Storm Water" on our Web site:

www.tceq.state.tx.us

Attachment 2



CONSTRUCTION SITE NOTICE

FOR THE
Texas Commission on Environmental Quality (TCEQ)
Storm Water Program
TPDES GENERAL PERMIT TXR150000

The following information is posted in compliance with **Part II.D.2** of the TCEQ General Permit Number TXR150000 for discharges of storm water runoff from construction sites. Additional information regarding the TCEQ storm water permit program may be found on the internet at:

www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdes.html

Contact Name and Phone Number:	
Project Description: (Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized)	
Location of Storm Water Pollution Prevention Plan:	

For Construction Sites Authorized Under Part II.D.2. (Obtaining Authorization to Discharge) the following certification must be completed:

I _____ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.D.2. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A storm water pollution prevention plan has been developed and implemented according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4 system. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title

145701

Date

01410-9
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ATTACHMENT 3

TPDES OPERATOR'S INFORMATION

Owner's Name and Address:

Telephone: _____

Contractor's Names and Addresses:

General Contractor:

Telephone: _____

Site Superintendent:

Telephone: _____

Erosion Control and Maintenance Inspection:

Telephone: _____

Subcontractor's Names and Addresses:

Phone: _____

Phone: _____

Note: Insert name, address, and telephone number of persons or firms.

ATTACHMENT 4

**CONTRACTOR'S / SUBCONTRACTOR'S
CERTIFICATION FOR TPDES PERMITTING**

I certify under penalty of law that I understand the terms and conditions of TPDES General Permit No. TXR150000 and the Storm Water Pollution Prevention Plan for the construction site identified as part of this certification.

Signature: _____
Name: (printed or typed) _____
Title: _____
Company: _____
Address: _____
Date: _____

Signature: _____
Name: (printed or typed) _____
Title: _____
Company: _____
Address: _____
Date: _____

Signature: _____
Name: (printed or typed) _____
Title: _____
Company: _____
Address: _____
Date: _____

ATTACHMENT 5



EPA NPDES
Construction
Inspection Form



The following inspection is being performed in compliance with Part IV.D.4. of the NPDES Region 6 Storm Water Construction General Permit [63 Fed. Reg. 36502] and being retained in accordance with Part V of the Permit. Qualified personnel (provided by the permittee or cooperatively by multiple permittees) shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, placement and effectiveness of structural control measures, and locations where vehicles enter or exit the site. Inspections shall be performed at least once every 14 days and within 24 hours of the end of a storm event of 0.5 inches or greater. Where sites have been temporarily stabilized, runoff is unlikely due to winter conditions, or during seasonal arid periods in arid areas (0-10 inches of rainfall annually) and semi-arid areas (10-20 inches annually) such inspections shall be conducted at least once every month. This form is primarily intended for use with construction projects in Texas and New Mexico. Permittees on Indian Country lands in Oklahoma, Louisiana and Arkansas and some oil and gas facilities in Oklahoma may use this form if they are eligible for this permit. Other facilities need to check with their NPDES authority before using this form.

If you do not know your NPDES Permit Number, contact the NOI Processing Center at (301)495-4145. This form was prepared as an example and it is not a required form for use with the permit. Alternative forms may be used if they contain all of the required information as set forth in the permit. This form and additional information regarding the NPDES Region 6 storm water program may be found on the Internet at <http://www.epa.gov/region6/sw/>. Any person with a complaint about the operation of this facility in regards to this permit should contact EPA Region 6 at (214)665-7112.

Permit Number(s) covered by this inspection (e.g. owners, developers, general contractor, builders)	
Signature and Certification in accordance with Part VI.G of the permit:	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
	Signature _____ Date _____
Date of Inspection	
Inspector Name	
Is there a copy of the permit language with the SWPPP?	• YES • NO
Is the inspector qualified and are the qualifications documented in the SWPPP?	• YES • NO
Is an NPDES storm water construction sign posted at the entrance for all permittees?	• YES • NO
<p>You may want to use EPA Region 6 construction checklist to assure components of the SWPPP are complete. This form, the construction sign, and the checklist are available on the Region 6 NPDES Storm Water Forms and Documents web page which may be found on the internet at http://www.epa.gov/earth/r6/6cn/w/formsw.htm. In addition to the checklist, you should provide a narrative (see next page) on the existing Best Management Practices and Structural Controls found during each inspection. Any problems identified in an inspection should be corrected within 7 days. The inspection should cover all components of the SWPPP and all potential pollutants. While eroded soil is the primary pollutant of concern, do not forget to inspect for other pollutant sources such as fuel tanks, paints, solvents, stabilization materials, concrete hardener, batch plants, and construction debris. The inspector will need to update the SWPPP to reflect findings of the inspection. The site map should be updated after an inspection to show controls that have been added or removed, to ensure the site map is kept current in accordance with Part IV.C. of the permit.</p>	

Revision 4, March 1, 2000

ATTACHMENT 5

Narrative Findings of the inspection:

Observations should include any findings of Best Management Practices or controls that are not in accordance with the SWPPP. If a control is not in place or failed, observe the reason why. A control removed temporarily for work is not necessarily a violation if properly recorded in the SWPPP. If it has been removed, record why it was removed and, if applicable, when it will be reinstalled. If the control has failed, observe the conditions so a conclusion may be made as to whether the control failed for improper maintenance or improper design. The qualified inspector will know when a failed control is inadequate and should be replaced by an improved control mechanism. Qualified inspectors are to have authority to make changes to the SWPPP to assure compliance. Controls that have not been installed should be given a reason why they are not installed and/or a scheduled date for installation if they are designed for a later phase of construction. After the inspection, the SWPPP and its site map should be updated to reflect current conditions of controls and Best Management Practices at the time of the inspection. This includes removing uninstalled controls from the site map or otherwise denoting on the site map if they are no longer installed if the controls have been removed because they are no longer necessary (e.g. stabilization has been achieved in that area).

Revision 4, March 1, 2000

ATTACHMENT 6

	<p>Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR150000)</p> <p style="font-size: small;">For help completing this application, read the TXR150000 NOI Instructions (TCEQ-20023-Instructions).</p>	<p style="font-size: x-small; margin: 0;">TCEQ Office Use Only</p> <p style="font-size: x-small; margin: 0;">TPDES Permit Number: TXR15•• •• •• •• NO</p> <p style="font-size: x-small; margin: 0;">GIN Number: •• •• •• •• •• •• ••</p>
<p>A. TPDES Permit Number: TXR15_____</p>		
<p>B. Construction Site Operator Customer Reference Number: CN _____</p> <p>Name: _____</p> <p>Mailing Address: _____</p> <p>City: _____ State: -- _____ Zip Code: _____</p> <p>Country Mailing Information (<i>if outside USA</i>) Territory: _____ Country Code: _____ Postal Code: _____</p> <p>Phone Number: _____ Extension: _____ Fax Number: _____</p> <p>E-mail Address: _____</p>		
<p>C. Project / Site Information Regulated Entity Reference Number: RN _____</p> <p>Name: _____</p> <p>Physical Address: _____</p> <p>Location Access Description: _____</p> <p>City: _____ County: -- _____ Zip Code: _____</p>		
<p>D. Contact - If the TCEQ needs additional information regarding this termination, who should be contacted?</p> <p>Name: _____ Title: _____</p> <p>Phone Number: _____ Extension: _____ Fax Number: _____</p> <p>E-mail Address: _____</p>		
<p>E. Certification</p> <p>I certify under penalty of law that authorization under the TPDES Construction General Permit (TXR150000) is no longer necessary based on the provisions of the general permit. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with construction activity under the general permit TXR150000, and that discharging pollutants in storm water associated with construction activity to waters of the U.S. is unlawful under the Clean Water Act where the discharge is not authorized by a TPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Clean Water Act.</p> <p>Construction Site Operator Representative:</p> <p>Prefix: _____ First: _____ Middle: _____</p> <p>Last: _____ Suffix: _____</p> <p>Title: _____</p> <p>Signature: _____ Date: _____</p> <p style="font-size: x-small;">If you have questions on how to fill out this form or about the storm water program, please contact us at (512) 239-4671. Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at (512) 239-3282.</p> <p style="text-align: center; margin-top: 20px;">The completed NOT must be mailed to the following address:</p> <p style="text-align: center; margin-top: 10px;">Texas Commission on Environmental Quality Storm Water & General Permits Team; MC - 228 P.O. Box 13087 Austin, Texas 78711-3087</p>		
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ATTACHMENT 6

Completing the Notice of Termination for Storm Water Discharges
Associated with Construction Activity
under the TPDES Construction General Permit (TXR150000)

Who May File a Notice of Termination (NOT) Form

Permittees disturbing 5 acres or more (or part of a larger common plan of development or sale disturbing 5 acres or more) who are presently covered under the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit must submit a Notice of Termination (NOT) when final stabilization has been achieved on all portions of the site that is the responsibility of the permittee; or another permitted operator has assumed control over all areas of the site that have not been finally stabilized and all silt fences and other temporary erosion controls have either been removed, scheduled for removal as defined in the SWP3, or transferred to a new operator if the new operator has sought permit coverage. Erosion controls that are designed to remain in place for an indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal.

Final Stabilization occurs when either of the following conditions are met:

- (a) All soil disturbing activities at the site have been completed and a uniform (e.g. evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
- (b) For individual lots in a residential construction site by either:
 - (1) the homebuilder completing final stabilization as specified in condition (a) above; or
 - (2) the homebuilder establishing temporary stabilization for an individual lot prior to the time of transfer of the ownership of the home to the buyer and after informing the homeowner of the need for, and benefits of, final stabilization.
- (c) For construction activities on land used for agricultural purposes (e.g. pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to a surface water and areas which are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.

A. TPDES Permit Number

Provide the TPDES permit number assigned to the operator of the construction site.

B. Construction Site Operator Information

Customer Reference Number

This number designates the operator's status as a TCEQ "customer"—in other words, an individual or business that is involved in an activity that we regulate. We assign each customer a number that begins with "CN," followed by nine digits. **This is not a permit number, registration number, or license number.** In the remainder of this section, we will use "this customer" to mean the operator for Part B of the form.

- If this customer has not been assigned a Customer Reference Number, leave the space for the Customer Reference Number blank.
- If this customer has already been assigned this number, enter the operator's Customer Reference Number.
- **Do not enter a permit number, registration number, or license number in place of the Customer Reference Number.**

Name

Enter the legal name of this customer as authorized to do business in Texas. Include any abbreviations (LLC, Inc., etc.).

Mailing Address

Enter a central and general mailing address for this customer to receive mail from the TCEQ. For example, if this customer is a large company, this address might be the corporate or regional headquarters. On the other hand, for a smaller business, this address could be the same as the site address.

If this is a street address, please follow US Postal Service standards. In brief, these standards require this information in this order:

- the "house" number—for example, the 1401 in 1401 Main St
- if there is a direction before the street name, the one- or two-letter abbreviation of that direction (N, S, E, W, NE, SE, SW, or NW)
- the street name (if a numbered street, do not spell out the number—for example, 6th St, not Sixth St)
- an appropriate abbreviation of the type of street—for example, St, Ave, Blvd, Fwy, Exwy, Hwy, Cr, Ct, Ln
- if there is a direction after the street name, the one- or two-letter abbreviation of that direction (N, S, E, W, NE, SE, SW, or NW)
- if there is a room number, suite number, or company mail code

City, State, and ZIP Code

Enter the name of the city, the two-letter USPS abbreviation for the state (for example, TX), and the ZIP Code. (Enter the full ZIP+4 if you know it.)

Country Mailing Information

If this address is **outside** the United States, enter the territory name, country code, and any non-ZIP mailing codes or other non-U.S. Postal Service features here. If this address is **inside** the United States, leave these spaces blank.

Phone Number and Extension

This number should correspond to this customer's mailing address given earlier. Enter the area code and phone number here. Leave "Extension" blank if this customer's phone system lacks this feature.

Fax Number

This number should correspond to this customer's mailing address given earlier. Enter the area code and fax number here.

E-mail Address

As with the mailing address, this should be a general address that is appropriate for e-mail to this customer's central or regional headquarters, if applicable.

C. Project / Site Information

Regulated Entity Reference Number

This number designates this site's status as a TCEQ "regulated entity"—in other words, a location where an activity that we regulate occurs. We assign each regulated entity a number that begins with "RN," followed by nine digits. **This is not a permit number, registration number, or license number.**

- If this site has not been assigned a Regulated Entity Reference Number, leave the space for the Regulated Entity Reference Number blank.
- If this site has already been assigned this number, enter the Regulated Entity Reference Number.
- **Do not enter a permit number, registration number, or license number in place of the Regulated Entity Reference Number.**

Name

Enter the name by which you want this site to be known to the TCEQ.

Physical Address

Enter the physical address of the site itself. TCEQ staff should be able to use this address to find the site.

Location Description

Enter a physical description of the location of the site based on highway intersections and/or permanent landmarks.

City, County, and ZIP Code

Enter the name of the city, the county, and the ZIP Code. (Enter the full ZIP+4 if you know it.)

D. Contact

Give all the relevant information for the person whom TCEQ can contact if there are questions about any of the information on this form—perhaps the same person who completed the form.

E. Certification

The operator must sign and date this statement to validate this NOI. Be sure to enter the full legal name of the person signing the form and the relevant title—for example, "Operator," "Operator's attorney," or "Senior Site Manager." Use the "Prefix" blank for such titles as Dr., Mr., or Ms., as desired. Use the "Suffix" blank for such designations as Ph.D., Jr., Sr., III, or J.D., if applicable.

For a corporation, the application shall be signed by a responsible corporate officer. A responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this application, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g. regional administrator of the United States Environmental Protection Agency).

Questions?

If you have questions about any of the information on this form, contact our Storm Water Program at 512/239-4671 or look for "Storm Water" on our Web site:

www.tceq.state.tx.us

END OF SECTION

Section 01422

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

Section includes general quality assurance related to Reference Standards and list of references.

1.02 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by current date of issue as stated in the General Conditions.
- C. Request clarification from Project Manager before proceeding when specified reference standards conflict with Contract Documents.

1.03 SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, D.C. 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
AGC	Associated General Contractors of America 333 John Carlyle Street Alexandria, VA 22314
AI	Asphalt Institute Research Park Drive P.O. Box 14052 Lexington, KY 40512
AITC	American Institute of Timber Construction 7012 S. Revere Parkway, Suite 140 Englewood, CO 80112
AISC	American Institute of Steel Construction One East Wacker Dr. Chicago, Il 60601

AISI	American Iron and Steel Institute 1101 17th Street NW, Suite 1300 Washington, D.C. 20036
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016
ANSI	American National Standards Institute 1819 L Street NW Sixth Floor Washington, D.C. 20036
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, N.W. Washington, D.C. 20005
AREMA Association	American Railway Engineering and Maintenance-of-Way 8201 Corporate Drive, Suite 1125 Landover, MD 20785
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428
AWPA	American Wood-Preservers' Association P.O. Box 5690 Granbury, TX 76049
AWS	American Welding Society 550 NW 42nd Avenue Miami, FL 33126
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
COH	City of Houston P.O. Box 1562 Houston, TX 77251-1562
CLFMI	Chain Link Fence Manufacturers Institute 9891 Broken Land Parkway, Suite 300 Columbia, MD 21046
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173-4758

EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FS	Federal Standardization Documents General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, D.C. 20406
ICEA	Insulated Cable Engineer Association P.O. Box 440 S. Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane P.O. Box 459 Piscataway, NJ 08855-459
ISA	International Society of Arboriculture P.O. Box 3129 Champaign, IL 61826-3129
MIL	Military Specifications General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, D.C. 20406
NACE	National Association of Corrosion Engineers 1440 South Creek Drive Houston, TX 77084-4906
NEMA	National Electrical Manufacturers' Association 1300 North 17th Street, Suite 1847 Rosslyn, VA 22209
NFPA	National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101
OSHA	Occupational Safety Health Administration U.S. Department of Labor Office of Public Affairs-Room N3647 200 Constitution Avenue Washington, D.C. 20210
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083

PCI	Prestressed Concrete Institute 209 W. Jackson Blvd. Chicago, IL 60606
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021
SSPC Council)	Society for Protective Coatings (Steel Structures Painting 40 24th Street, Sixth Floor Pittsburgh, PA 15222
TAC	Texas Administrative Code Texas Commission on Environmental Quality P. O. Box 13087 Library MC-196 Austin, TX 78711-3087
TxDOT	Texas Department of Transportation 125 East 11th Street Austin, TX 78701 2483
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Section 01450

CONTRACTOR'S QUALITY CONTROL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Quality assurance and control of installation and manufacturers' field services and reports.

1.02 MEASUREMENT AND PAYMENT

No payment will be made for this item. Include cost of Contractor's quality control in overhead cost for this project.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality at no additional cost to the Owner.
- B. Comply fully with manufacturers' installation instructions, including each step in sequence.
- C. Request clarification from Project Manager before proceeding when manufacturers' instructions conflict with Contract.
- D. Comply with specified standards as minimum requirements for Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce specified level of workmanship.

1.04 REFERENCES

Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.05 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual Specification sections or as required by Project Manager, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust and balance of equipment as applicable and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training when defined in Specification sections.

- B. At Project Manager's request, submit qualifications of manufacturers' representative to Project Manager 15 days in advance of required representatives' services. Representative is subject to approval by Project Manager.

- C. A manufacturers' representative is to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to a manufacturer's written instructions. Submit report within 14 days of observation to Project Manager for review.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

Section 01452

INSPECTION SERVICES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Inspection services and references

1.02 INSPECTION

- A. Owner's Representative will appoint Owner's Representative as representative of the Owner to perform inspections, tests, and other services specified in individual specification Sections
- B. Alternately, Owner's Representative may appoint, employ, and pay independent firm to provide additional inspection or construction management services as indicated in Section 01454 - Testing Laboratory Services.
- C. Reports will be submitted by independent firm to Owner's Representative, indicating observations and results of tests and indicating compliance or non-compliance with Contract.
- D. Contractor shall assist and cooperate with Owner's Representative; furnish samples of materials, design mix, equipment, tools, and storage.
- E. Contractor shall notify Owner's Representative 24 hours prior to expected time for operations requiring services.
- F. Contractor shall sign and acknowledge report for Owner's Representative.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01454

TESTING LABORATORY SERVICES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Testing laboratory services and responsibilities related to those services.

1.02 REFERENCES

- A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- B. ASTM D 3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
- C. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- D. ASTM E 329 - Standard Specification for Minimum Requirements for Agencies Engaged the Testing and/or Inspection of Materials Used in Construction.
- E. ISO/IEC 17025 - General Requirements for the Competence of Calibration and Testing Laboratories.

1.03 SELECTION AND PAYMENT

- A. The Owner will select, employ, and pay for services of independent testing laboratory to perform inspection and testing identified in Part 3 of individual Specification sections.
- B. Employ and pay for services of independent testing laboratory or laboratories to perform inspection and testing identified in Part 2 of individual Specification sections.
- C. Employment of testing laboratory by the Owner does not relieve the Contractor of obligation to perform the Work in accordance with requirements of Contract Documents.
- D. The Owner deducts minimum 2-hour charge for testing laboratory time from periodic progress payment when operations requiring testing or inspection are canceled without prior notification.
- E. The Owner deducts cost of retesting from periodic progress payment whenever failed work is removed, replaced, and retested.

- F. Project Representative schedules and monitors testing. Provide 24 hours notice of testing to Project Representative to avoid delay of the Work.

1.04 QUALIFICATION OF LABORATORY

- A. Meet laboratory requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.
- B. Meet ISO/IEC 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Specification sections.
- C. If laboratory subcontracts are part of testing services, such work will be placed with laboratory complying with requirements of this Section.
- D. Unless otherwise notified by Project Manager, Project Manager shall schedule and monitor testing. Provide 24 hours notice of testing to avoid delay of work.

1.05 LABORATORY REPORTS

- A. Testing laboratory provides and distributes copies of laboratory reports to distribution list provided by Project Manager at preconstruction conference.
- B. Keep one copy of each laboratory report distributed or faxed at site field office for duration of project.
- C. Laboratory will fax material supplier, Contractor and Project Manager no later than close of business on working day following test completion and review, reports which indicate failing test results.

1.06 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge requirements of Contract.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume duties of Contractor.
- D. Laboratory has no authority to stop the Work.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Provide safe access to the Work and to manufacturer's facilities for Project Manager, Project Representative, and for testing laboratory personnel.
- B. Provide testing laboratory with copy of construction schedule and copy of each update to construction schedule.

- C. Notify Project Representative and testing laboratory during normal working hours of day previous to expected time for operations requiring inspection and testing services. When Contractor fails to make timely prior notification, then do not proceed with operations requiring inspection and testing services.
- D. Notify Design Consultant 24 hours in advance when Specification requires presence of Design Consultant for sampling or testing.
- E. Request and monitor testing as required to provide timely results and avoid delay to the Work. Provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of material.
- F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested; to obtain and handle samples at site or at source of products to be tested; and to facilitate tests and inspections including storage and curing of test samples.
- G. Arrange with laboratory through Project Manager. Payment for additional testing will be made in accordance with General Conditions:
 - 1. Retesting required for failed tests
 - 2. Retesting for nonconforming Work
 - 3. Additional sampling and tests requested beyond specified requirements
 - 4. Insufficient notification of cancellation of tests for Work scheduled but not performed

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N

3.01 C O N D U C T I N G T E S T I N G

- A. Conform laboratory sampling and testing specified in individual Specification sections to latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by Project Manager.
- B. Requirements of this section also apply to those tests for approval of materials, for mix designs and for quality control of materials as performed by employed testing laboratories.

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Section 01502

MOBILIZATION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Mobilization of construction equipment and facilities onto site.

1.02 UNIT PRICES

- A. Measurement for mobilization is on lump sum basis.
- B. Mobilization payments will be included in periodic progress payment upon written application subject to following provisions:
 - 1. Authorization for payment of 50 percent of Contract Price for mobilization will be made upon receipt and approval by Project Manager of following items, as applicable:
 - a. Schedule of Values
 - b. Trench safety program
 - c. Construction Schedule
 - d. Preconstruction photographs
 - e. Establishment of Field Office for Project Representative where an office is required by other sections. Field Office must meet requirements of Section 01520 - Temporary Field Office.
 - f. Dewatering plan, when required
 - 2. Authorization for payment of remaining 50 percent of Contract Price for mobilization will be made upon completion of Work amounting to 5 percent of Contract Price less mobilization unit price.
- C. Mobilization payments will be subject to retainage amounts stipulated in the General Conditions.
- D. A reduction of 10 percent of mobilization amount bid in Schedule for Unit Price Work will be applied to each Payment Application when Field Office is not properly maintained. Proper maintenance consists of operational plumbing and sanitary facilities, adequate potable water supply, operational telephone and facsimile machine and functionable temperature control.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

Section 01504

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary facilities and necessary controls for project including utilities, telephone, sanitary facilities, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of Work and property, access roads and parking, environmental controls, pest and rodent control and disposal of trash, debris and excavated material.
- B. Facilities and controls specified in this section are considered minimum for Project. Provide additional facilities and controls for proper execution of Work and to meet Contractor's responsibilities for protection of persons and property.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No payment will be made for this item. Include the cost of Temporary Facilities and Controls in associated items for this project.
 - 2. No separate payment will be made for construction fencing.
- B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 CONTRACTOR'S RESPONSIBILITY

Comply with applicable requirements specified in other sections of Specifications.

- 1. Maintain and operate temporary facilities and systems to assure continuous service.
- 2. Modify and extend systems as Work progress requires.
- 3. Completely remove temporary materials and equipment when no longer required.
- 4. Restore existing facilities used for temporary services to specified or to original condition.

PART 2 PRODUCTS

2.01 TEMPORARY UTILITIES

A. Obtaining Temporary Service:

1. Make arrangements with utility service companies for temporary services.
2. Abide by rules and regulations of utility service companies or authorities having jurisdiction.
3. Be responsible for utility service costs until Work is substantially complete. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of Work.

B. Water:

1. Contractor to provide water required for and in connection with Work to be performed and for specified tests of piping, equipment, devices, or for other use as required for proper completion of Work.
2. Provide and maintain adequate supply of potable water for domestic consumption by Contractor personnel and Project Representative.

C. Electricity and Lighting:

1. Provide electric powered service required for Work, including testing of Work. Provide power for lighting, operation of equipment, or other use.
2. Electric power service includes temporary power service or generator to maintain plant operations during scheduled shutdown.
3. Minimum lighting level shall be 10-foot candles for open areas; 20-foot candles for stairs and shops. Provide minimum of one 300-watt lamp for each 200 square feet in work area.

D. Temporary Heat and Ventilation:

1. Provide temporary heat as necessary for protection or completion of Work.
2. Provide temporary heat and ventilation to assure safe working conditions; maintain enclosed areas at minimum of 50°F.

E. Telephone:

1. Provide emergency telephone service at Project Site for use by Contractor personnel and others performing work or furnishing services at site.

2. Provide Houston-Metro lines, allowing unlimited calls, without charge in Greater Houston Metropolitan area with “call waiting” and “call forwarding” options. Provide one telephone answering machine with beepless remote message retrieval capability.

F. Sanitary Facilities:

1. Provide and maintain sanitary facilities for persons on job site; comply with regulations of State and local departments of health.
2. Enforce use of sanitary facilities by construction personnel at job site. Enclose sanitary facilities. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause nuisance or health problem. Haul sewage and waste off-site and properly dispose in accordance with applicable regulation.
3. Locate toilets near Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout course of Work.

2.02 STORAGE SHEDS AND BUILDINGS

- A. Provide adequately ventilated, watertight storage facilities with floor above ground level for materials and equipment susceptible to weather damage.
- B. Storage of materials not susceptible to weather damage may be on blocks off ground.
- C. Store materials in neat and orderly manner. Place materials and equipment to permit easy access for identification, inspection, and inventory.
- D. Fill and grade site for temporary structures to provide drainage away from temporary and existing buildings.

2.03 SAFETY REQUIREMENTS

- A. At preconstruction conference submit and follow safety program in accordance with the General Provision. Include documented response to trench safety requirements as specified in Section 02260 - Trench Safety System.
- B. Conduct operations in strict accord with applicable Federal, State, and local safety codes and statutes and with good construction practice. Establish and maintain procedures for safety of all work, personnel, and equipment involved in Project.
- C. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health

standards under Williams-Steiger Occupational Safety and Health Act of 1970, and to other legislation enacted for safety and health of Contractor employees. Safety and health standards apply to subcontractors and their employees as well as to Contractor and its employees.

- D. Observance of and compliance with regulations is solely and without qualification responsibility of Contractor without reliance or superintendence of or direction by the Owner or Project Manager. Immediately advise Project Manager of investigation or inspection by Federal Safety and Health Inspectors of Contractor or subcontractor's work or place of work on job site under this Contract, and after investigation or inspection, advise Project Manager of results. Submit one copy of accident reports to Project Manager within 10 days of occurrence.
- E. Protect areas occupied by workmen using best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into Work area for visual or odor evidences of contamination, immediately take appropriate steps to seal off entry of contaminated liquids to Work area.
- F. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment and other safety equipment, as specified or detailed on Drawings.
- G. Maintain required coordination with Police and Fire Departments during entire period covered by Contract.
- H. In safety plan include project safety analysis. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

2.04 FIRST AID EQUIPMENT

- A. Provide first aid kit throughout construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.
- B. Have at least one person thoroughly trained in first aid and CPR procedures present on site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

2.05 FIRE PROTECTION

Conform to specified fire protection and prevention requirements established by Federal, State, or local governmental agencies and as provided in Safety Program.

2.06 SECURITY MEASURES

- A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Duty to protect property of the Owner used in connection with performance of Contract.
- B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

2.07 PROTECTION OF UTILITIES AND PIPELINES

- A. Prevent damage to existing utilities during construction. Utilities shown on Drawings are at approximate locations. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), underground utilities before excavating. Perform investigative work and repairs required after investigation. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of utilities at least 5 days notice before commencing Work in area, for locating utilities during construction, and for making adjustments or relocation of utilities when they conflict with proposed Work. Include cost for temporary relocation of utilities necessary to accommodate construction in unit cost for utility construction unless otherwise noted on Drawings. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service lines are not shown on Drawings. Anticipate service lines exist and repair them when damaged due to construction activity. No separate payment will be made for repair work. Include payment in unit price for work in appropriate sections.
- B. Utilize Utility Coordinating Committee One Call System, telephone number, (713) 223-4567, which must be called 48 hours in advance. Toll free telephone number is 1-800-669-8344, Texas One Call System.
- C. Prior to abandonment of utility, make arrangements with Project Manager and utility owner to terminate service, remove meters, transformers, and poles as required.
- D. When excavating near pipelines and prior to start of excavation, request representative of pipeline company to come to construction site(s) to meet representatives of Contractor and Project Representative to discuss actual procedures that will be used. Request pipeline company's representative to probe and locate pipelines in at least three locations: one at each side of proposed excavation and one at centerline of proposed utility. Representative of pipeline company and Project Representative must be present to observe activities of Contractor at all times when excavation is being conducted within 15 feet of pipeline.

2.08 PROTECTION OF WORK AND PROPERTY

- A. Preventive Actions:

1. Take precautions, provide programs, and take actions necessary to protect Work, public and private property from damage.
 2. Take action to prevent damage, injury or loss, including, but not limited to, the following:
 - a. Store apparatus, materials, supplies, and equipment in orderly, safe manner that will not interfere with progress of Work or Work of others.
 - b. Provide suitable storage for materials subject to damage by exposure to weather, theft, breakage, or otherwise.
 - c. Place upon Work or any part thereof only safe loads.
 - d. Frequently clean up refuse, rubbish, scrap materials, and debris caused by construction operations, keeping Project site safe and orderly.
 - e. Provide safe barricades and guard rails to protect pedestrian and vehicular traffic around openings, scaffolding, temporary stairs and ramps, excavations, elevated walkways, and other hazardous areas.
 3. Obtain written consent from proper parties before entering or occupying privately-owned land except on easements provided for construction.
 4. Assume full responsibility for preservation of public and private property on or adjacent to site. When direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of Work by Contractor, restore to condition equal to or better than that existing before damage was done.
- B. Barricades and Warning Signals: Where Work is performed on or adjacent to any roadway, right-of-way, or public place, furnish and erect barricades, fences, lights, warning signs, and danger signals; and take other precautionary measures for protection of persons or property and of the Work. Paint barricades to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade. Erect sufficient barricades to keep vehicles and pedestrians from being driven on or into Work under construction. Maintain barricades, signs, lights, and provide watchmen until Project is accepted by the Owner. Whenever Work creates encroachment on public roadways, station flagmen to manage traffic flow in accordance with approved traffic control plan.
- C. Protection of Existing Structures:
1. Underground Structures:

- a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, manholes, chambers, electrical signal and communication conduits, tunnels, and other existing subsurface installations located within or adjacent to limits of Work.
 - b. Known underground structures including water, sewer, electric, and telecommunication service connections are shown on Drawings. This information is not guaranteed to be correct or complete.
 - c. Explore ahead of trenching and excavation work and sufficiently uncover obstructing underground structures to determine their location, to prevent damage to them and to prevent interruption of utility services. Restore damage to underground structure to original condition at no additional cost.
 - d. Necessary changes in location of Work may be made by the Owner to avoid unanticipated underground structures.
 - e. If permanent relocation of underground structure or other subsurface installations is required and not otherwise provided in Contract, the Owner will direct Contractor in writing to perform Work, which is paid for under provisions for changes as described in the General Conditions.
2. **Surface Structures:** Surface structures are defined as existing buildings, structures and other constructed installations above ground surface. Included with structures are their foundations or extension below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities visible above ground surface.
3. **Protection of Underground and Surface Structures:**
- a. Support in place and protect from direct or indirect injury underground and surface structures located within or adjacent to limits of Work. Install supports carefully and as required by party owning or controlling structure. Before installing structure supports, satisfy Project Manager that methods and procedures have been approved by owner of structure.
 - b. Avoid moving or changing property of public utilities or private corporations without prior written consent of responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within limits of this Project for purpose of maintaining their properties, or of making changes or repairs to

their property that may be considered necessary by performance of this Contract.

- c. Notify owners and/or operators of utilities and pipelines of the nature of construction operations and dates when operations will be performed. When construction operations are required in immediate vicinity of existing structures, pipelines, or utilities, give minimum of 5 working days advance notice. Probe and flag location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reaches and uncovers utility.
- d. Assume risks attending presence or proximity of underground and surface structures within or adjacent to Work including but not limited to damage and expense for direct or indirect injury caused by his work to structure. Immediately repair damage.
- e. Employ structural engineer to ensure safety and integrity of structures and facilities.

D. Protection of Installed Products:

- 1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
- 2. Control traffic to prevent damage to equipment, materials, and surfaces.
- 3. Provide coverings to protect equipment and materials from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

2.09 ROADS AND PARKING

- A. Prevent interference with traffic on existing roads.
- B. Designate temporary parking areas to accommodate construction and management personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Project Manager.
- C. Minimize use by construction traffic of existing streets and driveways.
- D. Do not allow heavy vehicles or construction equipment in existing parking areas.

2.10 ENVIRONMENTAL CONTROLS

- A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at construction site and adjacent areas.
- B. Comply with statutes, regulations, and ordinances which relate to proposed Work for prevention of environmental pollution and preservation of natural resources, including but not limited to National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.
- C. Work to minimize impact to surrounding environment. Adopt construction procedures that do not cause unnecessary excavation and filling of terrain, indiscriminate destruction of vegetation, air or stream pollution, nor harassment or destruction of wildlife.
- D. Recognize and adhere to environmental requirements of Project. Limit disturbed areas to boundaries established by Contract. Avoid pollution of “on-site” streams, sewers, wells, or other water sources.
- E. Burning of rubbish, debris, or waste materials is not permitted.

2.11 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by discharge of noxious substances from construction operations.
- B. Provide equipment and personnel to perform required emergency measures to contain spillage, and to remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site, and replace with suitable compacted fill and topsoil.
- C. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.
 - 2. Prevent harmful dispersal of pollutants into atmosphere.
- D. Use equipment that conforms to current Federal, State, and local laws and regulations.
- E. Install or otherwise implement positive controls to prevent hazardous materials migrating from Work area.

2.12 PEST AND RODENT CONTROL

- A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

- B. Employ methods and use materials which will not adversely affect conditions at site or on adjoining properties.

2.13 NOISE CONTROL

- A. Provide vehicles, equipment, and construction activities that minimize noise to greatest degree practicable. Conform noise levels to latest OSHA standards. Do not permit noise levels to interfere with Work or create nuisance in surrounding areas.
- B. Conduct construction operations during daylight hours except as approved by Project Manager.
- C. Select construction equipment to operate with minimum noise and vibration. When in opinion of Project Manager, objectionable noise or vibration is produced by equipment, rectify conditions without additional cost to Owner. Sound Power Level (PWL) of equipment shall not exceed 85 dbA (re: 10-12 watts) measured 5 feet from piece of equipment. Explicit equipment noise requirements are specified with equipment specifications.

2.14 DUST CONTROL

Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of Project Manager, to control amount of dust generated.

2.15 WATER RUNOFF AND EROSION CONTROL

- A. Comply with Texas Pollutant Discharge Elimination system (TPDES) permit when required.
- B. In addition to TPDES requirements:
 - 1. Provide methods to control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to Work, site, or adjoining properties.
 - 2. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff courses so as to prevent erosion, sedimentation or damage.
 - 3. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
 - 4. Dispose of drainage water in manner to prevent flooding, erosion, or other damage to portion of site or to adjoining areas and in conformance with environmental requirements.

5. Retain existing drainage patterns external to construction site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as needed to control conditions.
6. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - a. Minimize area of bare soil exposed at one time.
 - b. Provide temporary control measures, as berms, dikes, and drains.
7. Construct fills and waste areas by selective placement to eliminate erosion of surface silts or clays.
8. Inspect earthwork periodically to detect evidence of start of erosion. Apply corrective measures as required to control erosion.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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Section 01520

TEMPORARY FIELD OFFICE

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Temporary field office building and associated parking area.

1.02 FACILITY DESCRIPTION

- A. Temporary field office will be utilized by Project Representative to coordinate and monitor daily construction activities performed by Contractor. Field office may also be used by duly authorized representatives or contract services retained to test or inspect materials furnished and work performed.
- B. Designate field office as non-smoking facility.

PART 2 P R O D U C T S

2.01 FIELD OFFICE

- A. Furnish and Locate:
 - 1. Locate temporary field office in vicinity approved by Project Manager and indicated on Drawings.
 - 2. Furnish, install and maintain field office for exclusive use of Project Representative. Provide sufficient room for project meetings and office for Project Representative.
 - 3. Provide office space ready for operation within 10 days of Date of Commencement for Project.
 - 4. Construct two all-weather, hard-surfaced parking spaces for exclusive use by Project Representative. Provide all-weather surfaced walk between parking spaces and field office.
- B. Minimum Construction:
 - 1. Structurally sound foundation and superstructure.
 - 2. Completely weather tight with insulated roof, walls, and 7-foot ceiling (minimum).

3. Stairs or walkway with handrail and covered entrance platform (minimum 4 feet by 4 feet) with mud scraper at door.
4. Resilient floor covering.
5. Screened windows with area equal to approximately 10 percent of floor area sufficient for light, view, and ventilation. Provide each window with operable sash and burglar bars.
6. Secure, lockable exterior doors with dead-bolt cylinder locks.

C. Minimum Services:

1. Exterior light at entrance.
2. Interior lighting of 75-foot candles minimum at desk-top height.
3. Automatic heating to maintain 65°F in winter.
4. Automatic cooling to maintain 75°F in summer.
5. Electric power service.
6. Telephone service including three lines—one for voice, one for data, and one for fax—for exclusive use by Project Representative.
7. Sanitary facilities in field office with one water closet and one lavatory and medicine cabinet for Project Representative.

D. Minimum Furnishings:

1. One, 5-drawer desk.
2. Two swivel-desk chairs with casters.
3. One plan table.
4. One plan rack to hold drawings.
5. One, 4-drawer legal file cabinet complete with 50 legal-size hanging folders and two full sized carriers.
6. One marker board with cleaner and markers.
7. Two waste baskets.
8. One tack board 30 inches by 36 inches.

9. One all-purpose fire extinguisher.
 10. Six protective helmets (hard hats) with ratchet adjustment for use by Project Representative.
 11. Conference table and chairs to accommodate ten persons.
 12. Plain-paper fax machine.
 13. Telephone instrument separate from fax machine.
- E. Provide adequate bookcase space for one set of Contract Documents for ready reference.

PART 3 EXECUTION

3.01 MAINTENANCE

- A. Provide maintenance of all-weather, surface driveway and parking areas, buildings and furnishings and equipment or materials furnished and supplied as part of temporary field office for duration of Contract.
- B. Provide janitorial services for temporary field office for duration of Contract. Janitorial services consist of twice weekly sweeping and mopping floors and trash removal, weekly cleaning of restrooms, and weekly dusting of furniture and equipment.
- C. Provide soap, paper towels, toilet paper, cleansers, and other necessary consumables to properly maintain temporary field office.
- D. Immediately repair damage, leaks, or defective service.

3.02 PROJECT CLOSEOUT

Remove temporary field office and signs and restore site as specified in Section 01770 - Closeout Procedures.

END OF SECTION

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Section 01555

TRAFFIC CONTROL AND REGULATION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Requirements for signs, signals, control devices, flares, lights, and traffic signals, as well as construction parking control, designated haul routes and bridging of trenches and excavations.
- B. Requirement for and qualifications of flagmen.

1.02 MEASUREMENT AND PAYMENT

- A. Traffic Control and Regulation. Measurement is on a lump sum basis for traffic control and regulation, including submittal of traffic control plan if different from plan shown on Drawings, provision of traffic control devices, and provision of equipment and personnel as necessary to protect Work and public. Amount invoiced shall be based on Schedule of Values submitted for traffic control and regulation.
- B. Payment for traffic control is on a lump sum basis and shall be authorized by Project Manager in three parts. Partial payments shall be made according to following schedule:
 - 1. Payment of 25 percent traffic control amount shall be authorized when permanent control devices and necessary temporary markings, sufficiently deployed along job site as required to maintain progress of Work, are installed at job site and approved. This limiting percentage shall be prorated based upon extent of Contractor's setup.
 - 2. Payment of 50 percent traffic control amount shall be authorized when pavement replacement commences. This limiting percentage shall be prorated based upon linear footage of pavement replaced, as measured along centerline axis of utility.
 - 3. Payment of 25 percent traffic control amount shall be authorized when permanent pavement markings are restored and unnecessary permanent and temporary control devices removed. This limiting percentage shall be prorated based upon extent of restoration.
 - 4. Flagmen. Measurement is on a lump sum basis for flagmen as required for Project. Amount invoiced shall be determined based on Schedule of Values submitted for flagmen.

- C. Refer to Section 01270 - Measurement and Payment for unit price procedures.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Traffic control plan responsive to Texas Manual on Uniform Traffic Control Devices (TMUTCD) sealed by Registered Professional Engineer is incorporated into Drawings. If Contractor proposes to implement traffic control without modification to plan provided, submit a letter confirming decision. If contractor proposes to implement traffic control different than plan provided, submit a traffic control plan in conformance with TMUTCD sealed by Registered Professional Engineer.
- C. Submit copies of approved lane closure permits.
- D. For both traffic control plan and flagmen use, submit Schedules of Values within 30 days following Notice to Proceed. Refer to Section 01292 - Schedule of Values.
- E. Provide information and records regarding use of qualified flagmen to verify use of “peace officers” as flagmen in compliance with Contract and Texas law, including but not limited to, Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.
- F. Provide information and records regarding use of qualified flagmen to verify Contractor’s use of “certified flagmen” as flagmen is in compliance with Contract

1.04 FLAGMEN

- A. Use flagmen, qualified as described under Paragraph 1.04.B, Uniformed Peace Officers, and Paragraph 1.04.C, Certified Flagmen, to control, regulate, and direct even flow and movement of vehicular and pedestrian traffic when construction operations encroach on public traffic lanes.
- B. Uniformed Peace Officer: Individual who has full-time employment as peace officer and receives compensation as flagman for private employment as individual employee or independent contractor. Private employment may be either employee-employer relationship or on an individual basis. Flagman may not be in employ of another peace officer and may not be a reserve peace officer.
 - 1. Peace officer is defined as:
 - a. Sheriffs and their deputies
 - b. Constables and deputy constables

- c. Marshals or police officers of an incorporated city, town, or village
 - d. As otherwise provided by Article 2.12, Code of Criminal Procedure, as amended
2. Individual who has full-time employment as a peace officer is one who is actively employed in a full-time capacity as a peace officer working, on average, a minimum of 32 paid hours per week, being paid a rate of pay not less than prevailing minimum hourly wage rate set by federal Wage and Hour Act and entitled to full benefits of participation in retirement plan, vacation, holidays, and insurance benefits. A reserve peace officer does not qualify, under this definition, as a peace officer.
- C. Certified Flagman: Individual who receives compensation as flagman and meets the following qualifications and requirements:
- 1. Formally trained and certified in traffic control procedures.
 - 2. Required to wear distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices
 - 3. English speaking, with Spanish as advantageous, but not required, primary, or secondary language
 - 4. Paid as Certified Flagman, equivalent to hourly wage rate set for Rough Carpenter under Document 00800, Wage Scale for Engineering Construction
 - 5. Required to carry proof of training/certification and photographic identification card issued by training institute to allow Project Manager to easily determine necessary full-time traffic control is actually provided when and where construction work encroaches upon traffic lanes.

PART 2 P R O D U C T S

2.01 SIGNS, SIGNALS, AND DEVICES

- A. Comply with Texas State Manual on Uniform Traffic Control Devices.
- B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

PART 3 E X E C U T I O N

3.01 PUBLIC ROADS

- A. Abide by laws and regulations of governing authorities when using public roads. If Work requires public roads be temporarily impeded or closed, obtain approvals

from governing authorities and pay permits before starting any Work. Coordinate activities with Project Manager.

- B. Maintain 10-foot-wide, all-weather lane adjacent to Work areas for use of emergency vehicles. Keep all-weather lane free of construction equipment and debris.
- C. Construction activities not to obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by Project Manager.
- D. Maintain local driveway access to residential and commercial properties adjacent to Work areas at all times. Use all-weather materials as approved by Project Manager when maintaining temporary driveway access to commercial and residential driveways.
- E. Cleanliness of Surrounding Streets: Keep streets used for entering and leaving job area free of excavated material, debris, and foreign material resulting from construction operations.
- F. Provide Project Manager 1-week notice prior to implementing each approved traffic control phase. Warn businesses of impending traffic control plans.
- G. Notify local schools, churches, METRO bus lines, police department, commercial businesses, and fire department in writing of construction a minimum of 5 working days prior to beginning Work.
- H. Remove existing signing and striping that are in conflict with construction activities or may cause driver confusion.
- I. Provide safe access for pedestrians along major cross streets.
- J. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.
- K. Do not close more than two consecutive esplanade openings at a time without prior approval by Project Manager.

3.02 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, and access by emergency vehicles.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.03 FLARES AND LIGHTS

Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.04 HAUL ROUTES

- A. Utilize haul routes designated by authorities or shown on Drawings for construction traffic.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.05 TRAFFIC SIGNS AND SIGNALS

- A. Construct necessary traffic control devices for temporary signals including but not limited to loop detectors, traffic signal conduits, traffic signal wiring, and crosswalk signals required to complete Work. Notify, a minimum of 60 days in advance, the agency concerning control boxes and switchgear. The agency will perform service, programming, or adjustments, to signal boxes and switchgear should this work be required during construction.
- B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations. Establish notices, signs, and traffic controls before moving into next phase of traffic control.
- C. Relocate traffic signs and signals as Work progresses to maintain effective traffic control.
- D. Unless otherwise approved by Project Manager, provide driveway signs with name of business that can be accessed from particular cross-over. Use two signs for each cross-over.
- E. Replace existing traffic control devices in project area.
- F. Project Representative may direct Contractor to make minor traffic control sign adjustments to eliminate driver confusion and maintain traffic safety during construction at no additional payment.

3.06 BRIDGING TRENCHES AND EXCAVATIONS

- A. Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic. Provide steel plates that can be laid across construction areas and major drives of commercial businesses.

- B. Secure bridging against displacement by using adjustable cleats, angles, bolts, or other devices whenever bridge is installed:
 - 1. On existing bus route
 - 2. When more than 5 percent of daily traffic is comprised of commercial or truck traffic
 - 3. When more than two separate plates are used for bridge
 - 4. When bridge is to be used for more than 5 consecutive days
- C. Install bridging to operate with minimum noise.
- D. Adequately shore trench or excavation to support bridge and traffic.
- E. Extend steel plates used for bridging a minimum of 1 foot beyond edges of trench or excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.
- F. Use steel plates of sufficient thickness to support H-20 loading, truck or lane, that produces maximum stress.

3.07 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of 2 feet.

3.08 TRAFFIC CONTROL, REGULATION, AND DIRECTION

- A. Use flagmen to control, regulate, and direct even flow and movement of vehicular and pedestrian traffic including but not limited to the following conditions:
 - 1. Where multi-lane vehicular traffic must be diverted into single lane vehicular traffic
 - 2. Where vehicular traffic must change lanes abruptly
 - 3. Where construction equipment must enter or cross vehicular traffic lanes and walks
 - 4. Where construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks
 - 5. Where traffic regulation is needed due to rerouting of vehicular traffic around Work site.

- 6. Other areas of Work where construction activities might affect public safety and convenience.
 - B. Use and maintain flagmen at points for periods of time as may be required to provide for public safety and convenience of travel.
 - C. Use of flagmen is for purpose of assisting in regulation of traffic flow and movement and does not relieve Contractor of full responsibility for taking other steps and providing other flaggers or personnel as Contractor may deem necessary to protect Work and public.
- 3.09 INSTALLATION STANDARDS
- A. Work in other phases shall be permitted, provided 1) phases are not continuous to one work is being done in presently, 2) installation of utility occurs in only one phase. Keep work and operation in second phase to an absolute minimum. Perform work in no more than two phases at a time. Authorization to perform work in second phase shall not relieve any responsibility of completing backfilling and paving operations in accordance with Contract.
 - B. Place temporary pavement with a single lane closure, in accordance with TMUTCD.
 - C. Reinstall temporary and permanent pavement markings as directed by Project Manager. Alternative markings shall be considered when marking manufacturer's weather conditions cannot be met. These alternatives are to be submitted and approved by Project Manager prior to installation. No extra payment will be made for use of alternative markings.
- 3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL
- A. Designate individual to be responsible for maintenance of traffic handling around construction area. Individual must be accessible at all times to immediately correct any deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings. Give name, address, and telephone number of designated individual to Project Representative.
 - B. Make daily inspections of signs, barricades, drums, lamps, and temporary pavement markings to verify that these are visible, in good working order, and conform with traffic handling plans and directions of Project Representative. When not in compliance, immediately bring equipment and materials into compliance by replacement, repair, cleaning, relocation, and realignment.
 - C. Keep equipment and materials, especially signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.

- D. Project Representative shall decide if damaged or vandalized signs, drums, and barricades can be reused.

END OF SECTION

Section 01562

TREE AND PLANT PROTECTION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Tree and plant protection and maintenance.
- B. Relocating and replanting existing trees.
- C. Employ qualified Arborist acceptable to Project Manager to move and relocate trees. Arborist must be normally engaged in field and have minimum of 5 years experience.

1.02 UNIT PRICES

No separate payment will be made for other tree and plant protection specified herein.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit name and experience of qualified Arborist to Project Manager.

1.04 PROJECT CONDITIONS

- A. Preserve and protect existing trees and plants to remain from foliage, branch, trunk, or root damage that could result from construction operations.
- B. Prevent following types of damage:
 - 1. Compaction of root zone by foot, vehicular traffic, or material storage.
 - 2. Trunk damage from equipment operations, material storage, or from nailing or bolting.
 - 3. Trunk and branch damage caused by ropes or guy wires.
 - 4. Root poisoning from spilled solvents, gasoline, paint, and other noxious materials.
 - 5. Branch damage due to improper pruning or trimming.
 - 6. Damage from lack of water due to:

- a. Cutting or altering natural water migration patterns near root zones
- b. Failure to provide adequate watering
- 7. Damage from alteration of soil pH factor caused by depositing lime, concrete, plaster, or other base materials near roots
- 8. Cutting of roots larger than 1½ inches in diameter

1.05 DAMAGE ASSESSMENT

When trees other than those designated for removal are destroyed or badly damaged as result of construction operations, remove and replace with same size, species, and variety up to and including 8 inches in trunk diameter. Tree larger than 8 inches in diameter shall be replaced with 8-inch diameter tree of same species and variety and total contract amount shall be reduced by amount determined from following International Shade Tree Conference formula: $0.7854 \times D^2 \times \38.00 where D is diameter in inches of tree or shrub trunk measured 12 inches above grade.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphalt Paint: Emulsified asphalt or other adhesive, elastic, antiseptic coating formulated for horticultural use on cut or injured plant tissue, free from kerosene and coal creosote
- B. Burlap: Suitable for use as tree wrapping
- C. Fertilizer: Liquid containing 20 percent nitrogen, 10 percent phosphorus, and 5 percent potash.
- D. Necessary tree replacements shall be as approved by Project Manager.

PART 3 EXECUTION

3.01 PROTECTION AND MAINTENANCE OF EXISTING TREES AND SHRUBS

- A. Except for trees shown on Drawings or determined by Project Manager to be removed and relocated, trees within Project area are to remain in place, protected from damage and maintained by Contractor.
- B. For trees or shrubs to remain, perform following:
 - 1. Trim trees and shrubs to remain only under supervision of professional tree surgeon or horticulturist.

- a. Prune trees according to International Society of Arbor culture specifications.
 - b. Trees and shrubs requiring pruning for construction should also be pruned for balance as well as to maintain proper form and branching habit.
 - c. Cut limbs at branch collar. No stubs should remain on trees. Branch cuts should not gouge outer layer of tree structure or trunk.
 - d. Prior to construction, prune all trees to remain of new or recent growth to maintain basic branching form of trees. Base extent of pruning upon proximity of pavement to trunk and size of tree blockouts and requirements of construction adjacent to tree.
 - e. Limit pruning to young branches as much as possible. Take care to maintain older branches that provide basic form of tree. All pruning shall be done in presence of and direction of Project Representative.
 - f. Paint cuts over $\frac{3}{4}$ inch in diameter with tree paint, covering exposed, living tissue.
2. Use extreme care to prevent excessive damage to root systems.
 - a. Roots in construction areas shall be cut smoothly with a trencher before excavation begins. Do not allow ripping of roots with a backhoe or other equipment.
 - b. Temporarily cover exposed roots with wet burlap to prevent roots from drying out.
 - c. Cover exposed roots with soil as soon as possible.
 3. Prevent damage or compaction of root zone (area below drip line) by construction activities.
 - a. Do not allow scarring of trunks or limbs by equipment or other means.
 - b. Do not store construction materials, vehicles, or excavated material under drip line of trees.
 - c. Do not pour liquid materials under drip line.
 4. Water and fertilize remaining trees and shrubs to maintain their health during construction period.

- a. Supplemental watering of landscaping during construction should be done once every 7 days in cold months and once every 4 days in hotter months.
 - b. This watering shall consist of saturating soils at least 6 to 8 inches beneath surface.
5. Water areas currently being served by private sprinkler systems while systems are temporarily taken out of service to maintain health of existing landscapes.
 6. Contractor's option with Project Manager's permission, shrubs to remain may be temporarily transplanted and returned to original positions under supervision of professional horticulturist.

3.02 PROTECTION

A. Protection of Trees or Shrubs in Open Area:

1. Install steel drive-in fence posts in protective circle, approximately 8 feet on center, not closer than 4 feet to trunk of trees or stems of shrubs.
2. Drive steel drive-in fence posts into ground for 3 feet minimum, leaving 5 feet minimum above ground.
3. Mount fluorescent orange construction fence on fence posts.
4. For trees or shrubs in paved areas, mount concrete-filled steel pipe 2½ inches in diameter minimum in rubber auto tires filled with concrete (movable posts).

B. Timber Wrap Protection for Trees in Close Proximity of Moving or Mechanical Equipment and Construction Work: When work is required within construction fence protecting trees, provide timber wrap protection for trees in close proximity of moving or mechanical equipment and work.

1. Wrap trunk with layer of burlap.
2. Install 2 by 4s or 2 by 5s (5-foot to 6-foot lengths) vertically, spaced 3 inches to 5 inches apart around circumference of tree trunk.
3. Tie in place with 12 to 9 gauge steel wire.

3.03 MAINTENANCE OF NEWLY PLANTED TREES AND REPLANTED TREES

A. Show proof of capacity to water during dry periods.

- B. Guarantee trees planted for this Project shall remain alive and healthy at least until end of 1-year warranty period and additional 1-year period required by Surface Restoration Bond.
1. Within 4 weeks notice from Project Manager, replace dead trees or trees that in opinion of Project Manager, have become unhealthy, unsightly or have lost their natural shape as result of additional growth, improper pruning, maintenance or weather conditions.
 2. When tree must be replaced, guarantee period begins on date of tree replacement, subject to Project Manager's inspection, for no less than 1 year.
 3. Straighten leaning trees and bear entire cost.
 4. Dispose of trees rejected by Project Representative and bear entire cost.

END OF SECTION

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Section 01570

STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Implementation of Storm Water Pollution Prevention Plans (SWP3) described in Section 01410 - TPDES Requirement.
- B. Installation and maintenance of storm-water pollution prevention structures: diversion dikes, interceptor dikes, diversion swales, interceptor swales, down spout extenders, pipe slope drains, paved flumes and level spreaders. Structures are used during construction and prior to final development of the site.
- C. Filter Fabric Fences:
 - 1. Type 1: Temporary filter fabric fences for erosion and sediment control in non-channelized flow areas.
 - 2. Type 2: Temporary reinforced filter fabric fences for erosion and sediment control in channelized flow areas.
- D. Straw Bale Fence.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for filter fabric fence is on a linear foot basis measured between limits of beginning and ending of stakes.
 - 2. Payment for reinforced filter fabric fence is on a linear foot basis measured between limits of beginning and ending of stakes.
 - 3. Payment for drop inlet baskets is on a unit price basis for each drop inlet basket.
 - 4. Payment for storm inlet sediment traps is on a unit price basis for each storm inlet sediment trap.
 - 5. Payment for storm-water-pollution-prevention structures is on a lump sum basis for the project. Earthen structures with outlet and piping includes diversion dikes, interceptor dikes, diversion swales, interceptor swales, and excavated earth-outlet sediment trap, embankment earth-outlet sediment

trap, down spout extenders, pipe slope drains, paved flumes, stone outlet sediment trap, and level spreaders.

6. Payment for straw bale barrier, if included in Document 00300 - Bid Form, is on a linear foot of accepted bale barriers, if not include in cost of storm-water-pollution-prevention structures.
7. Payment for brush berm, if included in Document 00300 - Bid Form, is on a linear foot of accepted brush berm, if not include in cost of stormwater-pollution-prevention structures.
8. Payment for sandbag barrier, if included in Document 00300 - Bid Form, is on a linear foot basis measured between limits of beginning and ending of sandbags, if not include in cost of storm-water-pollutionprevention structures.
9. Payment for sediment basin with pipe outlet or stone outlet, if included in Document 00300 - Bid Form, is on a square yard basis, if not include in cost of storm-water-pollution-prevention structures.
10. Payment for inlet protection barriers, if included in Document 00300 - Bid Form, is on a linear foot basis measured along outside face of inlet protection barrier, if not include in cost of storm-water-pollutionprevention structures.
11. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum) Contract. If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCE STANDARDS

A. ASTM

1. A 36 - Standard Specification for Carbon Structural Steel.
2. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. D3786 - Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics.
4. D 4355 - Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
5. D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

6. D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 7. D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 8. D 6382 - Standard Practice for Dynamic Mechanical Analysis and Thermogravimetry of Roofing and Waterproofing Membrane Material.
- B. A Guidance Manual for Identifying and Eliminating Illicit Connections to Municipal Separate Storm Sewer Systems (MS4) by the Galveston County Health District Pollution Control Division.

1.04 SYSTEM DESCRIPTIONS

- A. Filter Fabric Fence Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Fences to remain in proper position and configuration at all times.
- B. Straw Bale Fence: Install to allow surface runoff percolation through straw in sheet-flow manner and to retain and accumulate sediment. Maintain Straw Bale Fence to remain in proper position and configuration at all times.
- C. Interceptor Dikes and Swales: Construct to direct surface or channel runoff around the project area or runoff from project area into sediment traps.
- D. Drop Inlet Baskets: Install to allow runoff percolation through the basket and to retain and accumulate sediment. Clean accumulation of sediment to prevent clogging and backups.
- E. Sediment Traps: Construct to pool surface runoff from construction area to allow sediment to settle onto the bottom of trap.

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's literature for product specifications and installation instructions.
- C. Submit manufacturers' catalog sheets and other product data on geotextile or filter fabrics, outlet pipe, perforated riser and connectors.
- D. Submit proposed methods, equipment, materials, and sequence of operations for storm-water pollution prevention structures.
- E. Submit shop drawings for Drop Inlet Baskets.

PART 2 P R O D U C T S

2.01 CONCRETE

- A. Concrete: Class B in accordance with Section 03315 - Concrete for Utility Construction or as shown on the Drawings.

2.02 AGREGATE MATERIALS

- A. Use poorly graded cobbles with diameter greater than 3 inches and less than 5 inches.
- B. Provide gravel lining in accordance with Section 02320 - Utility Backfill Materials or as shown on the drawings.
- C. Provide clean cobbles and gravel consisting of crushed concrete or stone. Use clean, hard crushed concrete or stone free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic matter.
- D. Sediment Pump Pit Aggregate: Use nominal 2-inch diameter river gravel.

2.03 PIPE

- A. Polyethylene culvert pipe or PVC sewer pipe in accordance with Section 02505 - High Density Polyethylene (HDPE) Solid and Profile Wall Pipe and Section 02506 - Polyvinyl Chloride Pipe or as shown on the Drawings.
- B. Inlet Pipes: Galvanized steel pipe in accordance with Section 02642 - Corrugated Metal Pipe or as shown on the Drawings.
- C. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or round PVC pipe, minimum of 12-inch and a maximum of 24-inch diameter, perforate at 6- to 12-inch centers around circumference.

2.04 GEOTEXTILE FILTER FABRIC

- A. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
- B. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
- C. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.
- D. Mirafi, Inc., Synthetic Industries, or equivalent.

2.05 FENCING

- A. Wire Fencing: Woven galvanized steel wire, 14 gauge by 6-inch square mesh spacing, minimum 24-inch roll or sheet width of longest practical length.
- B. Fence Stakes: Nominal 2- by 2-inch moisture-resistant treated wood or steel posts (min. of 1.25 lbs. per linear foot and Brinell hardness greater than 140) with safety caps on top; length as required for minimum 8-inch bury and full height of filter fabric.

2.06 SANDBAGS

- A. Provide woven material made of polypropylene, polyethylene, or polyamide material.
 - 1. Minimum unit weight of 4 ounces per square yard.
 - 2. Minimum grab strength of 100 psi in any principal direction (ASTM D4632).
 - 3. Mullen burst strength exceeding 300 psi (ASTM D3786).
 - 4. Ultraviolet stability exceeding 70 percent.
 - 5. Size: Length: 18 to 24 inches. Width: 12 to 18 inches. Thickness: 6 to 8 inches. Weight: 50 to 125 pounds.

2.07 DROP INLET BASKET

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

2.08 STRAW BALES

- A. Straw: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.
- B. Straw Bale Stakes (applicable where bales are on soil): No. 3 (3/8 diameter) reinforcing bars, deformed or smooth at Contractor's option, length as required for minimum 18-inch bury and full-height bales.

PART 3 EXECUTION

3.01 PREPARATION, INSTALLATION AND MAINTENANCE

- A. Provide erosion and sediment control structures at locations shown on the Drawings.
- B. Do not clear, grub or rough cut until erosion and sediment control systems are in place unless approved by Project Manger to allow installation of erosion and sediment control systems, soil testing and surveying.
- C. Maintain existing erosion and sediment control systems located within project site until acceptance of Project or until directed by Project Manger to remove and discard existing system.
- D. Regularly inspect and repair or replace damaged components of erosion and sediment control structures. Unless otherwise directed, maintain erosion and sediment control structure until project area stabilization is accepted. Redress and replace granular fill at outlets as needed to replenish depleted granular fill. Remove erosion and sediment control structures promptly when directed by Project Manger. Dispose of materials in accordance with Section 01576 - Waste Material Disposal.
- E. Remove and dispose sediment deposits at the designated spoil site for the Project. If a project spoil site is not designated on Drawings, dispose of sediment off site at approved location in accordance with Section 01576 - Waste Material Disposal.
- F. Unless otherwise shown on the Drawings, compact embankments, excavations, and trenches in accordance with Section 02315 - Roadway Excavation or Section 02317 - Excavation and Backfill for Utilities.
- G. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated right-of-way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control structures.
- H. Protect existing trees and plants in accordance with Section 01562 - Tree and Plant Protection.

3.02 SEDIMENT TRAPS

- A. Install sediment traps so that surface runoff shall percolate through system in sheet flow fashion and allow retention and accumulation of sediment.
- B. Inspect sediment traps after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately.

- C. Use fill material for embankment in accordance with Section 02320 - Utility Backfill Materials.
- D. Excavation length and height shall be as specified on Drawings. Use side slopes of 2:1 or flatter.
- E. Stone outlet sediment traps:
 - 1. Maintain minimum of 6 inches between top of core material and top of stone outlet, minimum of 4 inches between bottom of core material and existing ground and minimum of 1 foot between top of stone outlet and top of embankment.
 - 2. Embed cobbles minimum of 4 inches into existing ground for stone outlet. Core shall be minimum of 1 foot in height and in width and wrapped in triple layer of geotextile filter fabric.
- F. Sediment Basin with Pipe Outlet Construction Methods: Install outlet pipe and riser as shown on the Drawings.
- G. Remove sediment deposits when design basin volume is reduced by one-third or sediment level is one foot below principal spillway crest, whichever is less.

3.03 FILTER FABRIC FENCE CONSTRUCTION METHODS

- A. Fence Type 1:
 - 1. Install stakes 3 feet on center maximum and firmly embed minimum 8 inches in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is 8 feet. Install wood stakes at a slight angle toward the source of anticipated runoff.
 - 2. Trench-in the toe of the fence lines so the downward face of the trenches is flat and perpendicular to direction of flow. V-trench configuration as shown on Drawings may also be used.
 - 3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with minimum 6-inch overlap and seal securely.
 - 4. Staple filter fabric to stakes at maximum 3 inches on center. Extend fabric minimum 18 inches and maximum 36 inches above natural ground.
 - 5. Backfill and compact trench.
- B. Fence Type 2:
 - 1. Layout fence same as for Type 1.

2. Install stakes at 6 feet on center maximum and at each joint in wire fence, firmly embedded 1-foot minimum and inclined as for Type 1.
 3. Tie wire fence to stakes with wire at 6 inches on center maximum. Overlap joints minimum one bay of mesh.
 4. Install trench same as for Type 1.
 5. Fasten filter fabric wire fence with tie wires at 3 inches on center maximum.
 6. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at 3 inches on center maximum and, if applicable, to stakes above top of wire fence as for Type 1.
 7. Backfill and compact trench.
- C. Attach filter fabric to wooden fence stakes spaced a maximum of 6 feet apart or steel fence stakes spaced a maximum of 8 feet apart and embedded a minimum of 12 inches. Install stakes at a slight angle toward source of anticipated runoff.
- D. Trench-in toe of filter fabric fence with spade or mechanical trencher so that downward face of trench is flat and perpendicular to direction of flow. V-trench configuration may also be used. Lay filter fabric along edges of trench. Backfill and compact trench upon completion of construction.
- E. Filter fabric fence shall have a minimum height of 18 inches and a maximum height of 36 inches above natural ground.
- F. Cut length of fence to minimize use of joints. When joints are necessary, splice fabric together only at support post with minimum 6-inch overlap and seal securely.
- G. Triangular Filter Fabric Fence Construction Methods:
1. Attach filter fabric to wire fencing, 18 inches on each side. Provide a fabric cover and skirt with continuous wrapping of fabric. Skirt should form continuous extension of fabric on upstream side of fence.
 2. Secure triangular fabric filter fence in place using one of the following methods:
 - a. Toe-in skirt 6 inches with mechanically compacted material;
 - b. Weigh down skirt with continuous layer of 3-inch to 5-inch graded rock; or
 - c. Trench-in entire structure 4 inches.

3. Anchor triangular fabric filter fence structure and skirt securely in place using 6-inch wire staples on 2-foot centers on both edges and on skirt, or staked using 18-inch by 3/8-inch diameter re-bar with tee ends.
 4. Lap fabric filter material by 6 inches to cover segment joints. Fasten joints with galvanized shoat rings.
- H. Reinforced Filter Fabric Barrier Construction Methods:
1. Attach woven wire fence to fence stakes.
 2. Securely fasten filter fabric material to wire fence with tie wires.
 3. When used in swales, ditches or diversions, elevation of barrier at top of filter fabric at flow line location in channel shall be lower than bottom elevation of filter fabric at ends of barrier or top of bank, whichever is less, in order to keep storm water discharge in channel from overtopping bank.
 4. Remove sediment deposits when silt reaches depth one-third height of barrier or 6 inches, whichever is less.

3.04 DIKE AND SWALE

- A. Unless otherwise indicated, maintain minimum dike height of 18 inches, measured from cleared ground at up slope toe to top of dike. Maintain side slopes of 2:1 or flatter.
- B. Dike and Swale Stabilization: When shown on the Drawings, place gravel lining 3 inches thick and compacted into the soil, or 6 inches thick if truck crossing is expected. Extend gravel lining across bottom and up both sides of swale minimum height of 8 inches vertically, above bottom. Gravel lining on dike side shall extend up the up slope side of dike a minimum height of 8 inches, measured vertically from interface of existing or graded ground and up slope toe of dike, as shown on Drawings.
- C. Divert flow from dikes and swales to sediment basins, stabilized outlets, or sediment trapping devices of types and at locations shown on Drawings. Grade dikes and swales as shown on Drawings, or, if not specified, provide positive drainage with maximum grade of 1 percent to outlet or basin.
- D. Clear in accordance with Section 02233 - Clearing and Grubbing Compact embankments in accordance with Section 02315 - Roadway Excavation.
- E. Carry out excavation for swale construction so that erosion and water pollution is minimal. Minimum depth shall be 1 foot and bottom width shall be 4 feet, with level swale bottom. Excavation slopes shall be 2:1 or flatter. Clear, grub and strip excavation area of vegetation and root material.

3.05 DOWNSPOUT EXTENDER

- A. Downspout extender shall have slope of approximately 1 percent. Use pipe diameter of 4 inches or as shown on the Drawings. Place pipe in accordance with Section 02317 - Bedding and Backfill for Utilities.

3.06 PIPE SLOPE DRAIN

- A. Compact soil around and under drain entrance section to top of embankment in lifts appropriately sized for method of compaction utilized.
- B. Inlet pipe shall have slope of 1 percent or greater. Use pipe diameter as shown on the Drawings.
- C. Top of embankment over inlet pipe and embankments directing water to pipe shall be at least 1 foot higher at all points than top of inlet pipe.
- D. Pipe shall be secured with hold-down grommets spaced 10 feet on centers.
- E. Place riprap apron with a depth equal to pipe diameter with 2:1 side slopes.

3.07 PAVED FLUME

- A. Compact soil around and under the entrance section to top of the embankment in lifts appropriately sized for method of compaction utilized.
- B. Construct subgrade to required elevations. Remove and replace soft sections and unsuitable material. Compact subgrade thoroughly and shape to a smooth, uniform surface.
- C. Construct permanent paved flumes in accordance with Drawings.
- D. Remove sediment from riprap apron when sediment has accumulated to depth of one foot.

3.08 LEVEL SPREADER

- A. Construct level spreader on undisturbed soil and not on fill. Ensure that spreader lip is level for uniform spreading of storm runoff.
- B. Maintain at required depth, grade, and cross section as specified on Drawings. Remove sediment deposits as well as projections or other irregularities which will impede normal flow.

3.09 INLET PROTECTION BARRIER

- A. Place sandbags and filter fabric fences at locations shown on the SWP3.

3.10 DROP INLET BASKET CONSTRUCTION METHODS

- A. Fit inlet insert basket into inlet without gaps around insert at locations shown on the SWP3.
- B. Support for inlet insert basket shall consist of fabricated metal as shown on Drawings.
- C. Push down and form filter fabric to shape of basket. Use sheet of fabric large enough to be supported by basket frame when holding sediment and extend at least 6 inches past frame. Place inlet grates over basket/frame to serve as fabric anchor.
- D. Remove sediment deposit after each storm event and whenever accumulation exceeds 1-inch depth during weekly inspections.

3.11 STRAW BALE FENCE CONSTRUCTION METHODS

- A. Place bales in row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface.
- B. Embed bale in soil a minimum of 4 inches.
- C. Securely anchor bales in place with Straw Bale Stakes driven through bales a minimum of 18 inches into ground. Angle first stake in each bale toward previously laid bale to force bales together.
- D. Fill gaps between bales with straw to prevent water from channeling between bales. Wedge carefully in order not to separate bales.
- E. Replace with new straw bale fence every two months or as required by Project Manager.

3.12 BRUSH BERM CONSTRUCTION METHODS

- A. Construct brush berm along contour lines by hand placing method. Do not use machine placement of brush berm.
- B. Use woody brush and branches having diameter less than 2 inches with 6 inches overlap. Avoid incorporation of annual weeds and soil into brush berm.
- C. Use minimum height of 18 inches measured from top of existing ground at upslope toe to top of berm. Top width shall be 24 inches minimum and side slopes shall be 2:1 or flatter.
- D. Embed brush berm into soil a minimum of 4 inches and anchor using wire, nylon or polypropylene rope across berm with a minimum tension of 50 pounds. Tie rope securely to 18-inch x 3/8-inch diameter rebar stakes driven into ground on 4-foot centers on both sides of berm.

3.13 STREET AND SIDEWALK CLEANING

- A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas, following Section 01575 - Stabilized Construction Exit.
- B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not waterhose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

3.14 WASTE COLLECTION AREAS

- A. Prevent water runoff from passing through waste collection areas, and prevent water runoff from waste collection areas migrating outside collection areas.

3.15 EQUIPMENT MAINTENANCE AND REPAIR

- A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.
- B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.16 VEHICLE/ EQUIPMENT WASHING AREAS

- A. Install wash area (stabilized with coarse aggregate) adjacent to stabilized construction exit(s), as required to prevent mud and dirt run-off. Release wash water into drainage swales or inlets protected by erosion and sediment controls. Build wash areas following Section 01575- Stabilized Construction Exit. Install gravel or rock base beneath wash areas.
- B. Wash vehicles only at designated wash areas. Do not wash vehicles such as concrete delivery trucks or dump trucks and other construction equipment at locations where runoff flows directly into watercourses or storm water conveyance systems.
- C. Locate wash areas to spread out and evaporate or infiltrate wash water directly into ground, or collect runoff in temporary holding or seepage basins.

3.17 WATER RUNOFF AND EROSION CONTROL

- A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties.
- B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.
- C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
- D. Dispose of drainage water to prevent flooding, erosion, or other damage to the site or adjoining areas. Follow environmental requirements.
- E. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.
- F. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Hold area of bare soil exposed at one time to a minimum.
 - 2. Provide temporary controls such as berms, dikes, and drains.
- G. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.
- H. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.
- I. Dispose of sediments offsite, not in or adjacent to streams or floodplains, nor allow sediments to flush into streams or drainage ways. Assume responsibility for offsite disposal location.
- J. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8-inch layers. Provide compaction density at minimum 90 percent Standard Proctor ASTM D-698-78 density. Make at least one test per 500 cubic yards of embankment.
- K. Do not maneuver vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.
- L. Do not damage existing trees intended to remain.

3.18 REMOVAL OF CONTROLS

- A. Remove erosion and sediment controls when the site is finally stabilized or as directed by Project Manager.
- B. Dispose of sediments and waste products following Section 01505 - Temporary Facilities.

END OF SECTION

Section 01575

STABILIZED CONSTRUCTION EXIT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Installation of erosion and sediment control for stabilized construction exits used during construction and prior to final development of site.

1.02 UNIT PRICES

- A. Measure and pay for stabilized construction roads, parking areas, exits and truck washing area by square yard of aggregate placed in 8-inch layer. No separate payment shall be made for Street Cleaning as Required by NPDES. Include cost of Work for Street Cleaning under Section in pay items for which Work is a component.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's catalog sheets and other product data on geotextile fabric.
- C. Submit sieve analysis of aggregates conforming to requirements of this Specification.

1.04 REFERENCES

- A. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- B. A Guidance Manual for Identifying and Eliminating Illicit Connections to Municipal Separate Storm Sewer Systems (MS4) by the Galveston County Health District Pollution Control Division.

PART 2 P R O D U C T S

2.01 GEOTEXTILE FABRIC

- A. Provide woven or non-woven geotextile fabric made of polypropylene, polyethylene, ethylene, or polyamide material.

- B. Geotextile fabric shall have minimum grab strength of 270 psi in any principal direction (ASTM D4632) and equivalent opening size between 50 and 140.
- C. Geotextile and threads shall be resistant to chemical attack, mildew, and rot and shall contain ultraviolet ray inhibitors and stabilizers to provide minimum of 6 months of expected usable life at temperature range of 0°F to 120°F.
- D. Representative Manufacturers: Mirafi, Inc. or equal.

2.02 COARSE AGGREGATES

- A. Coarse aggregate shall consist of crushed stone, gravel, crushed blast furnace slag, or combination of these materials. Aggregate shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.
- B. Coarse aggregates shall conform to following gradation requirements.

Sieve Size	Percent Retained
(<u>Square Mesh</u>)	(<u>By Weight</u>)
2-1/2"	0
2"	0 - 20
1-1/2"	15 - 50
3/4"	60 - 80
No. 4	95 - 100

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. If necessary to keep street clean of mud carried by construction vehicles and equipment, provide stabilized construction roads and exits at construction, staging, parking, storage, and disposal areas. Construct erosion and sediment controls in accordance with requirements shown on Drawings and specified in this Section.
- B. No clearing, grubbing or rough cutting permitted until erosion and sediment control systems are in place, other than as specifically directed by Project Manager to allow soil testing and surveying.
- C. Maintain existing erosion and sediment control systems located within Project site until acceptance of Project or until directed by Project Manager to remove and discard existing system.

- D. Regularly inspect, repair, or replace components of stabilized construction exits. Unless otherwise directed, maintain stabilized construction roads and exits until project is accepted by the Owner. Remove stabilized construction roads and exits promptly when directed by Project Manager. Discard removed materials off site.
- E. Remove and dispose of sediment deposits at designated spoil site for Project. If project spoil site is not designated on Drawings, dispose of sediment off site at location not in or adjacent to stream or flood plain. Assume responsibility for off site disposal. Spread sediment evenly throughout site, compacted and stabilized. Do not allow sediment to flush into stream or drainage way. If sediment has been contaminated, dispose in accordance with existing federal, state, and local rules and regulations.
- F. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control systems.
- G. Conduct construction operation under this Contract in conformance with erosion control practices described in Specification 01570 – Storm Water Pollution Control.

3.02 CONSTRUCTION METHODS

- A. Provide stabilized access roads, subdivision roads, parking areas, and other on-site vehicle transportation routes where shown on Drawings.
- B. Provide stabilized construction exits and truck washing areas when approved by Project Manager, of sizes and locations where shown on Drawings or as specified in this Section.
- C. Vehicles leaving construction areas shall have their tires cleaned to remove sediment prior to entrance onto public right-of-way. When washing is needed to remove sediment, construct truck washing area. Truck washing shall be done on stabilized areas which drain into drainage system protected by erosion and sediment control measures.
- D. Details for stabilized construction exit are shown on Drawings. Construct other stabilized areas to same requirements. Maintain roadway width at least 14 feet for one-way traffic and 20 feet for two-way traffic and sufficiently for ingress and egress. Furnish and place geotextile fabric as permeable separator to prevent mixing of coarse aggregate with underlying soil. Maximum exposure of geotextile fabric to elements between laydown and cover of 14 days to minimize damage potential.
- E. Grade roads and parking areas to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering public right-of-way, receiving stream or storm water conveyance system.

- F. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional coarse aggregates to maintain required depth. Repair and clean out damaged control measures used to trap sediment. Immediately remove sediment spilled, dropped, washed, or tracked onto public right-of-way.
- G. Maintain length of stabilized area as shown on Drawings, but not less than 50 feet. Maintain thickness less than 8 inches. Maintain width less than full width of all points of ingress or egress.
- H. Stabilization for other areas shall have same coarse aggregate, thickness, and width requirements as stabilized construction exit, except where shown otherwise on Drawings.
- I. Stabilized area may be widened or lengthened to accommodate truck washing area when authorized by Project Manager.
- J. Alternative methods of construction may be utilized when shown on Drawings, or when approved by Project Manager. These methods include following:
 - 1. Cement-Stabilized Soil - Compacted cement-stabilized soil or other fill material in application thickness of at least 8 inches.
 - 2. Wood Mats/Mud Mats - Oak or other hardwood timbers placed edge-to-edge and across support wooden beams which are placed on top of existing soil in application thickness of at least 6 inches.
 - 3. Steel Mats - Perforated mats placed across perpendicular support members.
- K. Provide street cleaning, such as sweeping or vacuuming, at locations around project site where construction traffic has caused tracking of sediments onto roadways. Do not wash or flush sediments into adjacent drainage systems.
- L. Mechanical sweepers shall be vacuum-type or regenerative sweepers. Sweeping speed not to exceed 6 mph. Make two passes.
- M. Clean street daily before end of workday. When excess sediments have tracked onto streets, Project Manager may direct contractor to clean street as often as necessary. Remove and dispose of sediments properly.
- N. Use other erosion and sediment control measures to prevent sediment runoff during period of rains and non-working hours and when storm discharges are expected.

END OF SECTION

Section 01576

WASTE MATERIAL DISPOSAL

PART 1 GENERAL

1.01 SECTION INCLUDES

Disposal of waste material and salvageable material.

1.02 UNIT PRICES

No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related sections.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances.
- C. Submit copy of written permission from property owner, with description of property, prior to disposal of excess material adjacent to Project. Submit written and signed release from property owner upon completion of disposal work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SALVAGEABLE MATERIAL

- A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at location or locations shown on Drawings outside limits of Project.
- B. Other Salvageable Materials: Conform to requirements of individual Specification Sections.
- C. Coordinate with Project Manager loading of salvageable material.

3.02 EXCESS MATERIAL

- A. Remove and legally dispose of vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage from job site.
- B. Excess soil may be deposited on private property adjacent to Project when written permission is obtained from property owner. See Paragraph 1.03B above.

- C. Verify flood plain status of any proposed disposal site. Do not dispose of excavated materials in area designated as within 100-year Flood Hazard Area unless the proper permit has been obtained. Remove excess material placed in "100-year Flood Hazard Area" at no additional cost to the Owner.

- D. Remove waste materials from site daily, in order to maintain site in neat and orderly condition.

END OF SECTION

Section 01578

CONTROL OF GROUND WATER AND SURFACE WATER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations, and foundation beds in stable condition, and controlling ground water conditions for tunnel excavations.
- B. Protecting work against surface runoff and rising flood waters.
- C. Disposing of removed water.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

- 1. When noted, dewatering of trench or excavation during course of project shall be measured per linear foot and paid for at contract unit prices for dewatering, when directed to perform such work by Project Manager. Dewatering must be fully detailed in submittal and submittal must be approved prior to performing dewatering work before payment will be made for dewatering. No payment will be made for work unless directed to perform work by Project Manager.
- 2. Presence of a pump on project does not constitute dewatering for payment under bid item "Ground Water Control for Open Cut Construction."
- 3. Dewatering required during course of project to lower water table for other utility installation less than 24 inches in diameter, construction of structures, removal of standing water, surface drainage seepage, or to protect against rising waters or floods shall be considered incidental to Work unless otherwise noted.
- 4. No separate payment will be made for groundwater control associated with augering, tunnels or casing. Include cost in unit price for augering.
- 5. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum) Contract. If the Contract is a Stipulated Price Contract, include payment for work under this section in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM D698 - Standard Test Methods for Laboratory Compaction of Soils Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³).

- B. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

1.04 DEFINITIONS

- A. Ground water control includes both dewatering and depressurization of water-bearing soil layers.
 - 1. Dewatering includes lowering water table and intercepting seepage that would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts, and disposing of removed water. Intent of dewatering is to increase stability of tunnel excavations and excavated slopes, prevent dislocation of material from slopes or bottoms of excavations, reduce lateral loads on sheeting and bracing, improve excavating and hauling characteristics of excavated material, prevent failure or heaving of bottom of excavations, and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.
 - 2. Depressurization includes reduction in piezometric pressure within strata not controlled by dewatering alone, as required to prevent failure or heaving of excavation bottom or instability of tunnel excavations.
- B. Excavation drainage includes keeping excavations free of surface and seepage water.
- C. Surface drainage includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines as required to protect Work from any source of surface water.
- D. Equipment and instrumentation for monitoring and control of ground water control system includes piezometers, monitoring wells and flow meters for observing and recording flow rates.

1.05 PERFORMANCE REQUIREMENTS

- A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems. Submit prepared method and spacing of readings for review prior to obtaining water level readings.
- B. Design ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 02260 - Trench Safety Systems, to produce following results:
 - 1. Effectively reduce hydrostatic pressure affecting:
 - a. Excavations

- b. Tunnel excavation, face stability, or seepage into tunnels
 2. Develop substantially dry and stable subgrade for subsequent construction operations
 3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work
 4. Prevent loss of fines, seepage, boils, quick condition, or softening of foundation strata
 5. Maintain stability of sides and bottom of excavations
 - C. Provide ground water control systems that include single-stage or multiple-stage well point systems, eductor, and ejector-type systems, deep wells, or combinations of these equipment types.
 - D. Provide drainage of seepage water and surface water, as well as water from any other source entering excavation. Excavation drainage may include placement of drainage materials, crushed stone and filter fabric, together with sump pumping.
 - E. Provide ditches, berms, pumps, and other methods necessary to divert and drain surface water from excavation and other work areas.
 - F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.
 - G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of system to protect property as required.
 - H. Provide adequate number of piezometers installed at proper locations and depths as required to provide meaningful observations of conditions affecting excavation, adjacent structures and water wells.
 - I. Provide environmental monitoring wells installed at proper locations and depths as required to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into work area or ground water control system.
- 1.06 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit Ground Water and Surface Water Control Plan for review by Project Manager prior to start of any field work. Plan shall be signed by Professional Engineer registered in State of Texas. Submit plan to include following:

1. Results of subsurface investigation and description of extent and characteristics of water bearing layers subject to ground water control
2. Names of equipment suppliers and installation subcontractors
3. Description of proposed ground water control systems indicating arrangement, location, depth, and capacities of system components, installation details and criteria and operation and maintenance procedures
4. Description of proposed monitoring and control system indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics
5. Description of proposed filters including types, sizes, capacities, and manufacturer's application recommendations
6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.
7. Operating requirements, including piezometric control elevations for dewatering and depressurization
8. Excavation drainage methods including typical drainage layers, sump pump application and other necessary means
9. Surface water control and drainage installations
10. Proposed methods and locations for disposing of removed water

C. Submit following records upon completed initial installation:

1. Installation and development reports for well points, eductors, and deep wells
2. Installation reports and baseline readings for piezometers and monitoring wells
3. Baseline analytical test data of water from monitoring wells
4. Initial flow rates

- D. Submit the following records weekly during operations:
 - 1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.02, Requirements for Eductor, Well Points, or Deep Wells.
 - 2. Maintenance records for ground water control installations, piezometers and monitoring wells

1.07 ENVIRONMENTAL REQUIREMENTS

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

PART 2 P R O D U C T S

2.01 EQUIPMENT AND MATERIALS

- A. Use optional equipment and materials as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review of Project Manager through submittals required in Paragraph 1.06, Submittals.
- B. Eductors, well points, or deep wells, where used, must be furnished, installed and operated by experienced contractor regularly engaged in ground water control system design, installation, and operation.
- C. Equipment must be in good repair and operating order.
- D. Keep sufficient standby equipment and materials available to ensure continuous operation, where required.

PART 3 E X E C U T I O N

3.01 GROUND WATER CONTROL

- A. Perform subsurface investigation by borings as necessary to identify water bearing layers, piezometric pressures, and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary to determine draw

- down characteristics of waterbearing layers. Present results in Ground Water and Surface Water Control Plan (See Paragraph 1.06B.1).
- B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in manner compatible with construction methods and site conditions. Monitor effectiveness of installed system and its effect on adjacent property.
 - C. Install, operate, and maintain ground water control systems in accordance with Ground Water and Surface Water Control Plan. Notify Project Manager in writing of changes made to accommodate field conditions and changes to Work. Provide revised drawings and calculations with notification.
 - D. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.
 - E. Monitor operations to verify system lowers ground water piezometric levels at rate required to maintain dry excavation resulting in stable subgrade for prosecution of subsequent operations.
 - F. Where hydrostatic pressures in confined water bearing layers exist below excavation, depressurize those zones to eliminate risk of uplift or other instability of excavation or installed works. Define allowable piezometric elevations in Ground Water and Surface Water Control Plan.
 - G. Remove ground water control installations.
 - 1. Remove pumping system components and piping when ground water control is no longer required
 - 2. Remove monitoring wells when directed by Project Manager.
 - 3. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.
 - H. During backfilling, dewatering may be reduced to maintain water level minimum of 5 feet below prevailing level of backfill. However, do not allow that water level to result in uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement stabilized sand until at least 48 hour after placement.
 - I. Provide uniform diameter for each pipe drain run constructed for dewatering. Remove pipe drain when it has served its purpose. If removal of pipe is impractical, provide grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout when pipe is removed from service.

- J. Extent of construction ground water control for structures with permanent perforated underground drainage system may be reduced, for units designed to withstand hydrostatic uplift pressure. Provide means of draining affected portion of underground system, including standby equipment. Maintain drainage system during operations and remove it when no longer required.
- K. Remove system upon completion of construction or when dewatering and control of surface or ground water is no longer required.
- L. Compact backfill to not less than 95 percent of maximum dry density in accordance with ASTM D 698.
- M. Foundation Beds: Maintain saturation line at least 3 feet below lowest elevations where concrete is to be placed. Drain foundations in areas where concrete is to be placed before placing reinforcing steel. Keep free from water for 3 days after concrete is placed.

3.02 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

- A. For aboveground piping in ground water control system, include 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header to visually monitor discharge from each installation.
- B. Install sufficient piezometers or monitoring wells to show trench or shaft excavations in water bearing materials are predrained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for selected method of Work.
- C. Install piezometers or monitoring wells not less than 1 week in advance of beginning associated excavation.
- D. Dewatering may be omitted for portions of under drains or other excavations, but only where auger borings and piezometers or monitoring wells show that soil is predrained by existing system and that criteria of ground water control plan are satisfied.
- E. Replace installations that produce noticeable amounts of sediments after development.
- F. Provide additional ground water control installations, or change methods, in event that installations according to ground water control plan does not provide satisfactory results based on performance criteria defined by plan and by specification. Submit revised plan according to Paragraph 1.06B.

3.03 EXCAVATION DRAINAGE

May use excavation drainage methods if necessary to achieve well drained

conditions. Excavation drainage may consist of layer of crushed stone and filter fabric, and sump pumping in combination with sufficient wells for ground water control to maintain stable excavation and backfill conditions.

3.04 MAINTENANCE AND OBSERVATION

- A. Conduct daily maintenance and observation of piezometers or monitoring wells while ground water control installations or excavation drainage are operating in area or seepage into tunnel is occurring. Keep system in good condition.
- B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedule.
- C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make observations, as specified.
- D. Remove and grout piezometers inside or outside excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by Project Manager.

3.05 MONITORING AND RECORDING

- A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Also monitor and record water level and ground water recovery. Obtain records daily until steady conditions are achieved, and twice weekly thereafter.
- B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until Work is completed or piezometers or wells are removed, except when Project Manager determines more frequent monitoring and recording are required. Comply with Project Manager's direction for increased monitoring and recording and take measures necessary to ensure effective dewatering for intended purpose.

3.06 SURFACE WATER CONTROL

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

END OF SECTION

Section 01580

PROJECT IDENTIFICATION SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project identification sign description.
- B. Project sign installation.
- C. Maintenance and removal of project sign.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

- 1. No separate payment will be made for Work included in this Section. Include cost of project identification signs in overhead cost.
- 2. Relocate skid-mounted signs as directed by Project Representative at no additional cost to Owner. Relocate post-mounted signs once, if directed in writing by Project Manager, at no additional cost to Owner. If a post-mounted sign is relocated more than once at written direction of Project Manager, payment for relocation will be made by change order.

- B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SYSTEM DESCRIPTION

- A. Sign Construction: Construct project identification signs of new materials. Construct post-mounted signs as shown on Standard Detail Drawing – Project Sign Detail.
- B. Appearance: Project identification signs shall be maintained to present a clean and neat look throughout project duration.
- C. Sign Manufacturer/Maker: Experienced as a professional sign company.
- D. Sign Placement: Place signs at locations as directed by Project Representative. Project Manager will provide sign placement instructions at preconstruction meeting.
 - 1. A linear project is one involving paving, overlay, sewer lines, storm drainage, or water mains that run in right-of-way over a distance. A linear project requires a project identification sign at each end of construction site.
 - 2. Single Site or Building Projects: Provide one project identification sign.

3. Multiple Sites: Provide one project identification sign at each site.
 4. Sign Relocation: As work progresses at each site, it may be necessary to move and relocate project identification signs. Relocate signs as directed in writing by Project Manager.
- E. Alternate Skid-mounted Sign Construction: Post-mounted signs are preferred, but skid-mounted signs are allowed, especially for projects with noncontiguous locations where work progresses from one location to another. Design skid structure so that sign will withstand a 60-mile-per-hour wind load directly to face or back of sign. Use stakes, straps, or ballast. Approval of use of skid-mounted signs shall not release Contractor from responsibility of maintaining a project identification sign on project site and shall not make Owner responsible for security of such signs.

1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01330 – Submittal Procedures.
- B. Show content, layout, lettering style, lettering size, and colors. Make sign and lettering to scale, clearly indicating condensed lettering, if used.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: Use new sign materials.
 1. Sign Posts: Use 4-inch by 4-inch pressure treated wood posts, 9 feet long for skid mounting and 12 feet long minimum for in-ground mounting.
 2. Skid Bracing: 2-inch by 4-inch wood framing material.
 3. Skid Members: 2-inch by 6-inch wood framing material.
 4. Fasteners:
 - a. Use galvanized steel fasteners.
 - b. Use ½-inch by 5½-inch button head carriage bolts to attach sign to posts. Secure with nuts and flat head washers at locations shown on Standard Detail Drawing – Project Sign Detail.
 - c. Cover button heads with white reflective film or paint to match sign background.
- B. Sign: Use ¾ inch thick marine plywood. Use full-size 4-foot by 8-foot sheet for sign and a single piece for header to minimize joints; do not piece wood to fabricate sign face.
- C. Paint and Primers: White paint used to prime surfaces and to resist weathering shall be an industrial grade, fast-drying, oil-based paint with gloss finish. Paint structural and

framing members white on all sides and edges to resist weathering. Paint sign and sign header material white on all sides and edges to resist weathering. Paint all sign surfaces with this weather-protective paint prior to adding any adhesive applications.

D. Colors:

1. Sign Background: Sign background shall be industrial grade, reflective white. Use 3M Scotchlite Engineer Grade, Pressure Sensitive Sheeting (White), or approved equal.
2. Border: Add ½ inch-wide red border around area which designates project name and project amount. For border, use industrial grade reflective red. Use 3M Scotchlite Engineer Grade, Pressure Sensitive Sheeting (Red), or approved equal.
3. Sign Film: Make legends, symbols, lettering, and artwork from 3M Scotchcal Pressure Sensitive Films, or approved equal. Match colors to following 3M Scotchcal Pressure Sensitive Films.

a. Lettering: Black

2.02 SIGN LAYOUT

A. Lettering:

1. Style: Prepare sign using uppercase Helvetica Regular lettering as shown on Standard Detail Drawing – Project Sign Detail.
2. Condensed Style: Lettering for variable text may be condensed if needed to maintain sign composition.

2.03 LAYOUT AND COMPOSITION

Owner Logo:

1. Owner will provide Contractor with logos.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install project identification signs within 7 calendar days after Date of Commencement.
- B. Erect signs where designated by Project Manager at preconstruction meeting. Position sign in such a manner as to be fully visible and readable to general public.
- C. Erect sign level and plumb.
- D. If mounted on posts, sink posts 3 feet to 4 feet below grade. Stabilize posts to minimize lateral motion. Leave a minimum of 8 feet of post above existing grade for mounting of sign.

- E. Erect sign so that top edge of sign is at a nominal 8 feet above existing grade.

3.02 MAINTENANCE AND REMOVAL

- A. Keep signs and supports clean. Repair deterioration and damage.
- B. Remove signs, framing, supports, and foundations to a depth of 2 feet upon completion of Project. Restore area to a condition equal to or better than before construction.

END OF SECTION

Section 01610

BASIC PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

Requirements for transportation, delivery, handling, and storage of materials and equipment.

1.02 PRODUCTS

- A. Products: Means material, equipment, or systems forming Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of Work. Products may also include existing materials or components designated for reuse.
- B. Do not reuse materials and equipment, designated to be removed, except as specified by Contract.
- C. Provide equipment and components from fewest number of manufacturers as practical, in order to simplify spare parts inventory and allow for maximum interchangeability of components. For multiple components of same size, type, or application, use same make and model of component throughout Project.

1.03 TRANSPORTATION

- A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of Work.
- B. Transport and handle products in accordance with instructions.
- C. Consign and address shipping documents to proper party giving name of Project, street number, and city. Shipments shall be delivered to Contractor.

1.04 DELIVERY

- A. Arrange deliveries of products to accommodate short term site completion schedules and in ample time to facilitate inspection prior to installation. Avoid deliveries that cause lengthy storage or overburden of limited storage space.
- B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate following:
 - 1. Work of other contractors
 - 2. Limitations of storage space.
 - 3. Availability of equipment and personnel for handling products.
- C. Have products delivered to site in manufacturer's original, unopened, labeled containers.

- D. Immediately upon delivery, inspect shipment to assure:
 - 1. Product complies with requirements of Contract.
 - 2. Quantities are correct.
 - 3. Containers and packages are intact; labels are legible.
 - 4. Products are properly protected and undamaged.

1.05 PRODUCT HANDLING

- A. Coordinate off-loading of materials and equipment delivered to job site. If necessary to move stored materials and equipment during construction, relocate materials and equipment at no additional cost.
- B. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
- C. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.
- D. Handle products by methods to prevent over bending or over stressing.
- E. Lift heavy components only at designated lifting points.
- F. Handle materials and equipment in accordance with manufacturer's recommendations.
- G. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.06 STORAGE OF MATERIAL

- A. Store and protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.
- B. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into Work to prevent damage to any part of Work or existing facilities and to maintain free access at all times to all parts of Work and to utility service company installations in vicinity of Work. Keep materials and equipment neatly and compactly stored in locations that will cause minimum inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage to provide easy access for inspection.
- C. Restrict storage to areas available on construction site for storage of material and equipment as shown on Drawings or approved by Project Manager.
- D. Provide off-site storage and protection when on-site storage is not adequate. Provide addresses of and access to off-site storage locations for inspection by Project Representative.
- E. Do not use lawns, grass plots, or other private property for storage purposes

without written permission of owner or other person in possession or control of premises.

- F. Protect stored materials and equipment against loss or damage.
- G. Store in manufacturers' unopened containers.
- H. Neatly, safely, and compactly stack materials delivered and stored along line of Work to avoid inconvenience and damage to property owners and general public, and maintain at least 3 feet from fire hydrant. Keep public, private driveways, and street crossings open.
- I. Repair or replace damaged lawns, sidewalks, streets, or other improvements to satisfaction of Project Manager. Total length which materials may be distributed along route of construction at one time is 1,000 linear feet, unless otherwise approved in writing by Project Manager.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01630

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Options for making Product or process selections.
- B. Procedures for proposing equivalent Products or processes, including pre-approved, pre-qualified, and approved Products or processes.

1.02 DEFINITIONS

- A. Product: Materials or equipment or systems incorporated into the Work or to be incorporated into the Work. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for reuse.
- B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Products includes Processes.

1.03 SELECTION OPTIONS

- A. Approved Products: Construction products of certain manufacturers or Suppliers designated in Specifications followed by words "or approved equal." Approval of alternate products not listed in Specifications may be obtained by substantiating compliance of proposed substitution with the contract, and by following submittal procedures specified in Section 01330- Submittal Procedures. The procedure for approval of alternate products is not applicable to pre-approved or pre-qualified products.
- B. Product Compatibility: To the maximum extent possible, provide Products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available, select Product that is compatible with other Products already selected, specified, or in use by the Owner.
- E. Project Manager may reject requests for substitution, and his decision will be final and binding on the parties.

1.04 CONTRACTOR'S RESPONSIBILITY

- A. Investigate proposed product and determine that it meets or exceeds the quality level of ht specified product.

- B. Furnish information Project Manager deems necessary to judge equivalency of alternate Product.
- C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish equivalency between products in order to obtain information upon which Project Manager can base a decision.
- D. If Project Manager determines alternate product is not equal to that named in Specifications, furnish one of the specified Products.

1.05 OWNER REVIEW

- A. Use alternate Products only when approved in writing by Project Manager. Project Manager's determination regarding acceptance of proposed alternate Product is final.
- B. Alternate Products shall be accepted if Products are judged by Project Manager to be equivalent to specified Product or to offer substantial benefit to the Owner.
- C. The Owner retains the right to accept any Product deemed advantageous to the Owner, and similarly, to reject any product deemed not beneficial to Owner.

1.06 SUBSTITUTION PROCEDURE

- A. Collect and assemble technical information applicable to the proposed Product to aid in determining equivalency as related to the approved Product specified.
- B. Submit a written request for a construction Product to be considered as an alternate Product.
- C. Submit Product information after the effective date of the Contract and within the first 15% of Contract Time or first 90 days after Notice to Proceed, whichever is less. After the submittal period has expired, requests for alternate Products shall be considered only when specified Product becomes unavailable because of conditions beyond Contractor's control.
- D. Electronically submit each request for alternate Product approval. Include the following information:
 - 1. Complete data substantiating compliance of proposed substitution with the Contract.
 - 2. For Products:
 - a. Product identification, including manufacturer's name and address.

- b. Manufacturer's literature with Product description, performance and test data, and reference standards.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which Product was used and date of installation. Include names of Owner, design consultant, and installing contractor.
 3. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 4. Itemized comparison of proposed substitution with Product or method specified.
 5. Data relating to changes in Construction Schedule.
 6. Relation to separate contracts, if any.
 7. Accurate cost data on proposed substitution in comparison with Product or method specified.
 8. Other information requested by Project Manager.
- E. Approved alternate Products will be subject to the same review process as the specified Product would have been for Shop Drawings, Product Data, and Samples.

PART 2 P R O D U C T S -Not Used

PART 3 E X E C U T I O N -Not Used

END OF SECTION

Section 01725

FIELD SURVEYING

PART 1 G E N E R A L

1.01 QUALITY CONTROL

Conform to State of Texas laws for surveys requiring licensed surveyors. Employ land surveyor acceptable to Owner, if required.

1.02 UNIT PRICES

No Separate payment will be made for field surveying. Include cost in unit price for Work requiring field surveying.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit to Project Manager name, address, and telephone number of Surveyor before starting survey work.
- C. Submit documentation verifying accuracy of survey work on request.
- D. Submit certificate signed by surveyor, that elevations and locations of Work are in conformance with Contract.

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain complete and accurate log of control and survey Work as it progresses.
- B. Prepare certified survey setting forth dimensions, locations, angles, and elevations of construction and site Work upon completion of foundation walls and major site improvements.
- C. Submit Record Documents under provisions of Section 01785 - Project Record Documents.

1.05 EXAMINATION

- A. Verify locations of survey control points prior to starting Work.
- B. Notify Project Manager immediately of any discrepancies discovered.

1.06 SURVEY REFERENCE POINTS

- A. Control datum for survey established by provided survey as indicated on Drawings. Inform Project Manager in advance of time at which horizontal and vertical control points will be established so verification deemed necessary by Project Manager may be done with minimum inconvenience to Project Manager and minimum delay to Contractor.
- B. Locate and protect survey control points prior to starting site work; preserve permanent reference points during construction.
- C. Notify Project Manager 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.
- D. Report promptly to Project Manager loss or destruction of reference point.
- E. Contractor to replace permanent reference points disturbed by operations, at no additional cost to the Owner.

1.07 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
- C. Establish elevations, lines, and levels to provide quantities required for measurement and payment and to provide appropriate controls for Work. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading; fill and topsoil placement; utility locations, slopes, and invert elevations
 - 2. Grid or axis for structures
 - 3. Building foundation, column locations, ground floor elevations
- D. Periodically verify layouts by same means.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Section 01731

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

Cutting, patching and fitting of Work or Work under construction. Coordinating installation or connection of Work with existing facilities, or uncovering Work for access, inspection, or testing and related submittals. Demolition is specified elsewhere.

1.02 UNIT PRICES

No separate payment will be made for cutting and patching under this Section. Include payment in unit price for related sections.

1.03 CUTTING AND PATCHING

- A. Perform activities to avoid interference with facility operations and Work of others.
- B. Execute cutting and patching, including excavation, backfill and fitting to:
 - 1. Remove and replace defective Work or Work not conforming to Drawings and Specifications.
 - 2. Take samples of installed Work as required for testing.
 - 3. Remove construction required to provide for specified alteration or addition to existing Work.
 - 4. Uncover Work to provide for inspection or reinspection of covered Work by Project Representative or regulatory agencies having jurisdiction.
 - 5. Connect Work not accomplished in proper sequence to completed Work.
 - 6. Remove or relocate existing utilities and pipes that obstruct Work.
 - 7. Make connections or alterations to existing or new facilities.
 - 8. When necessary, provide openings, channels, chases and flues and cut, patch, and finish.
 - 9. Provide protection for other portions of Project.

- C. Restore existing Work to state equal to or better than that prior to cutting and patching and to standards of these Specifications.
- D. Support, anchor, attach, match, trim, and seal materials to Work of others. Unless otherwise specified, furnish and install sleeves, inserts, hangers, required for execution of Work.
- E. Provide shoring, bracing and support as required to maintain structural integrity and protect adjacent Work from damage during cutting and patching. Before cutting beams or other structural members, anchors, lintels or other supports, request written instructions from Project Manager. Follow instructions, as applicable.
- F. Fully integrate new materials with existing similar materials by bonding, lapping, mechanically tying, anchoring or other effective means that shall prevent cracks and shall not show evidence of patching. Conceal effects of demolition and patching and provide new construction that blends with existing adjacent or abutting surfaces without obvious breaks, joints, or changes of surface appearance unless specifically shown otherwise.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit written notice to Project Manager requesting consent to proceed prior to cutting which may affect structural integrity, design function, or Work of another contractor.
- C. Include the following in submittal:
 - 1. Identification of Project
 - 2. Description of affected Work
 - 3. Necessity for cutting
 - 4. Effect on other Work and on structural integrity
 - 5. Include description of proposed Work:
 - a. Scope of cutting and patching
 - b. Contractor, subcontractor or trade to execute Work
 - c. Proposed products
 - d. Extent of refinishing
 - e. Schedule of operations

6. Alternatives to cutting and patching
- D. When conditions of Work or schedule indicate change of materials or methods, submit written recommendation to Project Manager including:
 1. Conditions indicating change
 2. Recommendations for alternative materials or methods
 3. Submittals as required for substitutions
- E. Submit written notice to Project Manager designating time Work shall be uncovered for observation. Do not begin cutting or patching operations until authorized by Project Manager.

1.04 CONNECTIONS TO EXISTING FACILITIES

- A. Perform construction necessary to complete connections and tie-ins to existing facilities. Keep all existing facilities in continuous operation unless otherwise specifically permitted in these Specifications or approved by Project Manager.
- B. Coordinate interruption of service requiring connection into existing facilities with facility owner and Project Manager. Bypassing of wastewater or sludge to waterways is not permitted. Provide temporary pumping facilities to handle wastewater if necessary. Use temporary bulkheads to minimize disruption. Provide temporary power supply and piping to facilitate construction where necessary.
- C. Submit detailed schedule of proposed connections, including shut-downs and tie-ins. Include proposed time and date as well as anticipated duration of Work. Submit detailed schedule coordinated with construction schedule.

Provide specific time and date information to Project Manager 48 hours in advance of proposed Work.

- D. Procedures and Operations:
 1. Operate existing pumps, valves, and gates required for sequencing procedures under supervision of facility owner and project representative. Do not operate valve, gate or other item of equipment without Owner's knowledge.
 2. Insofar as possible, equipment shall be tested and in operating condition before final tie-ins are made to connect equipment to existing facility.
 3. Carefully coordinate Work and schedules. Provide written notice to Project Manager at least 48 hours before shutdowns or bypasses are required.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Section 01732

PROCEDURE FOR WATER VALVE ASSISTANCE

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Operation of valves. Owner employees will operate existing valves. Contractor's employees may operate new valves included in the Project prior to acceptance by the Owner.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for this item. Include the cost of valve operation and valve assistance in Unit Price bid for valves and water mains.

1.03 PROCEDURE

- A. Contractor to coordinate with Owner's operator and inspectors for valve assistance.

1.04 SUBMITTALS

- A. Submit request for work order planning meetings in accordance with Section 01330 – Submittal Procedures.

1.05 CANCELLATION

- A. The Owner may cancel a scheduled valve assistance appointment at no extra cost to either party. Cancellation may be caused by bad weather, preparation work taking longer than anticipated or unforeseen delays by one or more of the three parties.

PART 2 P R O D U C T S -Not Used

PART 3 E X E C U T I O N -Not Used

END OF SECTION

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Section 01770

CLOSEOUT PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Substantial Completion Procedures.
- B. Closeout procedures for final submittals, operation and maintenance data, warranties, spare parts, and maintenance materials.
- C. Texas Department of Licensing and Regulation (TDLR) inspection for ADA compliance.

1.02 SUBSTANTIAL COMPLETION

- A. Comply with the General Conditions regarding substantial completion when Contractor considers the Work, or portion thereof designated by Project Manager, to be substantially complete.
- B. Insure the following items have been completed when included in the Work, prior to presenting a list of items to be inspected by Project Manager for issuance of a Certificate of Substantial Completion:
 - 1. cutting, plugging, and abandoning of water, wastewater, and storm sewer lines, as required by specifications for each item;
 - 2. construction of, and repairs to, pavement, driveways, sidewalks, and curbs and gutters;
 - 3. sodding and hydromulch seeding, unless waived by the Owner in writing;
 - 4. general clean up including pavement markings, transfer of services, successful testing and landscape;
 - 5. installation of all bid items included in the Bid Proposal and
 - 6. any additional requirements in Section 01110 - Summary of Work.
- C. Assist Project Manager with inspection of Contractor's list of items and complete or correct the items, including items added by Project Manager, within a time period of 30 days or as mutually agreed.
- D. Should Project Manager's inspection show failure of Contractor to comply with substantial completion requirements, including those items in Paragraph 1.02B of

this specification, Contractor shall complete or correct the items, before requesting another inspection by Project Manager.

1.03 CLOSEOUT PROCEDURES

- A. Comply with the General Conditions regarding Final Completion and Final Payment when Work is complete and ready for Project Manager's final inspection.
- B. Provide Project Record Documents in accordance with Section 01785 - Project Record Documents.
- C. Complete or correct items on punch list, with no new items added. Address new items during warranty period.
- D. Owner will occupy portions of Work as specified in other Sections.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition.
- D. Clean or replace filters of operating equipment.
- E. Clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Clean site; sweep paved areas, rake landscaped surfaces clean.
- G. Remove waste and surplus materials, rubbish, and temporary construction facilities from site following final test of utilities and completion of Work.

1.05 ADJUSTING

Adjust operating equipment to ensure smooth and unhindered operation. Value of this testing and adjusting is 5 percent of Lump Sum Price in Schedule of Values for item being tested.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operations and maintenance data as noted in Section 01330 - Submittal Procedures.
- B. Five percent of lump sum amount of each piece of equipment as indicated in Schedule of Unit Price Work or Schedule of Values shall be paid after required O&M data submissions are received and approved by Project Manager.

1.07 WARRANTIES

- A. Provide one original and two copies of each warranty from subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble warranties in three-ring/D binder with durable plastic cover.
- C. Submit warranties prior to final progress payment.
- D. Warranties shall commence in accordance with requirements in the General Conditions.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual Specification sections.
- B. Deliver to location as directed by Project Manager; obtain receipt prior to final Payment Application.

1.09 TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR) INSPECTION

- A. Contact TDLR's Houston Regional Office, 5425 Polk Street, Houston, Texas, 77023, telephone 713-924-6303, fax 713-921-3106, to schedule an inspection for ADA compliance prior to final completion.
- B. Provide results of TDLR's inspection to Project Manager prior to final inspection.

1.10 FINAL PHOTOS

Provide per Specification Section 01321 - Construction Photographs.

1.11 PROJECT RECORD DOCUMENTS

Provide per Specification Section 01785 - Project Record Documents.

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01782

OPERATIONS AND MAINTENANCE DATA

PART 1 G E N E R A L

1.01 SECTION INCLUDES

Submittal requirements for equipment and facility operating and maintenance manuals

1.02 MEASUREMENT AND PAYMENT

Value of approved equipment operations and maintenance manuals is 5 percent of individual equipment value as indicated in Schedule of Unit Price Work or Schedule of Values. This amount can be included in next progress payment after approval of submitted manual.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures. Submit list of operation and maintenance manuals and parts manuals to be provided.
- B. Submit documents, bound in 8½- x 11-inch text pages, three-ring/D binders with durable plastic covers.
- C. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of project and subject matter of binder when multiple binders are required.
- D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- E. Contents: Prepare Table of Contents for each volume, with each Product or system description identified.
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify following:
 - a. Significant design criteria
 - b. List of equipment
 - c. Parts list for each component
 - d. Operating instructions

- e. Maintenance instructions for equipment and systems
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents
3. Part 3: Project documents and certificates, including following:
- a. Shop drawings and product data
 - b. Air and water balance reports
 - c. Certificates
 - d. Photocopies of warranties
- F. Within 1 month prior to placing equipment or facility in service, submit one original and two copies of operation and maintenance manual and parts manual for review.
- G. Submit one original and two copies of completed volumes in final form 10 days prior to final inspection. This will be returned after final inspection, with Project Manager's comments. Revise content of documents as required prior to final submittal.
- H. Revise and resubmit final volumes (three each) within 10 days after final inspection.

1.04 EQUIPMENT OPERATION AND MAINTENANCE DATA

- A. Furnish operation and maintenance manuals for equipment. Operation and maintenance manual must contain all information required for the Owner to operate, maintain, and repair equipment. Manual must be prepared by equipment manufacturer, furnished to Project Manager and, as minimum, contain following:
- 1. Equipment functions, normal operating characteristics and limiting conditions
 - 2. Assembly, installation, alignment, adjustment, and checking instructions
 - 3. Operating instructions for start-up, normal operation, regulation and control, normal shutdown and emergency shutdown
 - 4. Lubrication and detailed maintenance instructions. Maintenance instructions are to include detailed drawings giving location of each maintainable part and lubrication point and detailed instructions on disassembly and reassembly of equipment
 - 5. Troubleshooting guide
 - 6. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability

7. Outline, cross-section, and assembly drawings; engineering data; wiring diagram
 8. Test data and performance curves
- B. Furnish parts manuals for equipment. Manual must be prepared by equipment manufacturers, furnished to Project Manager and, as minimum, contain following:
1. Detailed drawings giving location of each maintainable part
 2. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability

PART 2 P R O D U C T S (NOT USED)

PART 3 E X E C U T I O N (NOT USED)

END OF SECTION

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Section 01785

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

Maintenance and Submittal of Record Documents and Samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain one record copy of documents at site in accordance with the General Conditions.
- B. Store Record Documents and samples in field office when field office is required by Contract, or in secure location. Provide files, racks, and secure storage for Record Documents and samples.
- C. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain Record Documents in clean dry and legible condition. Do not use Record Documents for construction purposes.
- E. Keep Record Documents and Samples available for inspection by Project Representative.
- F. Bring Record Documents to progress review meetings for viewing by Project Representative. After each progress review meeting, update Contract Drawings.

1.03 RECORDING

- A. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- B. Contract Drawings and Shop Drawings: On actual documents and on Project Record Drawing, legibly mark each item to record actual construction, or "as built" conditions, including:
 - 1. Measured depths of elements of foundation in relation to finish first floor datum
 - 2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements
 - 3. Elevations of underground utilities referenced to bench mark utilized for Project
 - 4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction
 - 5. Field changes of dimension and detail

- 6. Changes made by modifications
- 7. Details not on original Contract Drawings
- 8. References to related shop drawings and modifications
- C. Maintain on site at all times an instrument for accurately measuring elevations. Survey every joint of water main at time of construction and record on drawings water main invert elevation, including elevation top of manway and centerline horizontal location relative to baseline.
- D. Record information with red felt-tip marking pen on set of blue line opaque drawings.
- E. For large diameter water mains, legibly mark specifications and addenda to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by change order or field order.
 - 3. Other matters not originally specified.
- F. Legibly annotate shop drawings to record changes made after review.
- G. In addition to record drawings, at Contract Closeout, make all as-built comments and changes to contract drawings.

1.04 SUBMITTALS

At Contract closeout, deliver original Documents to Project Manager.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Section 02081

CAST-IN-PLACE CONCRETE MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete manholes for sanitary sewers and storm sewers, including box sewers.
- B. Pile-supported concrete foundation used for unstable subgrade treatment for manhole base.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for manholes is on a unit price basis for each manhole installed.
 - 2. Payment for Type C manhole with BB inlet top is on a unit price basis for each.
 - 3. Payment for pile-supported concrete foundation used for unstable subgrade treatment for manhole base is on a unit price basis for each foundation installed.
 - 4. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
- C. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
- D. ASTM C 923 - Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- E. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic - Cement Grout (Non-shrink).

- F. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³).
- G. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe, and Fittings.
- H. ASTM D 2996 - Standard Specification for Filament-wound Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- I. ASTM D 2997 - Standard Specification for Centrifugally Cast Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- J. ASTM F 2306 – Standard Specification for 12 to 60 in. [300 to 1500 mm] Corrugated profile – Wall Polyethylene (PE) Pipe Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
- K. ASTM F 2510 – Standard Specification for Resilient Connectors Between Concrete Manhole Structures and Corrugated High Density Polyethylene Drainage Pipes.
- L. AWWA C 213 - Standard for Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit proposed design mix and test data for each type and strength of concrete.
- C. Submit manufacturer’s data and details of following items for approval:
 - 1. Frames, grates, rings, and covers.
 - 2. Materials to be used in fabricating drop connections.
 - 3. Materials to be used for pipe connections at manhole walls.
 - 4. Materials to be used for stubs and stub plugs.
 - 5. Plugs to be used for sanitary sewer hydrostatic testing.
 - 6. Installation instruments for forms.

PART 2 PRODUCTS

2.01 CONCRETE

- A. Conform to requirements of Section 03315 - Concrete for Utility Construction.

- B. Provide Class A concrete with minimum compressive strength of 4000 psi unless otherwise indicated on Drawings.

2.02 REINFORCING STEEL

- A. Conform to requirements of Section 03315 - Concrete for Utility Construction.

2.03 MORTAR

- A. Conform to requirements of Section 04061 - Mortar.

2.04 MISCELLANEOUS METALS

- A. Provide cast-iron frames, grates, rings, and covers conforming to requirements of Section 02084 - Frames, Grates, Rings, and Covers.

2.05 DROP CONNECTIONS AND STUBS

- A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on Drawings.

2.06 PIPE CONNECTIONS

- A. Sanitary Sewers:

1. Provide resilient connectors conforming to requirements of ASTM C 923. Use the following materials for metallic mechanical devices as defined in ASTM C 923:
 - a. External Clamps: Type 304 stainless steel.
 - b. Internal, Expandable Clamps on Standard Manholes: Type 304 stainless steel, 11 gauge minimum.
 - c. Internal, Expandable Clamps on Corrosion-Resistant Manholes:
 - 1) Type 316 stainless steel, 11 gauge minimum.
 - 2) Type 304 stainless steel, 11 gauge minimum, coated with minimum 16 mil fusion-bonded epoxy conforming to AWWA C 213.
2. Where rigid joints between pipe and cast-in-place manhole base are specified or shown on Drawings, provide polyethylene-isoprene waterstop meeting physical property requirements of ASTM C 923, such as Pres-Seal WS Series, or approved equal.

- B. Storm Sewers: Use non-shrink grout for storm sewer pipe connections to concrete manholes, unless otherwise shown on Drawings. Grout pipe penetration in place on both inside and outside of manhole.
- C. Water Lines:
 - 1. Where smooth exterior pipes (i.e., steel, ductile iron, or PVC pipes) are connected to manhole base or barrel, seal space between pipe and manhole wall with assembly consisting of rubber gasket or links mechanically compressed to form a watertight barrier. Assemblies: Press-Wedge, Press-Seal, Thunderline, Link-Seals, or approved equal. See Drawings for placement of assembly in manhole sections.
 - 2. When connecting concrete or cement mortar coated steel pipes, or as option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of a stainless steel power sleeve, stainless steel take-up clamp and a rubber gasket. Take-up clamp: minimum of 9/16-inch wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.

2.07 SEALANT MATERIALS

- A. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, such as Adeka Ultraseal P201, or approved equal.
- B. Provide external sealing material from Canusa Wrapid Seal manhole encapsulation system, or approved equal.
- C. Butyl Sealant: Provide Press-Seal EZ Stick, or equal, for HDPE rings.

2.08 CORROSION-RESISTANT MANHOLE MATERIALS

- A. Where corrosion-resistant manholes or PVC-lined manholes are indicated on the Drawings, provide one of the following:
 - 1. PVC liner for precast cylindrical manhole section, base sections, and cone sections.
 - 2. Precast base sections lined with PVC and fiberglass manhole sections and cone sections in accordance with Section 02083 - Fiberglass Manholes.

2.09 BACKFILL MATERIALS

- A. Conform to the requirements of Section 02317 - Excavation and Backfill for Utilities.

2.10 NON-SHRINK GROUT

- A. Provide prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based non-shrink grout requiring only addition of water.
- B. Provide grout meeting requirements of ASTM C 1107 and having minimum 28-day compressive strength of 7000 psi.

2.11 VENT PIPES

- A. Provide external vent pipes for manholes where indicated on Drawings.
- B. Buried Vent Pipes: Provide 3-inch or 4-inch PVC DWV pipe conforming to ASTM D 2665. Alternatively, provide FRP pipe as specified for vent outlet assembly.
- C. Vent Outlet Assembly: Provide vent outlet assembly as shown on Drawings, constructed of following specified materials:
 - 1. FRP Pipe: Provide filament-wound FRP conforming to ASTM D 2996 or centrifugally cast FRP conforming to ASTM D 2997. Seal cut ends in accordance with manufacturer's recommendations.
 - 2. Joints and Fittings: Provide epoxy- bodied fittings and join pipe to fittings with epoxy adhesive, according to pipe manufacturer's instructions.
 - 3. Flanges: Provide socket-flange fittings for epoxy adhesive bonding to pipe ends where shown on Drawings. Meet bolt pattern and dimensions for ASME B16.1, 125-pound flanges. Use Type 304 stainless steel, conforming to ASTM A 307, Class A or B flange bolts.
 - 4. Coating: Provide 2-component, aliphatic polyurethane coating, using primer or tie coat recommended by manufacturer. Provide two or more coats to yield dry film thickness of at least 3 mils. Provide Amershield, Tnemec 74, or approved equal. Project Manager selects color from manufacturer's standard colors.

2.12 MANHOLE LADDER FOR WATERLINE MANHOLES

- A. Manhole Ladder: Fiberglass with 300-lb rating at appropriate length; conform to requirements of Occupational Safety and Health Standards (OSHA), U.S. Department of Labor except where shown on Drawings.
 - 1. Use components, including rungs, made of fiberglass, fabricated with nylon or aluminum rivets and/or epoxy. Apply non-skid coating to ladder rungs. Mount ladder using manufacturer's recommended hardware.

2. Provide ladder as manufactured by Saf-Rail or approved equal. Locate ladder as shown on Drawings.
3. Fiberglass: Premium type polyester resin, reinforced with fiberglass; constructed to provide complete wetting of glass by resin; resistant to rot, fungi, bacterial growth and adverse effects of acids, alkalis and residential and industrial waste; yellow in color.
4. Provide approved petroleum-based tape encapsulating bolts in access manhole.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines and grades are correct.
- B. Determine if subgrade, when scarified and recompact, can be compacted to 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. When proper density cannot be reached, moisture condition subgrade until that density is reached or treat as an unstable subgrade.
- C. Do not build manholes in ditches, swales, or drainage paths unless approved by Project Manager.

3.02 MANHOLES

- A. Construct manholes to dimensions shown on Drawings. Commence construction as soon as possible after pipes are laid. On monolithic sewers, construct manholes at same time sewer is being constructed.
- B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify Project Manager for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for 24-inch-thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation, as detailed on Drawings, under manhole base.
- C. Cast manhole foundations and walls monolithically. Use cold joint with approved waterstop when manhole flow line depth exceeds 12 feet. No other joints will be allowed unless shown on Drawings. Wrap cold joints with external sealing material, minimum 6-inch width.

- D. For concrete containing micro silica admixtures, place, finish, and cure concrete for manholes following procedures in Section 03315 - Concrete for Utility Construction.
- E. Top of manhole elevations shown on Drawings are approximate, based on current pavement and natural ground conditions as determined from elevations measured on 50-foot spacing. No additional payment will be made if final elevation of manhole ring and cover is higher or lower due to requirements of finished grade or replaced pavement surface.

3.03 PIPE CONNECTIONS

- A. Install approved resilient connectors at each pipe entering and exiting water line and sanitary sewer manholes in accordance with manufacturer's instructions.
- B. Grout storm sewer connections to manhole unless otherwise shown on Drawings. Grout pipe penetrations both inside and outside of manhole.
- C. Ensure no concrete, cement stabilized sand, fill, or other solid material is allowed to enter space between pipe and edge of wall opening at and around resilient connector on interior or exterior of manhole. When necessary, fill space with compressible material to ensure resilient connector will maintain full flexibility where evidence of reduced flexibility is encountered.
- D. Where new manhole is to be constructed on existing sewer, a rigid joint pipe may be used. Install waterstop gasket around existing pipe at center of cast-in-place wall. Join ends of split waterstop material at pipe spring line using adhesive recommended and supplied by waterstop manufacturer.
- E. Do not construct joints on sanitary sewer pipe within wall sections of manholes. Use approved connection material.
- F. Construct pipe stubs with resilient connectors for future connections at locations and with material indicated on Drawings. Install approved stub plugs at interior of manhole.
- G. Test connection for watertight seal before backfilling.

3.04 INVERTS FOR SANITARY SEWERS

- A. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:
 - 1. Slope of Invert Bench: 1 inch per foot minimum; 1-1/2 inch per foot maximum.
 - 2. Depth of Bench to Invert:

- a. Pipes smaller than 15 inches: one-half of largest pipe diameter.
 - b. Pipes 15 to 24 inches: three-fourths of largest pipe diameter.
 - c. Pipes larger than 24 inches: equal to largest pipe diameter.
3. Invert Slope through Manhole: 0.10 foot drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on Drawings.
- B. Form invert channels with Class A concrete if not integral with manhole base. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.05 DROP CONNECTIONS FOR SANITARY SEWERS

- A. Backfill drop assembly with crushed stone wrapped in filter fabric, cement-stabilized sand, or Class A concrete to form solid mass. Extend cement stabilized sand or concrete encasement minimum of 4 inches outside bells.
- B. Install connection when sewer line enters manhole higher than 24 inches above invert of manhole.

3.06 STUBS FOR FUTURE CONNECTIONS

- A. In manholes where future connections are indicated on Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.07 ADJUSTMENT RINGS AND FRAME

- A. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply latex-based bonding agent to precast concrete surfaces to be joined with non-shrink grout. Set cast iron frame on adjustment ring in a bed of approved sealant material. Install a sealant bed consisting of two beads of sealant, each bead having minimum dimensions of 1/2-inch and 1/2-inch wide.
- B. Wrap manhole frame and adjustment rings with external sealing material, minimum 3 inches beyond joint between ring and frame, and ring and precast section.
- C. For manholes in unpaved areas, set top of frame minimum of 6 inches above existing ground line unless otherwise indicated on Drawings. Encase manhole frame in mortar or non-shrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

3.08 BACKFILL

- A. After concrete obtains adequate strength, place and compact backfill materials in area of excavation surrounding manholes in accordance with requirements of Section 02317 - Excavation and Backfill for Utilities. Use embedment zone backfill material for adjacent utilities, as shown in Details over each pipe connected to manhole. Provide trench zone backfill, as specified for adjacent utilities, above embedment zone backfill.
- B. Where rigid joints are used for connecting existing sewers to manhole, backfill under existing sewer up to spring line of pipe with Class B concrete or flowable fill.
- C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of 4 inches of topsoil conforming to requirements of Section 02911 - Topsoil. Seed in accordance with Section 02921 - Hydro Mulch Seeding, or sod disturbed areas in accordance with Section 02922 - Sodding.

3.09 FIELD QUALITY CONTROL

- A. Conduct leakage testing of sanitary sewer manholes in accordance with requirements of Section 02533 - Acceptance Testing for Sanitary Sewers.

3.10 PROTECTION

- A. Protect manholes from damage until subsequent work has been accepted. Repair or replace damaged elements of manholes at no additional cost to Owner.

END OF SECTION

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Section 02082

PRECAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precast concrete manholes for sanitary sewers, storm sewers, and water lines.
- B. Precast concrete sanitary sewer manholes with PVC liner where corrosion-resistant manholes are specifically indicated in Drawings.
- C. Pile-supported concrete foundation used for unstable subgrade treatment for manhole base.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for normal depth manholes, up to 8 feet deep, is on a unit price basis for each manhole installed. Manhole depth is measured from top of cover to sewer invert. Manholes for water lines are measured from top of cover to inside base.
 - 2. Payment for shallow depth manholes is on a unit price basis for each manhole installed. Shallow manholes have a depth of 5 feet or less measured from the top of cover to sewer invert.
 - 3. Payment for extra depth manholes is on a unit price basis per vertical foot for each foot of depth greater than 8 feet. Sewer manhole depth is measured from top of cover to sewer invert. Manholes for water lines are measured from top of cover to inside base.
 - 4. Payment for normal depth corrosion-resistant manholes is on a unit price basis for each manhole installed.
 - 5. Payment for standard manhole drops is on a unit price basis for each drop installed. Standard manhole drops include both internal and external drops.
 - 6. Payment for watertight manholes, including external vent pipe, is on a unit price basis for each.
 - 7. Payment for air-release manhole with valves and fittings installed is on a unit price basis for each manhole with air-release valves and fittings installed.

8. Payment for pile-supported concrete foundation used for unstable subgrade treatment for manhole base is on a unit price basis for each foundation installed.
 9. Pay estimates for partial payments will be made as measured above according to the following schedule for sanitary sewer manholes:
 - a. Estimate for 90 percent payment will be authorized when the manhole is completely installed and surrounding soil backfilled.
 - b. Estimate for 100 percent payment will be authorized when manhole has been tested as specified in Section 02533 - Acceptance Testing for Sanitary Sewers.
 10. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
- C. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- D. ASTM C 270- Standard Specification for Mortar for Unit Masonry.
- E. ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- F. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
- G. ASTM C 923 - Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- H. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
- I. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³).

- J. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
 - K. ASTM D 2996 - Standard Specification for Filament-Wound AFiberglass@ (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - L. ASTM D 2997 - Standard Specification for Centrifugally Cast AFiberglass@ (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
 - M. ASTM F 2306 – Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
 - N. ASTM F 2510 – Standard Specification for Resilient Connectors between Concrete Manhole Structures and Corrugated High Density Polyethylene Drainage Pipes.
 - O. AWWA C 213 - Standard for Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines.
 - P. American Association of State Highway and Transportation Officials (AASHTO).
- 1.04 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
 - B. Submit manufacturer's data and details of following items for approval:
 - 1. Shop drawings of manhole sections, base units and construction details, including reinforcement, jointing methods, materials and dimensions.
 - 2. Summary of criteria used in manhole design including, as minimum, material properties, loadings, load combinations, and dimensions assumed. Include certification from manufacturer that precast manhole design is in full accordance with ASTM C 478 and design criteria as established in Paragraph 2.01E of this Specification.
 - 3. Frames, grates, rings, and covers.
 - 4. Materials to be used in fabricating drop connections.
 - 5. Materials to be used for pipe connections at manhole walls.
 - 6. Materials to be used for stubs and stub plugs, if required.
 - 7. Materials and procedures for corrosion-resistant liner and coatings, if required.

8. Plugs to be used for sanitary sewer hydrostatic testing.
 9. Manufacturer's data for pre-mix (bag) concrete, if used for channel inverts and benches.
- C. Seal submittal drawings by Professional Engineer registered in State of Texas.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

- A. Provide manhole sections, base sections, and related components conforming to ASTM C 478. Provide base riser section with integral floors, unless shown otherwise. Provide adjustment rings which are standard components of manufacturer of manhole sections. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.
- B. Construct barrels for precast manholes from standard reinforced concrete manhole sections of diameter indicated on Drawings. Use various lengths of manhole sections in combination to provide correct height with fewest joints. Design wall sections for depth and loading conditions in Paragraph 2.01E, with minimum thickness of 5 inches. Base section shall have minimum thickness of 12 inches under invert.
- C. Provide tops to support HS-20 vehicle loading, and receive cast iron frame covers, as indicated on Drawings.
- D. Where manholes larger than 48-inch diameter are indicated on Drawings, provide precast base sections with flat slab top precast sections used to transition to 48-inch diameter manhole access riser sections. Transition can be concentric or eccentric unless otherwise shown on Drawings. Locate transition to provide minimum of 7-foot head clearance from base to underside of transition unless otherwise approved by Project Manager.
- E. Design Loading Criteria: Manhole walls, transition slabs, cone tops, and manhole base slab shall be designed, by manufacturer, to requirements of ASTM C 478 for depth as shown on Drawings and to resist following loads.
 1. AASHTO HS-20 vehicle loading applied to manhole cover and transmitted down to transition and base slabs.
 2. Unit soil weight of 120 pcf located above portions of manhole, including base slab projections.
 3. Lateral soil pressure based on saturated soil conditions producing an at-rest equivalent fluid pressure of 100 pcf.
 4. Internal liquid pressure based on unit weight of 63 pcf.

5. Dead load of manhole sections fully supported by transition and base slabs.
- F. Design: Manhole walls, transition slabs, cone tops, and manhole base slab shall be designed according to requirements of ASTM C 478 and following:
 1. Design additional reinforcing steel to transfer stresses at openings. Area of steel to be no less than shown on Drawings.
 2. Wall Loading Conditions:
 - a. Saturated soil pressure acting on empty manhole.
 - b. Manhole filled with liquid to a halfway depth as measured from invert to cover, with no balancing external soil pressure.
 3. Minimum clear distance between two wall penetrations shall be 12 inches or half diameter of smaller penetration, whichever is greater.
- G. Provide joints between sections with O-ring gaskets conforming to ASTM C 443.
- H. When base is cast monolithic with portion of vertical section, extend reinforcing in vertical section into base.
- I. Precast Concrete Base: Suitable cutouts or holes to receive pipe and connections. Lowest edge of holes or cutouts: for water line manhole, no less than 6 inches above inside surface of floor of base.

2.02 CONCRETE

- A. Conform to requirements of Section 03315 - Concrete for Utility Construction.
- B. Channel Inverts: Use 5 sack premix (bag) concrete or Class A concrete for inverts not integrally formed with manhole base, with minimum compressive strength of 4000 psi.
- C. Cement Stabilized Sand Foundation: Provide cement stabilized sand foundation under base section in lieu of foundation slab, as shown on Drawings, conforming to requirements of Section 02321 - Cement Stabilized Sand.
- D. Concrete Foundation: Provide Class A concrete with minimum compressive strength of 4000 psi for concrete foundation slab under manhole base section where indicated on Drawings.

2.03 REINFORCING STEEL

- A. Conform to requirements of Section 03315 - Concrete for Utility Construction.

2.04 MORTAR

- A. Conform to requirements of Section 04061 - Mortar.

2.05 MISCELLANEOUS METALS

- A. Provide cast-iron frames, rings, and covers conforming to requirements of Section 02084 - Frames, Grates, Rings and Covers.

2.06 DROP CONNECTIONS AND STUBS

- A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on Drawings.

2.07 PIPE CONNECTIONS TO MANHOLE

- A. Sanitary Sewers:

- 1. Provide resilient connectors conforming to requirements of ASTM C 923. Use the following materials for metallic mechanical devices as defined in ASTM C 923:
 - a. External Clamps: Type 304 stainless steel.
 - b. Internal, Expandable Clamps on Standard Manholes: Type 304 stainless steel, 11 gauge minimum.
 - c. Internal, Expandable Clamps on Corrosion-Resistant Manholes:
 - 1) Type 316 stainless steel, 11 gauge minimum.
 - 2) Type 304 stainless steel, 11 gauge minimum, coated with minimum 16-mil fusion-bonded epoxy conforming to AWWA C 213.
- 2. Where rigid joints between pipe and cast-in-place manhole base are specified or shown on Drawings, provide polyethylene-isoprene waterstop meeting physical property requirements of ASTM C 923, such as Press-Seal WS Series, or approved equal.

- B. Storm Sewer Connections

- 1. Provide watertight connections in accordance with ASTM 923 and ASTM F 2510 as applicable.

- C. Water Lines:

- 1. Where smooth exterior pipes (i.e., steel, ductile iron, or PVC pipes) are connected to manhole base or barrel, seal space between pipe and manhole wall with assembly consisting of rubber gasket or links mechanically

compressed to form a watertight barrier. Assemblies: Press-Wedge, Res-Seal, Thunderline Link-Seal, or approved equal. See Drawings for placement of assembly in manhole sections.

2. When connecting concrete or cement mortar coated steel pipes, or as option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of a stainless steel power sleeve, stainless steel take-up clamp and a rubber gasket. Take-up clamp: minimum of 9/16-inch wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.

2.08 SEALANT MATERIALS

- A. Approved products in accordance with Section 01630 - Product Substitution Procedures.
- B. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, Adeka Ultraseal P201, or approved equal.
- C. Provide external sealing material from Canusa Wrapid Seal manhole encapsulation system, or approved equal.
- D. Butyl Sealant: Provide Press-Seal EZ Stick, or equal, for HDPE rings.

2.09 CORROSION RESISTANT MANHOLE MATERIALS

- A. Where corrosion-resistant manholes or PVC-lined manholes are indicated on Drawings, provide one of following:
 1. PVC liner for precast cylindrical manhole section, base sections, and cone sections in accordance with Section 02427 - Plastic Liner for Large-Diameter Concrete Sewers and Structures.
 2. Precast base sections, as specified above, lined with PVC or equal and fiberglass manholes in accordance with Section 02083 - Fiberglass Manholes.

2.10 BACKFILL MATERIALS

- A. Conform to requirements of Section 02317 - Excavation and Backfill for Utilities.

2.11 NON-SHRINK GROUT

- A. Provide prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only addition of water.

- B. Meet requirements of ASTM C 1107 and have minimum 28-day compressive strength of 7000 psi.

2.12 VENT PIPES

- A. Provide external vent pipes for manholes where indicated on Drawings.
- B. Buried Vent Pipes: Provide 3-inch or 4-inch PVC DWV pipe conforming to ASTM D 2665. Alternatively, provide FRP pipe as specified for vent outlet assembly.
- C. Vent Outlet Assembly: Provide vent outlet assembly as shown on Drawings, constructed of following specified materials:
 - 1. FRP Pipe: Provide filament wound FRP conforming to ASTM D 2996 or centrifugally cast FRP conforming to ASTM D 2997. Seal cut ends in accordance with manufacturer's recommendations.
 - 2. Joints and Fittings: Provide epoxy bodied fittings and join pipe to fittings with epoxy adhesive.
 - 3. Flanges: Provide socket-flange fittings for epoxy adhesive bonding to pipe ends where shown on Drawings. Meet bolt pattern and dimensions for ASME B16.1, 125-pound flanges. Flange bolts shall be Type 304 stainless steel, conforming to ASTM A 307, Class A or B.
 - 4. Coating: Provide approved 2-component, aliphatic polyurethane coating using primer or tie coat recommended by manufacturer. Provide two or more coats to yield dry film thickness of at least 3 mils. Color shall be selected by Project Manager from manufacturer's standard colors.

2.13 PROHIBITED MATERIALS

- A. Do not use brick masonry for construction of sanitary sewer manholes, including adjustment of manholes to grade. Use only specified materials listed above.

2.14 MANHOLE LADDER FOR WATERLINE MANHOLES

- A. Manhole Ladder: Fiberglass with 300-lb rating at appropriate length; conform to requirements of Occupational Safety and Health Standards (OSHA), U.S. Department of Labor except where shown on Drawings.
 - 1. Use components, including rungs, made of fiberglass, fabricated with nylon or aluminum rivets and/or epoxy. Apply non-skid coating to ladder rungs. Mount ladder using manufacturer's recommended hardware.
 - 2. Provide ladder as manufactured by Saf-Rail or approved equal. Locate ladder as shown on Drawings.

3. Fiberglass: Premium type polyester resin, reinforced with fiberglass; constructed to provide complete wetting of glass by resin; resistant to rot, fungi, bacterial growth and adverse effects of acids, alkalis and residential and industrial waste; yellow in color.

B. Provide approved petroleum-based tape encapsulating bolts in access manhole.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that lines and grades are correct.

B. Determine if subgrade, when scarified and recompacted, can be compacted to 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. When proper density is not reached, moisture condition subgrade until that density is reached or treat as unstable subgrade.

C. Do not build manholes in ditches, swales, or drainage paths unless approved by Project Manager.

3.02 PLACEMENT

A. Install precast manholes to conform to locations and dimensions shown on Drawings.

B. Place sanitary and storm manholes at points of change in alignment, grade, size, pipe intersections, and end of sewer unless otherwise shown on Drawings.

3.03 MANHOLE BASE SECTIONS AND FOUNDATIONS

A. Place precast base on 12-inch-thick (minimum) foundation of crushed stone wrapped in filter fabric, cement stabilized sand, or concrete foundation slab. Compact cement-sand in accordance with requirements of Section 02321 - Cement Stabilized Sand.

B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify Project Manager for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for 24-inch-thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation, as detailed on Drawings, under manhole base.

3.04 PRECAST MANHOLE SECTIONS

- A. Install sections, joints, and gaskets in accordance with manufacturer's printed recommendations.
- B. Install precast adjustment rings above tops of cones or flat-top sections as required to adjust finished elevation and to support manhole frame.
- C. Seal any lifting holes with non-shrink grout.
- D. Where PVC liners are required, seal joints between sections in accordance with manufacturer's recommendations.
- E. Place at least two precast concrete grade rings with thickness of 12 inches or less, under casting.

3.05 PIPE CONNECTIONS AT MANHOLES

- A. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.
 - 1. Where smooth exterior pipes (i.e. steel, ductile iron or PVC pipes) are connected to manhole base or barrel, space between pipe and manhole wall shall be sealed with an assembly consisting of rubber gaskets or links mechanically compressed to form watertight barrier. Assemblies: "Press-Wedge," "Res-Seal," "Thunderline Link-Seals," or approved equal. See Drawings for placement of assembly in manhole sections.
 - 2. When connecting concrete or cement mortar coated steel pipes, or as an option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of stainless steel power sleeve, stainless steel take-up clamp and rubber gasket. Take-up clamp: minimum of 9/16-inch wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.
- B. Grout storm sewer connections to manhole unless otherwise shown on Drawings. Grout pipe penetration in place on both inside and outside of manhole.
- C. Ensure no concrete, cement stabilized sand, fill, or other rigid material is allowed to enter space between pipe and edge of wall opening at and around resilient connector on either interior or exterior of manhole. If necessary, fill space with compressible material to ensure full flexibility provided by resilient connector.
- D. Where new manhole is constructed on existing sewer, rigid joint pipe may be used. Install waterstop gasket around existing pipe at center of cast-in-place wall. Join ends of split waterstop material at pipe springline using an adhesive recommended and supplied by waterstop manufacturer.

- E. Test connection for watertight seal before backfilling.

3.06 INVERTS FOR SANITARY SEWERS

- A. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:
 - 1. Slope of Invert Bench: 1 inch per foot minimum; 1-1/2 inches per foot maximum.
 - 2. Depth of Bench to Invert:
 - a. Pipes smaller than 15 inches: one-half of largest pipe diameter.
 - b. Pipes 15 to 24 inches: three-fourths of largest pipe diameter.
 - c. Pipes larger than 24 inches: equal to largest pipe diameter.
 - 3. Invert Slope through Manhole: 0.10 foot drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on Drawings.
- B. Form invert channels with concrete if not integral with manhole base section. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.07 DROP CONNECTIONS FOR SANITARY SEWERS

- A. Backfill drop assembly with crushed stone wrapped in filter fabric, cement stabilized sand, or Class A concrete to form solid mass. Extend cement stabilized sand or concrete encasement minimum of 4 inches outside bells.
- B. Install drop connection when sewer line enters manhole higher than 24 inches above invert of manhole.

3.08 STUBS FOR FUTURE CONNECTIONS

- A. In manholes, where future connections are indicated on Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.09 MANHOLE FRAME AND ADJUSTMENT RINGS

- A. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply latex-based bonding agent to precast concrete surfaces joined with non-shrink grout. Set cast iron frame on adjustment ring in bed of

approved sealant material. Install sealant bed consisting of two beads of sealant, each bead having minimum dimensions of 1/2-inch and 1/2-inch wide.

- B. Wrap manhole frame and adjustment rings with external sealing material, minimum 3 inches beyond joint between ring and frame and ring and precast section.
- C. For manholes in unpaved areas, set top of frame minimum of 6 inches above existing ground line unless otherwise indicated on Drawings. In unpaved areas, encase manhole frame in mortar or non-shrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

3.10 BACKFILL

- A. Place and compact backfill materials in area of excavation surrounding manholes in accordance with the requirements of Section 02317 - Excavation and Backfill for Utilities. Provide embedment zone backfill material, as specified for adjacent utilities, from manhole foundation up to an elevation 12 inches over each pipe connected to manhole. Provide trench zone backfill, specified for adjacent utilities, above embedment zone backfill.
- B. Where rigid joints are used for connecting existing sewers to manhole, backfill under existing sewer up to springline of pipe with Class B concrete or flowable fill.
- C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of 4 inches of topsoil conforming to requirements of Section 02911 - Topsoil. Seed in accordance with Section 02921 - Hydro Mulch Seeding. When shown on Drawings, sod disturbed areas in accordance with Section 02922 - Sodding.

3.11 FIELD QUALITY CONTROL

- A. Conduct leakage testing of sanitary sewer manholes in accordance with requirements of Section 02533 - Acceptance Testing for Sanitary Sewers.

3.12 PROTECTION

- A. Protect manholes from damage until work has been accepted. Repair damage to manholes at no additional cost to Owner.

END OF SECTION

Section 02084

FRAMES, GRATES, RINGS, AND COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Iron castings for manhole frames and covers, inlet frames and grates, catch basin frames and grates, meter vault frames and covers, adjustment rings, and extensions.
- B. Ring grates.
- C. Trench Drainage
- D. Tree Grates

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No payment will be made for frames, grates, rings, covers, and seals under this Section. Include payment in unit price for related item.
 - 2. Payment to rack over existing manhole is on a unit price basis for each manhole.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO - American Association of State Highway and Transportation Officials
 - 1. Standard Specification for Highway Bridges
 - 2. M306: Drainage, Sewer, Utility, and Related Castings
 - 3. M105: Gray Iron Castings
- B. ASTM A 48 - Standard Specification for Gray Iron Castings.
- C. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

- D. AWS D12.1 - Welding Reinforcing Steel.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions.
- C. Submit shop drawings for fabrication and installation of casting assemblies that are not included in Drawings or standard details. Include plans, elevations, sections and connection details. Show anchorage and accessory items. Include setting drawings for location and installation of castings and anchorage devices.

PART 2 PRODUCTS

2.01 CASTINGS

- A. All castings shall be made from gray cast iron conforming to the requirements of AASHTO M105 Class 35b.
- B. Castings intended for traffic service shall be clean castings capable of withstanding an application of 40,000 pound proof load as described in Section 5 of AASHTO M306 (include items such as frames, grates, rings, covers, trench drainage, etc.)
- C. Fabricate castings to conform to shapes, dimensions, and with wording or logos shown on Drawings.
- D. All castings shall be manufactured in accordance with the requirement of Section 4 of AASHTO M306.
- E. Unless otherwise indicated, all castings shall be provided uncoated.
- F. Each individual casting shall include all markings as shown on the specification drawings and shall be identified by the producing foundry showing the following: Name of producing foundry; country of manufacturer preceded by the words "Made in," such as "Made in USA"; material designation, heat identification and cast date (MM/DD/YY), casting lettering as required by the purchaser. If a casting is melted and poured at one foundry and labeled with the name of another organization, manufacturer, or foundry the casting shall include the name of the producing foundry and the organization the casting is produced for. The name of the producing foundry and the organization the product is made for shall have lettering of equal size, be close in proximity to each other, and be easily identified from the same side of the casting. The casting shall also include any additional markings as required in Section 9 of AASHTO M306 and Section 17 of AASHTO M105.

2.02 TESTING REQUIREMENTS

- A. Testing shall be performed in accordance with the following inspection criteria unless otherwise specified in the contract or purchase order. The manufacturer/supplier shall be responsible for carrying out all of the required tests and inspections. All testing shall be conducted in the United States using purchaser approved reliable facilities. The manufacturer/supplier shall maintain complete records of all such tests and inspections. All testing shall be paid for by the manufacturer/supplier. If the producing foundry is located within the United States and operates in accordance with an approved Quality System they shall conduct testing in accordance with Subsection B. All others shall conduct testing in accordance with Subsection C.
- B. The manufacturer shall report and certify material information obtained from separately cast test bars. If there are more than three test bar failures in a calendar year the manufacturer shall report this to the purchaser and shall discontinue supplying product. In order to resume supplying product, documentation that a new Quality System is in place to ensure material compliance must be submitted to and accepted by the purchaser. The manufacturer may also supply under Subsection C.
- C. A test bar for determining the class of iron shall be cast on each casting in a place where it can be easily broken off with a breakage pattern remaining on the member. Test bars shall be of sufficient size in order to produce a machined test specimen complying with the dimension requirement for a Type B test bar as shown in AASHTO M105. For lots of 15 castings or less, 30% of test bars shall be tested. For lot sizes between 16 to 100, 10% or a minimum of 5 test bars shall be tested. For lots greater than 100, 10% of all bars shall be tested. All castings for testing shall be selected at random. All castings that have a test bar removed shall also be inspected for dimensional and mass requirements. If any casting fails the material, dimension, or mass inspection that casting will be rejected and destroyed. In order for the remaining castings in the lot to be accepted, all castings in the lot shall be tested and need to meet the material, dimensional, and mass requirements. If any additional casting fails, the entire lot shall be rejected and destroyed. If the purchaser elects to select a casting for verification of test results, the member shall be furnished by the supplier at no cost to the purchaser.

2.03 SPECIAL FRAMES AND COVERS

- A. Where indicated on Drawings, provide watertight manhole frames and covers with minimum of four bolts and gasket designed to seal cover to frame. Supply approved watertight manhole covers and frames.
- B. Where shown on Drawing, provide manhole frames and covers with 48-inch diameter clear opening, with inner cover for 22-inch diameter clear opening. Provide approved inner cover with pattern shown on Drawings.

2.04 FABRICATED RING GRATES

- A. Fabricate ring grates from reinforcing steel conforming to ASTM A 615.
- B. Conform to welds connecting bars to AWS D12.1.

2.05 ADJUSTMENT RINGS FOR ASPHALT OVERLAYS

- A. Use castings conforming to Section 2.01.
- B. One piece casting with dimensions to fit frame and cover.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install castings according to approved shop drawings, instructions in related specifications, and applicable directions from manufacturer's printed materials.
- B. Set castings accurately at required locations to proper alignment and elevation. Keep castings plumb, level, true, and free of rack. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in form work until permanently set.
- C. Fabricate ring grates in accordance with standard detail, "ARing Grate for Open End of 18-inch to 72-inch Stubs to Ditch." Set in mortar in mouth of pipe bell.
- D. Install adjustment rings in existing frames with clean bearing surfaces that are free from rocking.

END OF SECTION

Section 02085

VALVE BOXES, METER BOXES, AND METER VAULTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Valve boxes for water service.
- B. Meter boxes for water service.
- C. Meter vaults for water service.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

- 1. No separate payment will be made for valve boxes under this Section. Include payment in unit price for Section 02511 - Water Lines.
- 2. No separate payment will be made for meter boxes under this Section. Include payment in unit price for Section 02512 - Water Tap and Service Line Installation.
- 3. Payment for each size of meter vaults is on unit price basis per vault. Payment will be made for each vault installed, regardless of depth.
- 4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM A 48 - Standard Specification for Gray Iron Castings.
- B. ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
- C. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
- D. ASTM D 648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- E. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

- F. ASTM D 2240 - Standard Test Method for Rubber Property-Durometer Hardness.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturers= product data for following items for approval:
 - 1. Each type of valve box and lid.
 - 2. Each type of meter box and cover.
 - 3. Each type of meter vault frame and cover.
- C. Submit design calculations and shop drawings for precast vault elements, sealed by an Engineer registered in State of Texas.
- D. Submit shop drawings for cast-in-place meter vaults for approval if proposed construction varies from Drawings.
- E. Submit manufacturer's certification that plastic meter boxes meet requirements of Paragraph 2.05, Plastic Meter Boxes.

PART 2 P R O D U C T S

2.01 VALVE BOXES

- A. Provide approved Type A, cast-iron/ductile-iron, slide-type, valve boxes. Design of valve box shall minimize stresses on valve imposed by loads on box lid.
- B. Cast letter "W" into lid, 1/2 inch in height and raised 3/32 inch, for valves serving potable water lines.
- C. Unless otherwise specified, uncoated cast iron.
- D. Riser Pipe:
 - 1. Provide 6-inch PVC, Class 150, DR 18, riser pipes in accordance with Section 02506 - Polyvinyl Chloride Pipe or
 - 2. 6-inch ductile-iron, thickness Class 51 riser pipes in accordance with Section 02501 - Ductile Iron Pipe and Fittings.
 - 3. Provide single section of pipe.
- E. Concrete for Valve Box Placement:

1. For locations in new concrete pavement, provide strength and mix design of new pavement.
2. For other locations, provide concrete for sidewalks conforming to requirements of Section 02751 - Concrete Paving.

2.02 METER BOXES

- A. Provide meter boxes for 5/8-inch through 1-inch meters of the following materials:
 1. Non-traffic bearing locations: cast iron, concrete or plastic.
 2. Traffic bearing locations: cast iron.
- B. Provide meter boxes for 1-1/2-inch and 2-inch meters of cast iron.
- C. Provide meter box with reading lid. Provide lids with spring-type latching devices. Lids shall contain sufficient metal that meter box can be easily located with metal detector. Cast words "WATER METER" into lid with letters of 1/2-inch height and raised 3/32 inch.
- D. Meter box dimensions shall conform to the following approximate dimensions:
 1. Length: At top - 15-1/2 inches; at bottom 20 inches.
 2. Width: At top - 12-1/2 inches; at bottom 14-3/4 inches.
 3. Height: 12 inches.
- E. Extensions: Meter box extensions 3 inches and 6 inches in height shall be available from manufacturer as standard item.

2.03 CAST-IRON METER BOXES

- A. Cast-Iron Boxes: Clean and free from sand blow-holes or other defects conforming to requirements of ASTM A 48, Class 30B. Bearing surfaces shall be machined so that covers seat evenly in frames.
- B. Boxes and lids shall have dipped, coal-tar-pitch, varnish finish.
- C. Provide lock-type meter boxes when required by Drawings. Lock mechanisms shall work with ease.

2.04 CONCRETE METER BOXES

- A. Concrete Meter Boxes: Made of Class A concrete, with minimum 4000 psi compressive strength, conforming to requirements of Section 03315 - Concrete for Utility Construction. Construct to dimensions shown on Drawings.

- B. Castings: Free from fractures, large or deep cracks, blisters or surface roughness or any other defects that may affect serviceability.

2.05 PLASTIC METER BOXES

- A. Plastic Meter Boxes: Made of high-density polyethylene conforming to the following ASTM standards:

ASTM	REQUIREMENT
D 256	Impact Strength = 1.9 ft.-lb./inch (Izod, Notched)
D 256	Impact Strength = 6.4 ft.-lb./inch (Izod, Un-Notched)
D 638	Tensile Strength (2.0 min.) = 3400 psi
D 648	Deflection Temperature = 170 degrees F
D 2240	Shore D, Hardness, 55-65 Impact Strength, Falling Dart Method, 160 inch-lb.
D 790	Flexural Modulus = 90,000 psi

- B. Meter boxes shall meet the following test requirements:
 - 1. Static Load: Not less than 2500 pounds using 6-inch disc with direct compression exerted at center of top of meter box with solid plastic lid.
 - 2. Deflection: Not less than 1000 pounds load required to deflect top edge of meter box 1/8 inch.
- C. Meter box body, without lid, shall weigh approximately 7 pounds.

2.06 METER VAULTS

- A. Meter vaults may be constructed of precast concrete, cast-in-place concrete, or common brick masonry unless a specific type of construction is required by Drawings.
- B. Concrete for Meter Vaults: Class A concrete, conforming to requirements of Section 03315 - Concrete for Utility Construction with minimum compressive strength of 4000 psi at 28 days.
- C. Reinforcing Steel for Meter Vaults: Conform to requirements of Section 03315 - Concrete for Utility Construction.

- D. Grates and Covers: Conform to requirements of Section 02084 - Frames, Grates, Rings, and Covers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Obtain approval from Project Manager for location of meter vault.
- B. Verify lines and grade are correct.
- C. Verify compacted subgrade will support loads imposed by vaults.

3.02 VALVE BOXES

- A. Install riser pipe with suitable length for depth of cover indicated on Drawings or to accommodate actual finish grade.
 - 1. Install with bell on top of valve.
 - 2. Place riser pipe in plumb, vertical position.
- B. Install valve box and riser piping plumbed in a vertical position. Provide 6 inches telescoping freeboard space between riser pipe top butt end, and interior contact flange of valve box, for vertical movement damping. End of pipe resting on valve shall be notched out sufficiently to provide a snug fit around the valve bonnet and to center valve inside of pipe.
- C. Set, align, and adjust valve box so that lid is level with final grade.
- D. Paint covers of new valve boxes in fluorescent orange when installed. After completion and acceptance by Owner, repaint covers black.

3.03 METER BOXES

- A. Install cast iron or plastic boxes in accordance with manufacturer's instructions.
- B. Construct concrete meter boxes to dimensions shown on Drawings.
- C. Adjust top of meter boxes to conform to cover elevations specified in Paragraph 3.05, Frame and Cover for Meter Vaults.
- D. Do not locate under paved areas unless approved by Project Manager. Use approved traffic-type box with cast iron lid when meter must be located in paved areas.

3.04 METER VAULTS

- A. Construct concrete meter vaults to dimensions shown on Drawings. Do not cast in presence of water. Make bottom uniform. Verify lines and grades are correct and compacted subgrade will support loads imposed by vaults.
- B. Precast Meter Vaults:
 - 1. Install precast vaults in accordance with manufacturer's recommendations. Set level on a minimum 3-inch-thick bed of sand conforming to requirements of Section 02320 - Utility Backfill Materials.
 - 2. Seal lifting holes with cement-sand mortar or non-shrink grout.
- C. Meter Vault Floor Slab:
 - 1. Construct floor slabs of 6-inch-thick reinforced concrete. Slope floor 1/4 inch per foot toward sump. Make sump 12 inches in diameter, or 12 inches square, and 4 inches deep, unless other dimensions are required by Drawings. Install dowels at maximum of 18 inches, center-to-center for keying walls to floor slab.
 - 2. Precast floor slab elements may be used for precast vault construction
- D. Cast-in-Place Meter Vault Walls:
 - 1. Key walls to floor slab and form to dimensions shown on Drawings. Minimum wall thickness shall be 4 inches.
 - 2. Cast walls monolithically. One cold joint will be allowed when vault depth exceeds 12 feet.
 - 3. Set frame for cover in concrete

3.05 FRAME AND COVER FOR METER VAULTS

- A. Set cast iron frame in a mortar bed and adjust elevation of cover as follows:
 - 1. In unpaved areas, set top of meter box or meter vault cover 2 to 3 inches above natural grade.
 - 2. In paved areas, set top of meter box or meter vault cover flush with adjacent concrete but no higher than 1/2 inch.

3.06 BACKFILL

- A. Provide bank run sand in accordance with Section 02320 - Utility Backfill Materials and backfill and compact in accordance with Section 02317 - Excavation and Backfill for Utilities.

- B. In unpaved areas, slope backfill around meter boxes and vaults to provide a uniform slope 1-to-5 slope from top to natural grade.
- C. In paved areas, slope concrete down from meter box or vault to meet adjacent paved area.

END OF SECTION

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Section 02086

ADJUSTING MANHOLES, INLETS, AND VALVE BOXES TO GRADE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adjusting elevation of manholes, inlets, and valve boxes to new grades.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No separate payment will be made for adjusting manhole frames and covers, inlets, valve boxes, and meter boxes to grade for new construction under this Section. Include payment in unit price for related item.
2. Payment for adjusting existing manholes, frame and cover, inlets, valve boxes, and meter boxes to a new grade is on a unit price basis for each.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Provide concrete, conforming to requirements of Section 03315 - Concrete for Utility Construction.
- B. Provide precast concrete manhole sections and adjustment rings conforming to requirements of Section 02082 - Precast Concrete Manholes.
- C. Provide mortar conforming to requirements of Section 04061 - Mortar.

2.02 CAST-IRON MATERIALS

- A. Provide cast-iron materials conforming to requirements of Section 02084 - Frames, Grates, Rings, and Covers.

2.03 PIPING MATERIALS

- A. For riser pipes and fittings, refer to Sections 02501 - Ductile-iron Pipe and Fittings through 02528 - Polyethylene Wrap.

2.04 MASONRY MATERIALS FOR STORM SEWER MANHOLES AND INLETS

- A. Provide brick masonry units conforming to the requirements of Section 04210 - Brick Masonry for Utility Construction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine existing structure, valve box, frame and cover or inlet box, frame and cover or inlet, piping and connections for damage or defects affecting adjustment to grade. Report damage or defects to Project Manager.

3.02 ESTABLISHING GRADE

- A. Coordinate grade related items with existing grade and finished grade or paving, and relate to established bench mark or reference line.

3.03 ADJUSTING MANHOLES AND INLETS

- A. Rebuild adjustment portion of manhole or inlet by adding or removing Adjustments. Follow procedures for the type of structure being adjusted detailed in the following Sections:

1. Section 02081 - Cast-in-Place Concrete Manholes.
2. Section 02082 - Precast Concrete Manholes.
3. Section 02083 - Fiberglass Manholes.
4. Section 02087 - Brick Manholes for Storm Sewers.
5. Section 02632 - Cast-in-Place Inlets, Headwalls and Wingwalls.
6. Section 02633 - Precast Concrete, Inlets, Headwalls and Wingwalls.

- B. Salvage and reuse cast-iron frame and cover or grate.
- C. Protect or block off manhole or inlet bottom using wood forms shaped to fit so that no debris or soil falls to bottom during adjustment.
- D. Verify that manholes and inlets are free of visible leaks as result of reconstruction. Repair leaks in manner subject to Project Manager ' s approval.

3.04 ADJUSTING VALVE BOXES

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- A. Salvage and reuse valve box and surrounding concrete block as approved by Project Manager. No separate pay.
- B. Remove and replace 6-inch ductile iron riser pipe with suitable length for depth of cover required to establish adjusted elevation to accommodate actual finish grade.
- C. Reinstall valve box and riser piping plumbed in vertical position. Provide minimum 6 inches telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box for vertical movement damping.
- D. After valve box has been set, align and adjust so that top lid is level with final grade.

3.05 BACKFILL AND GRADING

- A. Backfill area of excavation surrounding each adjusted manhole, inlet, and valve box and compact according to requirements of Section 02316 - Excavation and Backfill for Structures.
- B. Grade ground surface to drain away from each manhole and valve box. Place earth fill around manholes to level of upper rim of manhole frame. Place earth fill around valve box concrete slab.
- C. In unpaved areas, grade surface at uniform slope of 1 to 5 from manhole frame to natural grade. Provide minimum of 4 inches of topsoil conforming to requirements of Section 02911 - Topsoil. Provide seeding in accordance with Section 02921 - Hydro-mulch Seeding, or if sodding in accordance with Section 02922 - Sodding.

END OF SECTION

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Section 02221

REMOVING EXISTING PAVEMENTS AND STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removing concrete paving, asphaltic concrete pavement, brick pavement and base courses.
- B. Removing concrete curbs, concrete curbs and gutters, sidewalks and driveways.
- C. Removing pipe culverts, sewers, and sewer leads.
- D. Removing existing inlets and manholes.
- E. Removing and disposing of pre-stressed concrete beams and drill shafts.
- F. Removing miscellaneous structures of concrete or masonry.
- G. Removing existing bridge.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for removing and disposing of asphaltic surfacing with or without base, regardless of thickness encountered, is on square yard basis measured between lips of gutters.
 - 2. Payment for removing and disposing of reinforced concrete pavement, with or without asphalt overlay, regardless of its thickness, is on square yard basis measured from back-to-back of curbs. Payment includes concrete pavement, esplanade curbs, curbs and gutters, and paving headers.
 - 3. Payment for removing and disposing of cement stabilized shell base course, with or without asphaltic surfacing, is on square yard basis.
 - 4. Payment for removing and disposing of concrete sidewalks and driveways is on square yard basis.
 - 5. Payment for removing asphaltic surface course only is on a square yard basis paid under item description Asphalt Surface Mill. This includes removal of existing surface to pavement base.

6. Payment for removing and disposing of miscellaneous concrete and masonry is on cubic yard basis of structure in place.
7. Payment for removing and disposing of pipe culverts, sewers, and sewer leads is on linear foot basis for each diameter and each material type of pipe removed.
8. Payment for removing and disposing of existing inlets is on unit price basis for each inlet removed.
9. Payment for removing and disposing of prestressed concrete piles and drill shafts is on linear foot basis.
10. Payment for removing and disposing of existing bridge, including piles and abutments to minimum of 4 feet below ground level, is on a lump sum basis.
11. Payment for removing and disposing of existing manholes is on unit price basis for each manhole removed.
12. No payment for saw cutting of pavement, curbs, curbs and gutters or sidewalks will be made under this section. Include cost of such work in unit prices for items listed in bid form requiring saw cutting.
13. No payment will be made for work outside maximum payment limits indicated on Drawings, or for pavements or structures removed for Contractor's convenience.
 - a. For Utility Installations: Match actual pavement replaced but no greater than maximum pavement replacement limits shown on Drawings. Limits of measurement will be as shown on Street Cut Pavement Replacement Rules.
14. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.
- B. Coordinate removal work with utility companies.

PART 2 P R O D U C T S - Not Used

PART 3

PART 4 E X E C U T I O N

4.01 P R E P A R A T I O N

- A. Obtain advance approval from Project Manager for dimensions and limits of removal work.
- B. Identify known utilities below grade. Stake and flag locations.

4.02 P R O T E C T I O N

- A. Protect following from damage or displacement:
 - 1. Adjacent public and private property.
 - 2. Trees, plants, and other landscape features designated to remain.
 - 3. Utilities designated to remain.
 - 4. Pavement and utility structures designated to remain.
 - 5. Bench marks, monuments, and existing structures designated to remain.

4.03 R E M O V A L S

- A. Remove pavements and structures by methods that will not damage underground utilities. Do not use drop hammer near existing underground utilities.
- B. Minimize amount of earth loaded during removal operations.
- C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to minimum depth of 2 inches.
- D. When street and driveway saw cut location is greater than one-half of pavement lane width, remove pavement for full lane width or to nearest longitudinal joint as directed by Project Manager.
- E. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.

- F. Where existing end of pipe culvert or end of sewer is to remain, install 8-inch-thick masonry plug in pipe end prior to backfill in accordance with requirements of Section 02316 - Excavation and Backfill for Structures.

4.04 BACKFILL

- A. Backfill of removal areas shall be in accordance with requirements of Section 02316 - Excavation and Backfill for Structures.

4.05 DISPOSAL

- A. Inlet frames, grates, and plates; and manhole frames and covers, may remain Owner property. Disposal shall be in accordance with requirements of Section 01576 - Waste Material Disposal.
- B. Remove from site, debris resulting from work under this section in accordance with requirements of Section 01576 - Waste Material Disposal.

END OF SECTION

Section 02233

CLEARING AND GRUBBING

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Removing surface debris and rubbish.
- B. Clearing site of plant life and grass.
- C. Removing trees and shrubs.
- D. Removing root system of trees and shrubs.
- E. Fence removal.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for clearing and grubbing is on per acre basis.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.
- B. Coordinate clearing work with utility companies.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 PREPARATION

- A. Verify that existing plant life and features designated to remain are identified and tagged.

3.02 PROTECTION

- A. Protect following from damage or displacement:
 - 1. Living trees located 3 feet or more outside of intersection of side slopes and original ground line.
 - 2. Plants other than trees and landscape features designated to remain.
 - 3. Utilities designated to remain.
 - 4. Bench marks, monuments, and existing structures designated to remain.

3.03 CLEARING

- A. Remove stumps, main root ball, and root system to:
 - 1. Depth of 24 inches below finished subgrade elevation in area bounded by lines 2 feet behind back of curbs.
 - 2. Depth of 24 inches below finished surface of required cross section for other areas.
- B. Clear undergrowth and deadwood without disturbing subsoil.
- C. Remove vegetation from top soil scheduled for reuse.

3.04 REMOVAL

- A. Remove debris, rubbish, and extracted plant material life from site in accordance with requirements of Section 01576 - Waste Material Disposal.
- B. Remove on-site fences. Materials generated from removal of fences become property of Contractor. Properly dispose of in accordance with applicable local, state and federal laws.

END OF SECTION

Section 02260

TRENCH SAFETY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Trench Safety System for the construction of trench excavations.
- B. Trench safety system for structural excavations that fall under provisions of State and Federal trench safety laws.
- C. This Standard Specification Section replaces previously published Section 01561 – Trench Safety System.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Measurement for Trench Safety Systems used on trench excavations is on a linear foot basis measured along the centerline of the trench, including manholes and other line structures.
 - 2. No payment will be made for Trench Safety Systems for structural excavations under this section. Include payment for Trench Safety System in applicable structure installation sections.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. A trench shall be defined as a narrow excavation (in relation to its depth) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.
- B. The Trench Safety System requirements will apply to larger open excavations if the erection of structures or other installations limits the space between the excavation slope and the installation to dimensions equivalent of a trench as defined.
- C. Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering, or diversion of water to provide adequate drainage.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit a safety program specifically for the construction of trench excavation. Design the Trench Safety Program to be in accordance with OSHA 29CFR standards governing the presence and activities of individuals working in and around trench excavations.
- C. Construction and shop drawings containing deviations from OSHA standards or special designs shall be sealed by a licensed Engineer retained and paid by Contractor.
- D. Review of the safety program by the Project Manager will only be in regard to compliance with this specification and will not constitute approval by the Project Manager nor relieve Contractor of obligations under State and Federal trench safety laws.

1.05 REGULATORY REQUIREMENTS

- A. Install and maintain Trench Safety Systems in accordance with the detail specifications set out in the provision of Excavations, Trenching, and Shoring, Federal Occupation Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Final Rule, published in the Federal Register Vol. 54, No. 209 on Tuesday, October 31, 1989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652.
- B. A reproduction of the OSHA standards included in “Subpart P – Excavations” from the Federal Register Vol. 54, No. 209 is available upon request to Contractors. The Owner assumes no responsibility for the accuracy of the reproduction. The Contractor is responsible for obtaining a copy of this section of the Federal Register.
- C. Legislation that has been enacted by the Texas Legislature with regard to trench safety systems, is hereby incorporated, by reference, into these specifications. Refer to Texas Health and Safety Code Ann., §756.021 (Vernon 1991).

1.06 INDEMNIFICATION

- A. Contractor shall indemnify and hold harmless the Owner and Project Manager, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments, or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this Contract.
- B. Contractor acknowledges and agrees that this indemnity provision provides indemnity

for the Owner and Project Manager in case the Owner or Project Manager is negligent either by act or omission in providing for trench safety, including, but not limited to safety program and design reviews, inspections, failures to issue stop work orders, and the hiring of the Contractor.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and maintain Trench Safety Systems in accordance with provisions of OSHA 29CFR.
- B. Install specially designed Trench Safety Systems in accordance with the Contractor's trench excavation safety program for the locations and conditions identified in the program.
- C. A competent person, as identified in the Contractor's trench safety program, shall verify that trench boxes and other premanufactured systems are certified for the actual installation conditions.

3.02 INSPECTION

- A. Contractor, or Contractor's independent retained consultant, shall make daily inspections of the Trench Safety Systems to ensure that the installed systems and operations meet OSHA 29 CFR and other personnel protection regulations requirements.
- B. If evidence of possible cave-ins or slides is apparent, Contractor shall immediately stop work in the trench and move personnel to safe locations until necessary precautions have been taken by Contractor to safeguard personnel entering the trench.
- C. Maintain a permanent record of daily inspections.

3.03 FIELD QUALITY CONTROL

- A. Contractor shall verify specific applicability of the selected or specially designed Trench Safety Systems to each field condition encountered on the project.

END OF SECTION

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Section 02316

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, backfilling, and compaction of backfill for structures.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. No payment will be made for structural excavation and backfill under this Section. Include payment in unit price or lump sum for construction of structures.
2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
2. Materials that cannot be compacted to required density due to gradation, plasticity, or moisture content.
3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

- B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.

- C. Select Material: Material as defined in Section 02320 - Utility Backfill Materials.

- D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.
- E. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.
- F. Foundation Base: For foundation base material, use crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab. Foundation base provides smooth, level working surface for construction of concrete foundation.
- G. Foundation Subgrade: Foundation subgrade is surface of natural soil which has been excavated and prepared to support foundation base or foundation backfill, where needed.
- H. Ground Water Control Systems: Installations external to excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of excavation, and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01578 - Control of Ground Water and Surface Water.
- I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from excavation. Remove rain water and surface water which accidentally enters excavation as part of excavation drainage.
- J. Excavation Drainage: Removal of surface and seepage water in excavation by sump pumping and using French drains surrounding foundation to intercept water.
- K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below foundation as shown on Drawings, and backfilled with foundation backfill material.
- L. Shoring System: Structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.04 REFERENCES

- A. ASTM D 698 - Standard Test Methods for Laboratory Compaction of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³)).
- B. ASTM D 1556 - Standard Test Method for Density of Soil in Place by Sand-Cone Method.

- C. ASTM D 2922 - Standard Test Methods for Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- D. ASTM D 3017 - Standard Test Method for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
- E. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- F. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
- G. TxDOT Tex-110-E - Particle Size Analysis of Soils.
- H. Federal Regulations, 29 CFR, Part 1926, Standards - Excavation, Occupational Safety and Health Administration (OSHA).

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit work plan for excavation and backfill for each structure with complete written description which identifies details of proposed method of construction and sequence of operations for construction relative to excavation and backfill activities. Use descriptions, with supporting illustrations, sufficiently detailed to demonstrate to Project Manager that procedures meet requirements of Specifications and Drawings.
- C. Submit excavation safety system plan.
 - 1. Submit excavation safety system plan in accordance with applicable OSHA requirements for excavations.
 - 2. Submit excavation safety system plan in accordance with requirements of Section 02260 - Trench Safety System, for excavations that fall under State and Federal trench safety laws.
- D. Submit ground and surface water control plan in accordance with requirements in this Section and Section 01578 - Control of Ground Water and Surface Water.
- E. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.
- F. Submit project record documents under provisions of Section 01785 - Project Record Documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.06 TESTS

- A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by Owner in accordance with requirements of Section 01454 - Testing Laboratory Services and as specified in this Section.
- B. Perform embedment and backfill material source qualification testing in accordance with requirements of Section 02320 - Utility Backfill Materials.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with equipment suitable for achieving requirements of this Specification.
- B. Use equipment which will produce degree of compaction specified. Compact backfill within 3 feet of walls with hand-operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to depth of fill at that time. Use hand-operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

- A. Use backfill materials conforming to classifications and product descriptions of Section 02320 - Utility Backfill Materials. Use classification or product description for backfill applications as shown on Drawings and as specified.

PART 3 EXECUTION

3.01 PREPARATION

- A. Conduct an inspection to determine condition of existing structures and other permanent installations.
- B. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Conform to requirements of Section 01555 - Traffic Control and Regulation. Maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by Work, and is considered hazardous to traffic movements.
- C. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified in Section 02260 - Trench Safety Systems.

- D. Remove existing pavements and structures, including sidewalks and driveways, in accordance with requirements of Section 02221 - Removing Existing Pavements and Structures.
- E. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01578 - Control of Ground Water and Surface Water.

3.02 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on Drawings, and in accordance with requirements of Section 01562 - Tree and Plant Protection.
- B. Protect and support above-grade and below-grade utilities which are to remain.
- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on Drawings.
- D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.
- E. Maintain excavation and backfill areas until start of subsequent work. Repair and recompact slides, washouts, settlements, or areas with loss of density at no additional cost to Owner.

3.03 EXCAVATION

- A. Perform excavation work so that underground structure can be installed to depths and alignments shown on Drawings. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to absolute minimum necessary. No additional payment will be made for excess excavation not authorized by Project Manager.
- B. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Project Manager and obtain instructions before proceeding in such areas.
- C. Immediately notify the agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Project Manager and agency for any repairs or relocations, either temporary or permanent.
- D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.
- E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.

- F. Conduct hauling operations so that trucks and other vehicles do not create dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner such that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud, or other materials that spill onto streets or are deposited onto streets by vehicle tires.
- G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by Work.
- H. Provide sheeting, shoring, and bracing where required to safely complete Work, to prevent excavation from extending beyond limits indicated on Drawings, and to protect Work and adjacent structures or improvements. Use sheeting, shoring, and bracing to protect workmen and public conforming to requirements of Section 02260 - Trench Safety Systems.
- I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, cement stabilized sand, or other material approved by Project Manager, and compact to 95 percent standard density.
- J. After completion of structure, remove sheeting, shoring, and bracing unless shown on Drawings to remain in place or directed by Project Manager in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to Work and adjacent structures or improvements.
- K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or other material approved by Project Manager and compact to 95 percent standard density.

3.04 HANDLING EXCAVATED MATERIALS

- A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at sufficient distance from excavation to prevent slides or cave-ins.
- B. Provide additional backfill material in accordance with requirements of Section 02319 - Borrow, if adequate quantities of suitable material are not available from excavation and trenching operations at site.

3.05 DEWATERING

- A. Provide ground water control per Section 01578 - Control of Ground Water and Surface Water.
- B. Keep ground water surface elevation minimum of 2 feet below bottom of foundation base.

- C. Maintain ground water control as directed by Section 01578 - Control of Ground Water and Surface Water and until structure is sufficiently complete to provide required weight to resist hydrostatic uplift with minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

- A. Notify Project Manager at least 48 hours prior to planned completion of foundation excavations. Do not place foundation base until excavation is accepted by Project Manager.
- B. Excavate to elevations shown on Drawings, as needed to provide space for foundation base, forming level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or material as directed by Project Manager. Prior to placing material over it, recompact subgrade where indicated on Drawings, scarifying as needed, to 95 percent of maximum Standard Dry Density according to ASTM D 698. If specified level of compaction cannot be achieved, moisture condition subgrade and recompact until 95 percent is achieved, over-excavate to provide minimum layer of 24 inches of foundation backfill material, or other means acceptable to Project Manager.
- C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by Project Manager.
- D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.
- E. Remove soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to required subgrade, and replace with foundation backfill material, as directed by Project Manager, at no additional cost to Owner.
- F. Place foundation base, or foundation backfill material where needed, over subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with seal slab or cement-stabilized sand.
- G. Use filter fabric as specified in Section 02621 - Geotextile to separate crushed aggregate and other free-draining Class I materials from native soils or select material backfill. Overlap fabric minimum of 12 inches beyond where another material stops contact with soil.
- H. Place crushed aggregate, and other Class I materials, in uniform layers of 8-inch maximum thickness. Perform compaction by means of at least two passes of vibratory compactor.

3.07 FOUNDATION BASE

- A. Place foundation backfill after subgrade is properly prepared, including placement of foundation backfill where needed. Use foundation base consisting of 12-inch layer of crushed stone aggregate or cement stabilized sand. Alternately, seal slab with minimum thickness of 4 inches may be placed. Extend foundation base minimum of 12 inches beyond edge of structure foundation, unless shown otherwise on Drawings.
- B. Where foundation base and foundation backfill are of same material, both can be placed in one operation.

3.08 BACKFILL

- A. Complete backfill to surface of natural ground or to lines and grades shown on Drawings. Remove forms, lumber, trash and debris from structures. Use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on Drawings. Deposit backfill in uniform layers and compact each layer as specified.
- B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that concrete has reached minimum of 85 percent of specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until slab or intermediate walls have been placed and concrete has attained sufficient strength.
- C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.
- D. Maintain fill material at no less than 2 percent below nor more than 2 percent above optimum moisture content, unless otherwise approved by Project Manager. Place fill material in uniform 8-inch maximum loose layers. Compact fill to at least 95 percent of the maximum Standard Proctor Density according to ASTM D 698 below paved areas. Compact fill to at least 95 percent around structures below unpaved areas.
- E. Where backfill is placed against sloped excavation surface, run compaction equipment across boundary of cut slope and backfill to form compacted slope surface for placement of next layer of backfill.
- F. Place backfill using cement stabilized sand in accordance with Section 02321 - Cement Stabilized Sand.

3.09 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

- B. Tests will be performed initially on minimum of one different sample of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is noticeable change in material gradation or plasticity.
 - C. In-place density tests of compacted subgrade and backfill will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at following frequencies and conditions:
 - 1. Minimum of one test for every 50 to 100 cubic yards of compacted backfill material as directed by Project Manager.
 - 2. A minimum of three density tests for each full work shift.
 - 3. Density tests will be performed in all placement areas.
 - 4. Number of tests will be increased when inspection determines that soil types or moisture contents are not uniform or when compacting effort is variable and not considered sufficient to attain uniform density.
 - 5. Identify elevation of test with respect to natural ground.
 - 6. Record approximate depth of lift tested.
 - D. At least one test for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Perform additional moisture-density relationship test once a month or whenever there is noticeable change in material gradation or plasticity.
 - E. When tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at Contractor's expense.
- 3.10 DISPOSAL OF EXCESS MATERIAL
- A. Dispose of excess materials in accordance with requirements of Section 01576 - Waste Material Disposal.

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Section 02317

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, including manholes and other pipeline structures.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No additional payment will be made for trench excavation, embedment and backfill under this Section. Include cost in unit price for installed underground piping, sewer, conduit, or ductwork.
2. When Project Manager directs Contractor to overexcavate trench bottom, Contractor will be paid by unit price bid per linear foot under bid item - 6" Overexcavation of Trench Bottom.
 - a. No payment will be paid if Project Manager does not direct Contractor to overexcavate trench bottom.
 - b. No overexcavation will be measured or paid when unsuitable conditions result from dewatering system not in conformance with Section 01578 - Control of Ground Water and Surface Water.
3. No additional payment will be made for performing Critical Location exploratory excavation. Include cost in unit price for installed underground piping, sewer, conduit, or duct work.
4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

- A. Pipe Foundation: Suitable and stable native soils that are exposed at trench subgrade after excavation to depth of bottom of bedding as shown on Drawings, or foundation backfill material placed and compacted in over-excavations.

- B. Pipe Bedding: Portion of trench backfill that extends vertically from top of foundation up to level line at bottom of pipe, and horizontally from one trench sidewall to opposite sidewall.
- C. Haunching: Material placed on either side of pipe from top of bedding up to springline of pipe and horizontally from one trench sidewall to opposite sidewall.
- D. Initial Backfill: Portion of trench backfill that extends vertically from springline of pipe (top of haunching) up to level line 12 inches above top of pipe, and horizontally from one trench sidewall to opposite sidewall.
- E. Pipe Embedment: Portion of trench backfill that consists of bedding, haunching and initial backfill.
- F. Trench Zone: Portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.
- G. Unsuitable Material: Unsuitable soil materials are the following:
 - 1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
 - 2. Materials that cannot be compacted to required density due to gradation, plasticity, or moisture content.
 - 3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
 - 4. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- H. Suitable Material: Suitable soil materials are those meeting specification requirements. Materials mixed with lime, fly ash, or cement that can be compacted to required density and meeting requirements for suitable materials may be considered suitable materials, unless otherwise indicated.
- I. Backfill: Suitable material meeting specified quality requirements placed and compacted under controlled conditions.
- J. Ground Water Control Systems: Installations external to trench, such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of trench excavation, and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01578 - Control of Ground Water and Surface Water.

- K. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from trench excavation. Rain water and surface water accidentally entering trench shall be controlled and removed as part of excavation drainage.
- L. Excavation Drainage: Removal of surface and seepage water in trench by sump pumping and using drainage layer, as defined in ASTM D 2321, placed on foundation beneath pipe bedding or thickened bedding layer of Class I material.
- M. Trench Conditions are defined with regard to stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.
 - 1. Dry Stable Trench: Stable and substantially dry trench conditions exist in pipe embedment zone as result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.
 - 2. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.
 - a. Stable Trench with Seepage in Clayey Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.
 - b. Stable Wet Trench in Sandy Soils: Excavation drainage is provided in embedment zone in combination with ground water control in predominately sandy or silty soils.
 - 3. Unstable Trench: Unstable trench conditions exist in pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.
- N. Sub-trench: Sub-trench is special case of benched excavation. Sub-trench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or embedment materials directly against undisturbed soils. Depth of sub-trench depends upon trench stability and safety as determined by Contractor.
- O. Trench Dam: Placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along trench.
- P. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of

foundation as shown on Drawings, and backfilled with foundation backfill material.

- Q. Foundation Backfill Materials: Natural soil or manufactured aggregate of controlled gradation, and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.
- R. Trench Safety Systems include both protective systems and shoring systems as defined in Section 02260 - Trench Safety Systems.
- S. Trench Shield (Trench Box): Portable worker safety structure moved along trench as work proceeds, used as protective system and designed to withstand forces imposed on it by cave-in, thereby protecting persons within trench. Trench shields may be stacked if so designed or placed in series depending on depth and length of excavation to be protected.
- T. Shoring System: Structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins, or to prevent movement of ground affecting adjacent installations or improvements.
- U. Special Shoring: Shoring system meeting special shoring as specified in Paragraph 1.08, Special Shoring Design Requirements, for locations identified on Drawings.
- V. Vacuum Excavation: An excavation technique performed by an experienced subcontractor in which water or air jets are used to slough off and vacuum away soil.

1.04 REFERENCES

- A. ASTM C 12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
- B. ASTM D 558 - Standard Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
- C. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft).
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
- E. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
- F. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes.

- G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - H. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - I. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - J. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
 - K. TxDOT Tex-110-E - Particle Size Analysis of Soils.
 - L. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
 - M. ASTM C76 – Standard Specification for Reinforced Concrete Culverts, Storm Drain, and Sewer Pipe.
- 1.05 SCHEDULING
- A. Schedule work so that pipe embedment can be completed on same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.
- 1.06 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
 - B. Submit planned typical method of excavation, backfill placement and compaction including:
 - 1. Trench widths.
 - 2. Procedures for foundation and pipe zone bedding placement, and trench backfill compaction.
 - 3. Procedures for assuring compaction against undisturbed soil when pre-manufactured trench safety systems are proposed.
 - C. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.
 - D. Submit trench excavation safety program in accordance with requirements of Section 02260 - Trench Safety System. Include designs for special shoring meeting requirements defined in Paragraph 1.08, Special Shoring Design Requirements contained herein.

- E. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts, and gradients.
- F. Submit 11-inch by 17-inch or 12-inch by 18-inch copy of Drawing with plotted utility or obstruction location titled Critical Location Report to Project Manager.

1.07 TESTS

- A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by Owner in accordance with requirements of Section 01454 - Testing Laboratory Services and as specified in this Section.
- B. Perform backfill material source qualification testing in accordance with requirements of Section 02320 - Utility Backfill Materials.

1.08 SPECIAL SHORING DESIGN REQUIREMENTS

- A. Have special shoring designed or selected by Contractor's Professional Engineer to provide support for sides of excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a pre-manufactured system selected by Contractor's Professional Engineer to meet project site requirements based on manufacturer's standard design.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with hydraulic excavator or other equipment suitable for achieving requirements of this Section.
- B. Use only hand-operated tamping equipment until minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.
- C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.
- D. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting requirements as specified in Paragraph 1.08, Special Shoring Design Requirements.

2.02 MATERIAL CLASSIFICATIONS

- A. Embedment and Trench Zone Backfill Materials: Conform to classifications and product descriptions of Section 02320 - Utility Backfill Materials and Section 02321 - Cement Stabilized Sand.
- B. Concrete Backfill: Conform to requirements for Class B concrete as specified in Section 03315 - Concrete for Utility Construction.
- C. Geotextile (Filter Fabric): Conform to requirements of Section 02621 - Geotextile.
- D. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.
- E. Timber Shoring Left in Place: Untreated oak.

PART 3 EXECUTION

3.01 STANDARD PRACTICE

- A. Install flexible pipe, including semi-rigid pipe, to conform to standard practice described in ASTM D 2321, and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.
- B. Install rigid pipe to conform to standard practice described in ASTM C 12, and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.
- C. Classification of material will be determined by Project Manager.

3.02 PREPARATION

- A. Establish traffic control to conform with requirements of Section 01555 - Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections affected by Work, and are considered hazardous to traffic movements.
- B. Perform work to conform to applicable safety standards and regulations. Employ trench safety system as specified in Section 02260 - Trench Safety Systems.
- C. Immediately notify agency or company owning any existing utility line which is damaged, broken, or disturbed. Obtain approval from Project Manager and agency for any repairs or relocations, either temporary or permanent.
- D. Remove existing pavements and structures, including sidewalks and driveways, to conform to requirements of Section 02221 - Removing Existing Pavements and Structures, as applicable.

- E. Install and operate necessary dewatering and surface-water control measures to conform to Section 01578 - Control of Ground Water and Surface Water. Provide stable trench to allow installation in accordance with Specifications.
- F. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed in accordance with Section 01725 - Field Surveying.
- G. Limit concrete removal, pavement removal and dewatering to less than five pipe laying days in advance of pipe laying.

3.03 CRITICAL LOCATION INVESTIGATION

- A. Horizontal and vertical location of various underground lines shown on Drawings, including but not limited to water lines, gas lines, storm sewers, sanitary sewers, telecommunication lines, electric lines or power ducts, pipelines, concrete and debris, are based on best information available but are only approximate locations. Unless otherwise approved by Program Manager, at Critical Locations shown on Drawings, perform vacuum excavation to field verify horizontal and vertical locations of such lines within zone of 2 feet vertically and 4 feet horizontally of proposed work.
 - 1. Verify location of existing utilities minimum of 7 working days in advance of pipe laying activities based on daily pipe laying rate or prior to beginning installation of auger pit or tunnel shaft. Use extreme caution and care when uncovering utilities designated by Critical Locate.
 - 2. Notify Project Manager in writing immediately upon identification of obstruction. In event of failure to identify obstruction in minimum of 7 days, Contractor will not be entitled to extra cost for downtime including, but not limited to, payroll, equipment, overhead, demobilization and remobilization, until 7 days has passed from time Project Manager is notified of obstruction.
- B. Notify involved utility companies of date and time that investigation excavation will occur and request that their respective utility lines be marked in field. Comply with utility or pipeline company requirements that their representative be present during excavation. Provide Project Manager with 48 hours notice prior to field excavation or related work.
- C. Survey vertical and horizontal locations of obstructions relative to project baseline and datum and plot on 12-inch by 18-inch copy of Drawings. For large diameter water lines, submit to Project Manager for approval, horizontal and vertical alignment dimensions for connections to existing lines, tied into project baseline, signed and sealed by R.P.L.S.

3.04 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within grading limits as designated on Drawings, and in accordance with requirements of Section 01562 - Tree and Plant Protection.
- B. Protect and support above-grade and below-grade utilities which are to remain.
- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on Drawings.
- D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements, or areas with loss of density or pavement failures or potholes occur, repair, re-compact, and pave those areas at no additional cost to Owner.

3.05 EXCAVATION

- A. Except as otherwise specified or shown on Drawings, install underground utilities in open cut trenches with vertical sides.
- B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on Drawings. Avoid disturbing surrounding ground and existing facilities and improvements.
- C. Determine trench excavation widths using following schedule as related to pipe outside diameter (O.D.). Excavate trench so that pipe is centered in trench. Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials

Nominal Pipe Size, Inches	Minimum Trench Width, Inches
Less than 18	O.D. + 18
18 to 30	O.D. + 24
36 to 42	O.D. + 36
Greater than 42	O.D. + 48

- D. Use sufficient trench width or benches above embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.
- E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Project Manager and obtain instructions before proceeding.
- F. Shoring of Trench Walls:

1. Install Special Shoring in advance of trench excavation or simultaneously with trench excavation, so that soils within full height of trench excavation walls will remain laterally supported at all times.
 2. For all types of shoring, support trench walls in pipe embedment zone throughout installation. Provide trench wall supports sufficiently tight to prevent washing trench wall soil out from behind trench wall support.
 3. Leave sheeting driven into or below pipe embedment zone in place to preclude loss of support of foundation and embedment materials, unless otherwise directed by Project Manager. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and trench wall in vicinity of pipe zone.
 4. Employ special methods for maintaining integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
 5. If sheeting or other shoring is used below top of pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into embedment zone shall be equivalent of 1-inch-thick steel plate. As sheeting is removed, fill in voids left with grouting material.
- G. Use of Trench Shields: When trench shield (trench box) is used as worker safety device, the following requirements apply:
1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to trench sidewalls.
 2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor degree of compaction reduced. Re-compact after shield is moved if soil is disturbed.
 3. When required, place, spread, and compact pipe foundation and bedding materials beneath shield. For backfill above bedding, lift shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.
 4. Maintain trench shield in position to allow sampling and testing to be performed in safe manner.
 5. Conform to applicable Government regulations.

- H. Voids under paving area outside shield caused by Contractor's work will require removal of pavement, consolidation and replacement of pavement in accordance with Contract Documents. Repair damage resulting from failure to provide adequate supports.
- I. Place sand or soil behind shoring or trench shield to prevent soil outside shoring from collapsing and causing voids under pavement. Immediately pack suitable material in outside voids following excavation to avoid caving of trench walls.
- J. Coordinate excavation within 15 feet of pipeline with company's representative. Support pipeline with methods agreed to by pipeline company's representative. Use small, rubber-tired excavator, such as backhoe, to do exploratory excavation. Bucket that is used to dig in close proximity to pipelines shall not have teeth or shall have guard installed over teeth to approximate bucket without teeth. Excavate by hand within 1 foot of pipeline company's line. Do not use larger excavation equipment than normally used to dig trench in vicinity of pipeline until pipelines have been uncovered and fully exposed. Do not place large excavation and hauling equipment directly over pipelines unless approved by pipeline company's representative.
- K. When, during excavation to uncover pipeline company's pipelines, screwed collar or an oxy-acetylene weld is exposed, immediately notify Project Manager. Provide supports for collar or welds. Discuss with pipeline company's representative and determine methods of supporting collar or weld during excavation and later backfilling operations. When collar is exposed, request pipeline company to provide welder in a timely manner to weld ends of collar prior to backfilling of excavation.

3.06 HANDLING EXCAVATED MATERIALS

- A. Use only excavated materials which are suitable as defined in this Section and conforming to Section 02320 - Utility Backfill Materials. Place material suitable for backfilling in stockpiles at distance from trench to prevent slides or cave-ins.
- B. When required, provide additional backfill material conforming with requirements of Section 02320 - Utility Backfill Materials.
- C. Do not place stockpiles of excess excavated materials on streets and adjacent properties. Protect backfill material to be used on site. Maintain site conditions in accordance with Section 01504 - Temporary Facilities and Controls. Excavate trench so that pipe is centered in trench. Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials.

3.07 TRENCH FOUNDATION

- A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.

- B. When wet soil is encountered on trench bottom and dewatering system is not required, over-excavate an additional 6 inches with approval by Project Manager. Place non-woven geotextile fabric and then compact 12 inches of crushed stone in one lift on top of fabric. Compact crushed stone with four passes of vibratory-type compaction equipment.
- C. Perform over-excavation, if directed by Project Manager, in accordance with Paragraph 3.08B above. Removal of unstable or unsuitable material may be required if approved by Project Manager.
 - 1. Even though Contractor has not determined material to be unsuitable, or
 - 2. If unstable trench bottom is encountered and an adequate ground water control system is installed and operating according to Section 01578 - Control of Ground Water and Surface Water.
- D. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.08 PIPE EMBEDMENT, PLACEMENT, AND COMPACTION

- A. Remove loose, sloughing, caving, or otherwise unsuitable soil from bottoms and sidewalls of trenches immediately prior to placement of embedment materials.
- B. Place embedment including bedding, haunching, and initial backfill as shown on Drawings.
- C. For pipe installation, manually spread embedment materials around pipe to provide uniform bearing and side support when compacted. Protect flexible pipe from damage during placing of pipe zone bedding material. Perform placement and compaction directly against undisturbed soils in trench sidewalls, or against sheeting which is to remain in place.
- D. Do not place trench shields or shoring within height of embedment zone unless means to maintain density of compacted embedment material are used. If moveable supports are used in embedment zone, lift supports incrementally to allow placement and compaction of material against undisturbed soil.
- E. Place geotextile to prevent particle migration from in-situ soil into open-graded (Class I) embedment materials or drainage layers.
- F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

- G. Place haunching material manually around pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside pipe with sandbags or other suitable means.
- H. Place electrical conduit, if used, directly on foundation without bedding.
- I. Shovel in-place and compact embedment material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Water tamping is not allowed.
- J. For water lines construction embedment, use bank run sand, concrete sand, gem sand, pea gravel, or crushed limestone as specified in Section 02320 - Utility Backfill Material. Adhere to the following subparagraph numbers 1 and 2.
 - 1. Class I, II and III Embedment Materials:
 - a. Maximum 6 inches compacted lift thickness.
 - b. Compact to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D 698.
 - c. Moisture content to be within -3 percent to +5 percent of optimum as determined according to ASTM D 698, unless otherwise approved by Project Manager.
 - 2. Cement Stabilized Sand (where required for special installations):
 - a. Maximum 6 inches compacted thickness.
 - b. Compact to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D 698.
 - c. Moisture content to be on dry side of optimum as determined according to ASTM D 698 but sufficient for effective hydration.
- K. For Sanitary Sewers adhere to subparagraph number 1 and 2. For Storm Sewers provide cement stabilized sand per paragraph 2. This provision does not apply to storm Sewers constructed of HDPE pipe installed under pavement.
 - 1. Class I Embedment Materials.
 - a. Maximum 6 inches compacted lift thickness.
 - b. Systematic compaction by at least two passes of vibrating equipment. Increase compaction effort as necessary to effectively embed pipe to meet deflection test criteria.

- c. Moisture content as determined by Contractor for effective compaction without softening soil of trench bottom, foundation or trench walls.
 - 2. Class II Embedment and Cement Stabilized Sand.
 - a. Maximum 6 inches compacted thickness.
 - b. Compaction by methods determined by Contractor to achieve minimum of 95 percent of maximum dry density as determined according to ASTM D 698 for Class II materials and according to ASTM D 558 for cement stabilized materials.
 - c. Moisture content of Class II materials within 3 percent of optimum as determined according to ASTM D 698. Moisture content of cement stabilized sands on dry side of optimum as determined according to ASTM D 558 but sufficient for effective hydration.
 - L. For Storm Sewers constructed of HDPE pipe and installed under pavement provide flowable fill pipe embedment as specified in Section 02322 Flowable Fill.
 - M. Place trench dams in Class I embedment in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.
- 3.09 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION
- A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only minimum length of trench open as necessary for construction.
 - B. For water lines, backfill in trench zone, including auger pits, intermediate and site pits, with bank run sand, select fill, or random backfill material as specified in Section 02320 – Utility Backfill materials.
 - C. For sewer pipes (Storm and Sanitary), use backfill materials described by trench limits. For “trench zone backfill” under pavement and to within one foot back of curb, use cement stabilized sand for pipes of nominal sizes 36 inches in diameter and smaller to level 12 inches below the pavement. For sewer pipes 42 inches in diameter and larger, under pavement or natural ground, in satisfactory soil conditions, backfill from 12 inches above top of pipe to 12 inches below pavement with suitable on-site material or select backfill. For sewer pipes 42 inches in diameter and larger, under pavement or natural ground, in unsatisfactory soil conditions, backfill from 12 inches above top of pipe to 12 inches below pavement with suitable on-site material or select backfill. Use select backfill for rigid pavement or flexible base material for asphalt pavements for 12-inch backfill directly under pavement. For backfill materials reference Section 02320 – Utility

Backfill Materials. This provision does not apply where a Storm Sewer is constructed of HDPE pipe.

- D. For Storm Sewers constructed of HDPE pipe and installed under pavement provide flowable fill as specified in Section 02322 Flowable Fill. For Storm Sewers constructed of HDPE pipe and not installed under pavement provide cement stabilized sand.
- E. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave sheeting in place. Cut off sheeting 1.5 feet or more above crown of pipe. Remove trench supports within 5 feet from ground surface.
- F. Place trench zone backfill in lifts and compact. Fully compact each lift before placement of next lift.
 - 1. Class I, II, III or IV or combination thereof (Random Backfill):
 - a. Maximum 9-inches compacted lift thickness.
 - b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D 698.
 - c. Moisture content within zero percent to +5 percent of optimum determined according to ASTM D 698, unless otherwise approved by Project Manager.
 - 2. Cement-Stabilized Sand:
 - a. Maximum lift thickness determined by Contractor to achieve uniform placement and required compaction, but do not exceed 12 inches.
 - b. Compact by vibratory equipment to minimum of 95 percent of maximum dry density determined according to ASTM D 538.
 - c. Moisture content on dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.
 - 3. Select Backfill:
 - a. Place in maximum 8-inch thick loose lifts.
 - b. Compaction by equipment providing tamping or kneading impact to minimum of 95 percent of maximum dry density determined according to ASTM D 698..

- c. Moisture content within 2 percent to +5 percent above optimum determined according to ASTM D 698, unless approved by Project Manager.
- G. Unless otherwise shown on Drawings, for trench excavations not under pavement, random backfill of suitable material may be used in trench zone. This provision does not apply to HDPE storm sewers.
 - 1. Fat clays (CH) may be used as trench zone backfill outside paved areas at Contractor's option. When required density is not achieved, at an additional cost to Owner, rework, dry out, use lime stabilization or other approved methods to achieve compaction requirements or use different suitable material.
 - 2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.
 - 3. Compact to minimum of 90 percent of maximum dry density determined according to ASTM D 698.
 - 4. Moisture content as necessary to achieve density.
- H. For electric conduits, remove form work used for construction of conduits before placing trench zone backfill.

3.10 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

- A. Meet requirements of adjoining utility installations for backfill of pipeline structures, as shown on Drawings.
- B. Below paved areas, encapsulate manhole with cement stabilized sand; minimum of 1 foot below base, minimum 1 foot around walls, up to within 12 inches of pavement subgrade. Compact in accordance with Paragraph 3.10F.2 of this Section.
- C. In unpaved areas, use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on Drawings. Deposit backfill in uniform layers and compact each layer as specified. Maintain backfill material at no less than 2 percent below nor more than 5 percent above optimum moisture content, unless otherwise approved by Project Manger. Place fill material in uniform 8-inch maximum loose layers. Compact fill to at least 95 percent of maximum Standard Proctor Density according to ASTM D 698.

3.11 FIELD QUALITY CONTROL

- A. Test for material source qualifications as defined in Section 02320 - Utility Backfill Materials.

- B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction at no additional cost to Owner.
- C. Tests will be performed on minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is noticeable change in material gradation or plasticity, or when requested by Project Manager.
- D. At least three tests for moisture-density relationships will be performed initially for backfill materials in accordance with ASTM D 698, and for cement- stabilized sand in accordance with ASTM D 558. Perform additional moisture-density relationship tests once a month or whenever there is noticeable change in material gradation or plasticity.
- E. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at following frequencies and conditions.
 - 1. For open-cut construction projects and auger pits: Unless otherwise approved by Project Manager, successful compaction to be measured by one test per 40 linear feet measured along pipe for compacted embedment and two tests per 40 linear feet measured along pipe for compacted trench zone backfill material. Length of auger pits to be measured to arrive at 40 linear feet.
 - 2. A minimum of three density tests for each full shift of Work.
 - 3. Density tests will be distributed among placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.
 - 4. The number of tests will be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.
 - 5. Density tests may be performed at various depths below fill surface by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.
 - 6. Two verification tests will be performed adjacent to in-place tests showing density less than acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.
 - 7. Recompacted placement will be retested at same frequency as first test series, including verification tests.
 - 8. Identify elevation of test with respect to natural ground or pavement.

- F. Recondition, recompact, and retest at Contractor's expense if tests indicate Work does not meet specified compaction requirements. For hardened soil cement with nonconforming density, core and test for compressive strength at Contractor's expense.
- G. Acceptability of crushed rock compaction will be determined by inspection.

3.12 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess materials in accordance with requirements of Section 01576 - Waste Material Disposal.

END OF SECTION

Section 02318

EXTRA UNIT PRICE WORK FOR EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Measurement and payment applicable to extra unit price work items for excavation and backfill made necessary by unusual or unforeseen circumstances encountered during utility installations.
- B. Extra unit price work for excavation and backfill is paid only when authorized in advance by Project Manager.

1.02 UNIT PRICES

- A. Excavation Around Obstructions: Payment for excavation around obstructions is on cubic yard basis, measured in place, without deduction for volume occupied by portions of pipes, ducts, or other structures left in place across trenches excavated under this item.
- B. Extra Hand Excavation: Payment for extra hand excavation is on cubic yard basis, measured in place.
- C. Extra Machine Excavation: Payment for extra machine excavation is on cubic yard basis, measured in place.
- D. Extra Placement of Backfill Material: Payment for extra placement of backfill material is on cubic yard basis, measured in place, for material installed as part of Work. At discretion of Project Manager, measurement of cubic yards may be calculated from volume of Extra Hand Excavation or Extra Machine Excavation for which replacement is made, minus volume of any Extra Placement of Granular Backfill authorized in conjunction with Work.
- E. Extra Placement of Granular Backfill: Payment for extra placement of granular backfill material is on cubic yard basis, measured in place.
- F. No separate payment will be made for surface water control, groundwater control, or for excavation drainage. Refer to Section 01270 - Measurement and Payment for unit price procedures.

1.03 DEFINITIONS

- A. Excavation Around Obstructions: Excavation necessitated by obstruction of pipes (other than service connections 3 inches in diameter or less), ducts, or other structures, not shown on Drawings, and of an unusual or unforeseen nature which

interfere with installation of utility piping by normal methods of excavation or auguring.

- B. Extra Hand Excavation: Excavation by manual labor made necessary by unusual or unforeseen circumstances at locations approved in advance by Project Manager.
- C. Extra Machine Excavation: Excavation by machine at or near project site to perform related work not included in original project scope but added for convenience of Owner, as approved in advance by Project Manager.
- D. Extra Replacement of Backfill Material: Handling, backfill, and compaction of excavated material authorized under extra work bid items for Extra Hand Excavation or Extra Machine Excavation. Placement and compaction shall conform to requirements specified for excavation and backfill in Division 2 - Site Work.
- E. Extra Placement of Granular Backfill: Hauling, placing, and compacting granular backfill materials as approved by Project Manager in conjunction with Extra Replacement of Backfill Material. Materials placed under this item shall conform to requirements for Bank Run Sand, Cement Stabilized Sand, Concrete Sand, Gem Sand, Crushed Stone, or Crushed Concrete specified for backfill material in Division 2 - Site Work.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 02320

UTILITY BACKFILL MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Material Classifications.

B. Utility Backfill Materials:

1. Concrete sand.
2. Gem sand.
3. Pea gravel.
4. Crushed stone.
5. Crushed concrete.
6. Bank run sand.
7. Select backfill.
8. Random backfill.
9. Material Handling and Quality Control Requirements.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No payment will be made for backfill material. Include payment in unit price for applicable utility installation.
2. Payment for backfill material, when included as separate pay item or when directed by Project Manager, is on cubic yard basis for material placed and compacted within theoretical trench width limits and thickness of material according to Drawings, or as directed by Project Manager.
3. Payment for backfill of authorized over-excavation is in accordance with Section 02318 - Extra Unit Price Work for Excavation and Backfill.
4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

A. Unsuitable Material:

1. Materials classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
2. Materials that cannot be compacted to required density due to gradation, plasticity, or moisture content.
3. Materials containing large clods, aggregates, or stones greater than 4 inches in any dimension; debris, vegetation, or waste; or any other deleterious materials.
4. Materials contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material:

1. Materials meeting specification requirements.
2. Unsuitable materials meeting specification requirements for suitable soils after treatment with lime or cement.

C. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

D. Foundation Base: Crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab. Foundation base provides smooth, level working surface for construction of concrete foundation.

E. Backfill Material: Classified soil material meeting specified quality requirements for designated application as embedment or trench zone backfill.

F. Embedment Material: Soil material placed under controlled conditions within embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching and initial backfill.

G. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in trench zone from top of

embedment zone to base course in paved areas or to surface grading material in unpaved areas.

- H. Foundation: Either suitable soil of trench bottom or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.
- I. Source: Source selected by Contractor for supply of embedment or trench zone backfill material. Selected source may be project excavation, off-site borrow pits, commercial borrow pits, or sand and aggregate production or manufacturing plants.
- J. Refer to Section 02317 - Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.04 REFERENCES

- A. ASTM C 33 - Standard Specification for Concrete Aggregate.
- B. ASTM C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
- C. ASTM C 123 - Standard Test Method for Lightweight Particles in Aggregate.
- D. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in Los Angeles Machine.
- E. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. ASTM C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
- G. ASTM D 1140 - Standard Test Method for Amount of Material in Soils Finer Than No. 200 Sieve.
- H. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- I. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- J. ASTM D 4643 - Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.
- K. TxDOT Tex-110-E - Determining Particle Size Analysis of Soils.

- L. TxDOT Tex-460-A - Material Finer Than 75 Φ m (No.200) Sieve in Mineral Aggregates (Decantation Test for Concrete Aggregates).

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit description of source, material classification and product description, production method, and application of backfill materials.
- C. Submit test results for samples of off-site backfill materials. Comply with Paragraph 2.03, Material Testing.
- D. Before stockpiling materials, submit copy of approval from landowner for stockpiling backfill material on private property.
- E. Provide delivery ticket which includes source location for each delivery of material that is obtained from off-site sources or is being paid as specific bid item.

1.06 TESTS

- A. Perform tests of sources for backfill material in accordance with Paragraph 2.03B.
- B. Verification tests of backfill materials may be performed by Owner in accordance with Section 01454 - Testing Laboratory Services and in accordance with Paragraph 3.03.

PART 2 PRODUCTS

2.01 MATERIAL CLASSIFICATIONS

- A. Classify materials for backfill for purpose of quality control in accordance with Unified Soil Classification Symbols as defined in ASTM D 2487. Material use and application is defined in utility installation specifications and Drawings either by class, as described in Paragraph 2.01B, or by product descriptions, as given in Paragraph 2.02.
- B. Class Designations Based on Laboratory Testing:
 - 1. Class I: Well-graded gravels and sands, gravel-sand mixtures, crushed well-graded rock, little or no fines (GW, SW):
 - a. Plasticity index: non-plastic.
 - b. Gradation: D_{60}/D_{10} - greater than 4 percent; amount passing No. 200 sieve - less than or equal to 5 percent.

2. Class II: Poorly graded gravels and sands, silty gravels and sands, little to moderate fines (GM, GP, SP, SM):
 - a. Plasticity index: non-plastic to 4.
 - b. Gradations:
 - 1) Gradation (GP, SP): amount passing No. 200 sieve - less than 5 percent.
 - 2) Gradation (GM, SM): amount passing No. 200 sieve - between 12 percent and 50 percent.
 - 3) Borderline gradations with dual classifications (e.g., SP-SM): amount passing No. 200 sieve - between 5 percent and 12 percent.
3. Class III: Clayey gravels and sands, poorly graded mixtures of gravel, sand, silt, and clay (GC, SC, and dual classifications, e.g., SP-SC):
 - a. Plasticity index: greater than 7.
 - b. Gradation: amount passing No. 200 sieve - between 12 percent and 50 percent.
4. Class IVA: Lean clays (CL).
 - a. Plasticity Indexes:
 - 1) Plasticity index: greater than 7, and above A line.
 - 2) Borderline plasticity with dual classifications (CL-ML): PI between 4 and 7.
 - b. Liquid limit: less than 50.
 - c. Gradation: amount passing No. 200 sieve - greater than 50 percent.
 - d. Inorganic.
5. Class IVB: Fat clays (CH).
 - a. Plasticity index: above A line.
 - b. Liquid limit: 50 or greater.
 - c. Gradation: amount passing No. 200 sieve - greater than 50 percent.
 - d. Inorganic.

6. Use soils with dual class designation according to ASTM D 2487, and which are not defined above, according to more restrictive class.

2.02 PRODUCT DESCRIPTIONS

- A. Soils classified as silt (ML), silty clay (CL-ML with PI of 4 to 7), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in unimproved areas as approved by Project Manager. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
- B. Provide backfill material that is free of stones greater than 6 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to following limits for deleterious materials:
 1. Clay Lumps: Less than 0.5 percent for Class I, and less than 2.0 percent for Class II, when tested in accordance with ASTM C 142.
 2. Lightweight Pieces: Less than 5 percent when tested in accordance with ASTM C 123.
 3. Organic Impurities: No color darker than standard color when tested in accordance with ASTM C 40.
- C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in product specification, and approved by Project Manager, provided that physical property criteria are determined to be satisfactory by testing.
- D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by Unified Soil Classification System (ASTM D 2487) meeting following requirements:
 1. Less than 15 percent passing number 200 sieve when tested in accordance with ASTM D 1140. Amount of clay lumps or balls may not exceed 2 percent.
 2. Material passing number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318: Plasticity index: not exceeding 7.
- E. Concrete Sand: Natural sand, manufactured sand, or combination of natural and manufactured sand conforming to requirements of ASTM C 33 and graded within following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

- F. Gem Sand: Sand conforming to requirements of ASTM C 33 for coarse aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	95 to 100
No. 4	60 to 80
No. 8	15 to 40

- G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

- H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:

1. Materials of one product delivered for same construction activity from single source, unless otherwise approved by Project Manager.
2. Non-plastic fines.
3. Los Angeles abrasion test wear not exceeding 45 percent when tested in accordance with ASTM C 131.
4. Crushed aggregate shall have minimum of 90 percent of particles retained on No. 4 sieve with 2 or more crushed faces as determined by Tex-460-A, Part I.
5. Crushed Stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from naturally

occurring single source. Uncrushed gravel is not acceptable material for embedment where crushed stone is shown on applicable utility embedment drawing details.

- 6. **Crushed Concrete:** Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate), or debris.
- 7. **Gradations,** as determined in accordance with Tex-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipes Sizes		
	>15"	15" - 8"	<8"
1"	95 - 100	100	-
3/4"	60 - 90	90 - 100	100
1/2"	25 - 60	-	90 - 100
3/8"	-	20 - 55	40 - 70
No. 4	0 - 5	0 - 10	0 - 15
No. 8	-	0 - 5	0 - 5

- I. **Select Backfill:** Class III clayey gravel or sand or Class IV lean clay with plasticity index between 7 and 20 or clayey soils treated with lime in accordance with Section 02951 - Pavement Repair and Resurfacing, to meet plasticity criteria.
- J. **Random Backfill:** Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
- K. **Cement Stabilized Sand:** Conform to requirements of Section 02321 - Cement Stabilized Sand.
- L. **Concrete Backfill:** Conform to Class B concrete as specified in Section 03315 - Concrete for Utility Construction.
- M. **Flexible Base Course Material:** Conform to requirements of applicable portions of Section 02711 - Hot-Mix Asphaltic Base Course, Section 02712 - Cement Stabilized Base Course, and Section 02713 - Crushed Concrete Base Course.

2.03 MATERIAL TESTING

- A. Source Qualification: Perform testing to obtain tests by suppliers for selection of material sources and products not from the project site. Test samples of processed materials from current production representing material to be delivered. Use tests to verify that materials meet specification requirements. Repeat qualification test procedures each time source characteristics change or there is planned change in source location or supplier. Include the following qualification tests, as applicable:
 - 1. Gradation: Report complete sieve analyses regardless of specified control sieves from largest particle through No. 200 sieve.
 - 2. Plasticity of material passing No. 40 sieve.
 - 3. Los Angeles abrasion wear of material retained on No. 4 sieve.
 - 4. Clay lumps.
 - 5. Lightweight pieces.
 - 6. Organic impurities.
- B. Production Testing: Provide reports to Project Manager from an independent testing laboratory that backfill materials to be placed in Work meet applicable specification requirements.
- C. Assist Project Manager in obtaining material samples for verification testing at source or at production plant.

PART 3 EXECUTION

3.01 SOURCES

- A. Use of existing material in trench excavations is acceptable, provided applicable specification requirements are satisfied.
- B. Identify off-site sources for backfill materials at least 14 days ahead of intended use so that Project Manager may obtain samples for verification testing.
- C. Materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet requirements of specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once material is approved by Project Manager, expense for sampling and testing required to change to different material will be credited to Owner through change order.
- D. Bank run sand, select backfill, and random backfill, if available in project excavation, may be obtained by selective excavation and acceptance testing.

Obtain additional quantities of these materials and other materials required to complete work from off-site sources.

- E. Owner does not represent or guarantee that any soil found in excavation work will be suitable and acceptable as backfill material.

3.02 MATERIAL HANDLING

- A. When backfill material is obtained from either commercial or non-commercial borrow pit, open pit to expose vertical faces of various strata for identification and selection of approved material to be used. Excavate selected material by vertical cuts extending through exposed strata to achieve uniformity in product.
- B. Establish temporary stockpile locations for practical material handling, control, and verification testing by Project Manager in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.
- C. When stockpiling backfill material near project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering drainage system.
- D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.03 FIELD QUALITY CONTROL

- A. Quality Control:
 - 1. The Project Manager may sample and test backfill at:
 - a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
 - b. On-site stockpiles.
 - c. Materials placed in Work.
 - 2. The Project Manager may re-sample material at any stage of work or location if changes in characteristics are apparent.
- B. Production Verification Testing: Owner's testing laboratory will provide verification testing on backfill materials, as directed by Project Manager. Samples may be taken at source or at production plant, as applicable.

END OF SECTION

Section 02321

CEMENT STABILIZED SAND

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cement stabilized sand.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:

1. No separate payment will be made for Work performed under this Section. Include cost of such work in Contract unit prices for items listed in bid form requiring cement stabilized sand.
2. Refer to Paragraph 3.04 for material credit.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 33 - Standard Specification for Concrete Aggregates (Fine Aggregate).
- B. ASTM C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
- C. ASTM C 42 - Standard Test Methods for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- D. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
- E. ASTM C 123 - Standard Test Method for Lightweight Particles in Aggregate.
- F. ASTM C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
- G. ASTM C 150 - Specification for Portland Cement.
- H. ASTM D 558 - Standard Test Method for Moisture-Density Relations of Soil Cement-Mixtures.

- I. ASTM D 1632 - Standard Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory.
 - J. ASTM D 1633 - Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
 - K. ASTM D 2487 - Standard Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - L. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - M. ASTM D 3665 - Standard Practice for Random Sampling of Construction Materials.
 - N. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- 1.04 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
 - B. Submit proposed target cement content and production data for sand-cement mixture in accordance with requirements of Paragraph 2.03, Materials Qualifications.
- 1.05 DESIGN REQUIREMENTS
- A. Use sand-cement mixture producing minimum unconfined compressive strength of 100 pounds per square inch (psi) in 48 hours.
 - 1. Design will be based on strength specimens molded in accordance with ASTM D 558 at moisture content within 3 percent of optimum and within 4 hours of batching.
 - 2. Determine minimum cement content from production data and statistical history. Provide no less than 1.1 sacks of cement per ton of dry sand.
 - 3. Where potable water lines cross wastewater lines, embed wastewater line with cement stabilized sand in accordance with Texas Administrative Code §290.44(e)(4)(B):
 - a. Provide minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume. Use at least 2.5 bags of cement per cubic yard of mixture (2 sacks per ton of dry sand). Minimum compressive strength to be 250 psi in 48 hours.

- b. Unless otherwise shown on Drawings, embed wastewater main or lateral minimum of six inches above and below.
- c. Use brown coloring in cement stabilized sand for wastewater main or lateral bedding for identification of pressure rated wastewater mains during future construction.
- d. Design of will be based on strength specimens molded in accordance with ASTM D 558 at moisture content within 3 percent of optimum and within 4 hours of batching.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Type I Portland cement conforming to ASTM C 150.
- B. Sand: Clean, durable sand meeting grading requirements for fine aggregates of ASTM C 33, or requirements for bank run sand of Section 02320 - Utility Backfill Materials, and the following requirements:
 - 1. Classified as SW, SP, SW-SM, SP-SM, or SM by Unified Soil Classification System of ASTM D 2487.
 - 2. Deleterious Materials:
 - a. Clay lumps, ASTM C 142 - less than 0.5 percent.
 - b. Lightweight pieces, ASTM C 123 - less than 5.0 percent.
 - c. Organic impurities, ASTM C 40, color no darker than standard color.
 - 3. Plasticity index of 4 or less when tested in accordance with ASTM D 4318.
- C. Water: Potable water, free of oils, acids, alkalies, organic matter or other deleterious substances, meeting requirements of ASTM C 94.

2.02 MIXING MATERIALS

- A. Add required amount of water and mix thoroughly in pugmill-type mixer.
- B. Stamp batch ticket at plant with time of loading. Reject material not placed and compacted within 4 hours after mixing.

2.03 MATERIAL QUALIFICATION

- A. Determine target cement content of material as follows:
1. Obtain samples of sand-cement mixtures at production facility representing range of cement content consisting of at least three points.
 2. Complete molding of samples within 4 hours after addition of water.
 3. Perform strength tests (average of two specimens) at 48 hours and 7 days.
 4. Perform cement content tests on each sample.
 5. Perform moisture content tests on each sample.
 6. Plot average 48-hour strength vs. cement content.
 7. Record scale calibration date, sample date, sample time, molding time, cement feed dial settings, and silo pressure (if applicable).
- B. Test raw sand for following properties at point of entry into pug-mill:
1. Gradation.
 2. Plasticity index.
 3. Organic impurities.
 4. Clay lumps and friable particles.
 5. Lightweight pieces.
 6. Moisture content.
 7. Classification.
- C. Present data obtained in format similar to that provided in sample data form attached to this Section.
- D. The target content may be adjusted when statistical history so indicates. For determination of minimum product performance use formula:

$f'_c + 1/2$ standard deviation

PART 3 EXECUTION

3.01 PLACING

- A. Place sand-cement mixture in maximum 12-inch-thick loose lifts and compact to 95 percent of maximum density as determined in accordance with ASTM D 558,

unless otherwise specified. Refer to related specifications for thickness of lifts in other applications. Target moisture content during compaction is ± 3 percent of optimum. Perform and complete compaction of sand-cement mixture within 4 hours after addition of water to mix at plant.

- B. Do not place or compact sand-cement mixture in standing or free water.

3.02 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.
- B. One sample of cement stabilized sand shall be obtained for each 150 tons of material placed per day with no less than one sample per day of production. Random samples of delivered cement stabilized sand shall be taken in the field at point of delivery in accordance with ASTM D 3665. Obtain three individual samples of approximately 12 to 15 lbs. each from the first, middle, and last third of the truck and composite them into one sample for test purpose.
- C. Prepare and mold four specimens (for each sample obtained) in accordance with ASTM D 558, Method A, without adjusting moisture content. Samples will be molded at approximately same time material is being used, but no later than 4 hours after water is added to mix.
- D. After molding, specimens will be removed from molds and cured in accordance with ASTM D 1632.
- E. Specimens will be tested for compressive strength in accordance with ASTM D 1633, Method A. Two specimens will be tested at 48 hours plus or minus 2 hours and two specimens will be tested at 7 days plus or minus 4 hours.
- F. A strength test will be average of strengths of two specimens molded from same sample of material and tested at same age. Average daily strength will be average of strengths of all specimens molded during one day's production and tested at same age.
- G. Precision and Bias: Test results shall meet recommended guideline for precision in ASTM D 1633 Section 9.
- H. Reporting: Test reports shall contain, as a minimum, the following information:
 - 1. Supplier and plant number.
 - 2. Time material was batched.
 - 3. Time material was sampled.
 - 4. Test age (exact hours).

5. Average 48-hour strength.
6. Average 7-day strength.
7. Specification section number.
8. Indication of compliance / non-compliance.
9. Mixture identification.
10. Truck and ticket numbers.
11. The time of molding.
12. Moisture content at time of molding.
13. Required strength.
14. Test method designations.
15. Compressive strength data as required by ASTM D 1633.
16. Supplier mixture identification.
17. Specimen diameter and height, in.
18. Specimen cross-sectional area, sq. in.

3.03 ACCEPTANCE

- A. Strength level of material will be considered satisfactory if:
 1. The average 48-hour strength is greater than 100 psi with no individual strength test below 70 psi.
 2. All 7-day individual strength tests (average of two specimens) are greater than or equal to 100 psi.
- B. Material will be considered deficient when 7-day individual strength test (average of two specimens) is less than 100 psi but greater than 70 psi. See Paragraph 3.04 Adjustment for Deficient Strength.
- C. The material will be considered unacceptable and subject to removal and replacement at Contractor's expense when individual strength test (average of two specimens) has 7-day strength less than 70 psi.
- D. When moving average of three daily 48-hour averages falls below 100 psi, discontinue shipment to project until plant is capable of producing material, which

exceeds 100 psi at 48 hours. Five 48-hour strength tests shall be made in this determination with no individual strength tests less than 100 psi.

- E. Testing laboratory shall notify Contractor, Project Manager, and material supplier by facsimile of tests indicating results falling below specified strength requirements within 24 hours.
- F. If any strength test of laboratory cured specimens falls below the specified strength, Contractor may, at his own expense, request test of cores drilled from the area in question in accordance with ASTM C 42. In such cases, three (3) cores shall be taken for each strength test that falls below the values given in 3.03A.
- G. Cement stabilized sand in an area represented by core tests shall be considered satisfactory if the average of three (3) cores is equal to at least 100 psi and if no single core is less than 70 psi. Additional testing of cores extracted from locations represented by erratic core strength results will be permitted.

3.04 ADJUSTMENT FOR DEFICIENT STRENGTH

- A. When mixture produces 7-day compressive strength greater than or equal to 100 psi, then material will be considered satisfactory and bid price will be paid in full.
- B. When mixture produces 7-day compressive strength less than 100 psi and greater than or equal to 70 psi, material shall be accepted contingent on credit in payment. Compute credit by the following formula:

$$\text{Credit per Cubic Yard} = \frac{\$30.00 \times 2 (100 \text{ psi} - \text{Actual psi})}{100}$$

- C. When mixture produces 7-day compressive strength less than 70 pounds per square inch, then remove and replace cement-sand mixture and paving and other necessary work at no cost to Owner.

END OF SECTION

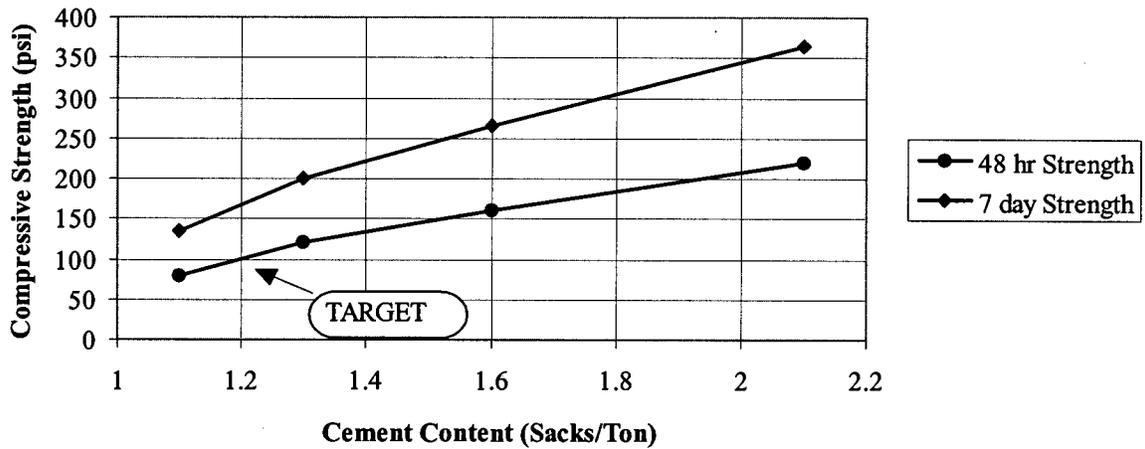
Supplier: Authority Stabilized Sand	Plant No: 1 - Main Street	Date of Tests: January 1, 1997
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Item	Raw Sand	1.1 Sack	100 psi	1.5 Sack	2.0 Sack
Moisture Content	10.9	15.7	14.0	13.8	13.7
Cement Feed Dial Setting	—	2.25	2.5	2.75	3.75
Silo Pressure (psi)	—	4	4	4	4
Batch Time	10:00	10:10	10:15	10:20	10:25
Sample Time	—	10:10	10:15	10:20	10:25
Molding Time	—	12:30	12:45	1:00	1:15
Cement Content (sacks/ton)	—	1.1	1.3	1.6	2.1
Compressive Strength at 48 hrs. (avg of 2)	—	80	120	160	220
Compressive Strength at 7 days (avg of 2)	—	135	200	265	365

Sieve size	Percent Passing	Spec. Section 02320
3/8 Inch	100	—
No. 16	100	—
No. 40	100	—
No. 50	99	—
No. 100	41	—
No. 200	11	0 to 15

Raw Sand Tests	Result	Authority
Plasticity Index	Non-Plastic	4 Maximum
Organic Impurities	Passing	No Darker Than
Clay Lumps & Friable Parts (%)	0.0	0.5 % Maximum
Lightweight Pieces (%)	0.0	5.0 % Maximum
Classification	SP-SM	SW, SP, SW-SM, SP-SM, SM

Compressive Strength vs Cement Content



Section 02330

EMBANKMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction of embankments with excess excavated material and borrow.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:

- 1. No separate payment will be made for embankment under this section. Include payment in unit price for excavation or borrow.
- 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- B. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- C. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to Section 02315 - Roadway Excavation for acceptable excess materials from roadway excavation.
- B. Refer to Section 02317 - Excavation and Backfill for Utilities for acceptable excess materials from utility excavation and trenching.
- C. Refer to Section 02319 - Borrow for acceptable borrow materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify borrow and excess excavated materials to be reused are approved.
- B. Verify removals and clearing and grubbing operations have been completed.

3.02 PREPARATION

- A. Backfill test pits, stump holes, small swales and other surface irregularities. Backfill and compact in designated lift depths to requirements for embankment compaction.
- B. Record location and plug and fill inactive water and oil wells. Conform to Texas State Health Department, Texas Commission on Environmental Quality, and Texas Railroad Commission requirements. Notify Project Manager prior to plugging wells.
- C. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02316 - Excavation and Backfill for Structures and Section 02320 - Utility Backfill Materials.
- D. Backfill new utilities below future grade. Conform to requirements of Sections 02317 - Excavation and Backfill for Utilities, 02511 - Water Lines, 02531 - Gravity Sanitary Sewers, and 02532 - Sanitary Sewage Force Mains.

3.03 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other features outside of embankment limits.
- B. Protect utilities above and below grade, which are to remain.
- C. Conform to protection requirements of Section 02315 - Roadway Excavation.

3.04 PLACING EMBANKMENT

- A. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed 3 percent of optimum moisture content. Contractor may manipulate wet material to facilitate drying, by disking or windrowing.
- B. Do not place embankment fill until density and moisture content of previously placed material comply with specified requirements.
- C. Scarify areas to be filled to minimum depth of 4 inches to bond existing and new materials. Mix with first fill layer.

- D. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Extend each layer across full width of fill.
- E. Each layer shall be homogeneous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.
- F. Layers shall not exceed the following compacted thickness:
 - 1. Areas indicated to be under future paving or shoulders, to be constructed within 6 months: 6 inches when compacted with pneumatic rollers, or 8 inches when compacted with other rollers.
 - 2. Other areas: 12 inches.
- G. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to level of each bench.
- H. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of 4 inches and recompact with next fill layer.
- I. Construct to lines and grades shown on Drawings.
- J. Remove unsuitable material and excess soil not being used for embankment from site in accordance with requirements of Section 01576 - Waste Material Disposal.
- K. Maintain moisture content of embankment materials to attain required density.
- L. Compact to following minimum densities at moisture content of optimum to 3 percent above optimum as determined by ASTM D 698, unless otherwise indicated on Drawings:
 - 1. Areas under future paving and shoulders: Minimum density of 95 percent of maximum dry density.
 - 2. Other areas: Minimum density of 90 percent of maximum dry density.

3.05 TOLERANCES

- A. Top of compacted surface: Plus or minus 1/2 inch in cross section or 16-foot length.

3.06 FIELD QUALITY CONTROL

- A. Compaction Testing will be performed in accordance with ASTM D 698 or ASTM D 2922 and ASTM D 3017 under provisions of Section 01454 - Testing Laboratory Services.
- B. A minimum of three tests will be taken for each 1000 linear feet per lane of roadway or 500 square yards of embankment per lift.
- C. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at no cost to Owner.

END OF SECTION

Section 02336

LIME-STABILIZED SUBGRADE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foundation course of lime-stabilized subgrade material.
 - 1. Application of lime slurry to subgrade.
 - 2. Mixing, compaction, and curing of lime slurry, water, and subgrade into a stabilized foundation.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. Measurement and payment for lime-stabilized subgrade is on per ton basis compacted in place to proper density. Separate measurement will be made for each required thickness of subgrade course.
 - a. Limits of measurement shall match actual pavement replaced, but no greater than maximum pavement replacement limits shown on Drawings. Limits for measurement will be extended to include installed lime stabilized subgrade material that extends 1 foot beyond outside edge of pavement to be replaced, except where proposed pavement section shares common longitudinal or transverse edge with existing pavement section. No payment will be made for lime stabilized subgrade in areas beyond these limits.
 - b. Limits of measurement and payment shall match pavement replacement limits shown on Drawings, except as noted in Paragraph 1.02.A.1.a, or as approved by Owner's Engineer.
 - 2. Measurement and payment for lime is by ton of 2,000 pounds dry weight basis. Calculate weight of dry solids for lime slurry based on percentage by dry weight solids.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

- A. Moist Cure: Curing soil and lime to obtain optimum hydration.

- B. 1,000-Foot Roadway Section: 1,000 feet per lane width or approximately 500 square yards of compacted subgrade for other than full-lane-width roadway sections.

1.04 REFERENCES

- A. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- B. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- C. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- D. TxDOT Tex-101-E (Part III) - Preparation of Soil and Flexible Base Material for Testing.
- E. TxDOT Tex-140-E - Measuring Thickness of Pavement Layer.
- F. TxDOT Tex-600-J - Sampling and Testing Hydrated Lime, Quicklime, and Commercial Lime Slurry.

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit certification that hydrated lime, quicklime, or commercial lime slurry complies with specifications.
- C. Submit weight tickets, certified by supplier, with each bulk delivery of lime to work site.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Bagged lime shall bear manufacturer's name, product identification, and certified weight. Bags varying more than 5 percent of certified weight may be rejected; average weight of 50 random bags in each shipment shall not be less than certified weight.
- B. Store lime in weatherproof enclosures. Protect lime from ground dampness.

PART 2 PRODUCTS

2.01 WATER

Use clean, clear water, free from oil, acids, alkali, or vegetation.

2.02 LIME

- A. Type A - Hydrated Lime: Dry material consisting essentially of calcium hydroxide or mixture of calcium hydroxide and an allowable percentage of calcium oxide as listed in chemical composition chart.
- B. Type B - Commercial Lime Slurry: Liquid mixture consisting essentially of lime solids and water in slurry form. Water or liquid portion shall not contain dissolved material in sufficient quantity to be injurious or objectionable for purpose intended.
- C. Type C - Quicklime: Dry material consisting essentially of calcium oxide. Furnish quicklime in either of the following grades:
 - 1. Grade DS: Pebble quicklime of gradation suitable for use in preparation of slurry for wet placing.
 - 2. Grade S: Finely-graded quicklime for use in preparation of slurry for wet placing. Do not use grade S quicklime for dry placing.
- D. Conform to the following requirements:

CHEMICAL COMPOSITION	TYPE		
	A	B	C
Active lime content, % by weight Ca(OH) ₂ +CaO	90.0 min ¹	87.0 min ²	-
Unhydrated lime content, % by weight CaO	5.0 max	-	87.0 min
Free water content, % by weight H ₂ O :	5.0 max	-	-
SIZING			
Wet Sieve, as % by weight residue retained:			
No. 6	0.2 max	0.2 max ²	8.0 max ³
No. 30	4.0 max	4.0 max ²	-
Dry sieve, as % by weight residue retained:			
1-inch	-	-	0.0
¾-inch	-	-	10.0 max

Notes:

- 1. Maximum 5.0% by weight CaO shall be allowed in determining total active lime content.
- 2. Maximum solids content of slurry.
- 3. Total active lime content, as CaO, in material retained on No. 6 sieve shall not exceed 2.0% by weight of original Type C lime.

- E. Deliver lime slurry to job site as commercial lime, or prepare at job site by using hydrated lime or quicklime. Provide slurry free of liquids other than water and of consistency that can be handled and uniformly applied without difficulty.
- F. Lime containing magnesium hydroxide is prohibited.

2.03 SOIL

- A. Soil to receive lime treatment may include borrow or existing subgrade material, existing pavement structure, or combination of all three. Where existing pavement or base material is encountered, pulverized or scarify material so that 100 percent of sampled material passes 2-inch sieve.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade will support imposed loads.
- B. Verify subgrade lines and grades.

3.02 PREPARATION

- A. Complete backfill of utilities prior to stabilization.
- B. Cut material to bottom of subgrade using an approved cutting and pulverizing machine meeting following requirements:
 - 1. Cutters accurately provide smooth surface over entire width of cut to plane of secondary grade.
 - 2. Provide cut to depth as specified or shown in the Drawings.
- C. Alternatively, scarify or excavate to bottom of stabilized subgrade. Remove material or windrow to expose secondary grade. Obtain uniform stability.
- D. Correct wet or unstable material below secondary grade by scarifying, adding lime, and compacting as directed by Owner's Engineer.
- E. Pulverize existing material so that 100 percent passes a 1³/₄-inch sieve.

3.03 LIME SLURRY APPLICATION

- A. Apply slurry with distributor truck equipped with an agitator to keep lime and water in consistent mixture. Make successive passes over measured section of roadway to attain proper moisture and lime content. Limit spreading to an area where preliminary mixing operations can be completed on same working day.
- B. Minimum lime content shall be 5 percent of dry unit weight of subgrade as determined by ASTM D 698.

3.04 PRELIMINARY MIXING

- A. Use approved single-pass or multiple-pass rotary speed mixers to mix soil, lime, and water to required depth. Obtain homogeneous friable mixture free of clods and lumps.
- B. Shape mixed subgrade to final lines and grades.

- C. Eliminate following operations and final mixing if pulverization requirements of Paragraph 3.05C can be met during preliminary mixing:
 - 1. Seal subgrade as precaution against heavy rainfall by rolling lightly with light pneumatic rollers.
 - 2. Cure soil-lime material for 24 to 72 hours or as required to obtain optimum hydration. Keep subgrade moist during cure.

3.05 FINAL MIXING

- A. Use approved single-pass or multiple-pass rotary speed mixers to uniformly mix cured soil and lime to required depth.
- B. Add water to bring moisture content of soil mixture to optimum or above.
- C. Mix and pulverize until all material passes 1 $\frac{3}{4}$ -inch sieve; minimum of 85 percent, excluding non-slacking fractions, passes $\frac{3}{4}$ -inch sieve; and minimum of 60 percent excluding non-slacking fractions passes No. 4 sieve. Test according to TxDOT Tex-101-E, Part III using dry method.
- D. Shape mixed subgrade to final lines and grades.
- E. Do not expose hydrated lime to open air for 6 hours or more during interval between application and mixing. Avoid excessive hydrated lime loss due to washing or blowing.

3.06 COMPACTION

- A. Aerate or sprinkle to attain optimum moisture content to 3 percent above optimum, as determined by ASTM D 698 on material sample from roadway after final mix with lime.
- B. Start compaction immediately after final mixing.
- C. Spread and compact in two or more equal layers where total compacted thickness is greater than 8 inches.
- D. Compact with approved heavy pneumatic or vibrating rollers, or combination of tamping rollers and light pneumatic rollers. Begin compaction at bottom and continue until entire depth is uniformly compacted.
- E. Do not allow stabilized subgrade to mix with underlying material. Correct irregularities or weak spots immediately by replacing material and recompacting.
- F. Compact subgrade to minimum density of 95 percent of maximum dry density, according to ASTM D 698, at moisture content of optimum to 3 percent above optimum, unless otherwise indicated on Drawings.
- G. Seal with approved light pneumatic tired rollers. Prevent surface hair line cracking. Rework and recompact at areas where hairline cracking develops.

3.07 CURING

- A. Moist cure for minimum of 3 days before placing base or surface course, or opening to traffic. Subgrade may be opened to traffic after 2 days when adequate strength has been attained to prevent damage. Restrict traffic to light pneumatic rollers or vehicles weighing less than 10 tons.
- B. Keep subgrade surface damp by sprinkling. Roll with light pneumatic roller to keep surface knit together.
- C. Place base or surface within 14 days after final mixing and compaction. Restart compaction and moisture content of base material when time is exceeded.

3.08 TOLERANCES

- A. Completed surface: smooth and conforming to typical section and established lines and grades.
- B. Top of compacted surface: Plus or minus $\frac{1}{4}$ inch in cross section or in 16-foot length.
- C. Depth of lime stabilization shall be plus or minus one inch of specified depth for each 1,000-foot roadway section.

3.09 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.
- B. Test soils, lime, and mixtures as follows:
 - 1. Tests and analysis of soil materials will be performed in accordance with ASTM D 4318, using the wet preparation method.
 - 2. Sampling and testing of lime slurry shall be in accordance with TxDOT Tex-600-J, except using a lime slurry cup.
 - 3. Sample mixtures of hydrated lime or quicklime in slurry form will be tested to establish compliance with specifications.
 - 4. Moisture-density relationship will be established on material sampled from roadway, after stabilization with lime and final mixing, in accordance with ASTM 698, Moist Preparation Method.
- C. In-place depth will be evaluated for each 1,000-foot roadway section and determined in accordance with TxDOT Tex-140-E in hand excavated holes. For each 1,000-foot section, 3 phenolphthalein tests will be performed. Average stabilization depth for 1,000-foot section will be based on average depth for three tests.
- D. Perform compaction testing in accordance with ASTM D 2922. Three tests will be performed for each 1,000-foot roadway section.

- E. Pulverization analysis will be performed as required by Paragraph 3.05C on material sampled during mixing of each production area. Three tests will be performed per 1,000-foot roadway section or a minimum of once daily.

3.10 REWORK OF FAILED SECTIONS

- A. Rework sections that do not meet specified thickness.
- B. Perform the following steps when more than 72 hours have lapsed since completion of compaction.
 - 1. Moist cure for minimum of 3 days after compaction to required density.
 - 2. Add lime at rate of 25 percent of specified rate at no additional cost to Owner.
 - 3. Moisture density test of reworked material must be completed by laboratory before field compaction testing can be completed.

3.11 PROTECTION

- A. Maintain stabilized subgrade to lines and grades and in good condition until placement of base or surface course. Protect asphalt membrane from being picked up by traffic.
- B. Repair defects immediately by replacing material to full depth.

END OF SECTION

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Section 02371 (Large Diameter)

EROSION CONTROL AND VEGETATION MAT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Installation of erosion control and vegetation mat for disturbed areas that are seeded.

1.02 PAYMENT

- A. No separate payment will be made for erosion control and vegetation mat. Include cost in unit price for regrading existing ditches.

1.03 DESCRIPTION

- A. Mat shall cover newly seeded and fertilized ground, and shall be held in place with netting and staples driven into ground.
- B. Mat shall assist in germination of grass seedlings and protect seedlings and establish vegetation.
- C. Mat shall be specifically designed for use on steep slopes and other hard-to-hold problem areas.
- D. Mat shall help ground retain moisture, control surface temperature fluctuations of soil, conform to terrain, protect seedlings against sun burnout, and break up raindrops to prevent erosion.
- E. Wood fibers of blanket ultimately shall attach to soil, stabilize terrain, and act as mulch after vegetation has started.
- F. Netting shall degrade in time in sunlight.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Erosion Blanket:
 - 1. Machine produced mat consisting of 100 percent wood with 80 percent 6-inch or longer fiber length, with consistent thickness and fiber evenly distributed over entire area of blanket.

2. Topside of blanket shall be covered with 3/4-inch by 3/4-inch mesh of biodegradable netting.
3. Blanket shall be made smolder-resistant with use of chemical additives.

B. Staples:

1. 11-gauge biodegradable steel.
2. "U" shaped with legs 6 inches in length and 1-inch crown.

2.02 ACCEPTABLE PRODUCT

- A. Standard Excelsior Erosion Control Blanket; Erosion Control Systems, Inc.

PART 3 EXECUTION

3.01 PREPARATION

- A. Properly cultivate, seed and fertilize area to be covered in compliance with Section 02921 - Hydromulch Seeding.
- B. Apply blanket immediately over prepared ground.

3.02 APPLICATION

- A. Unroll blanket over prepared area; keep netting on top and fibers in contact with soil over entire area.
- B. Apply blankets in ditches in direction of water flow.
- C. Butt edges snugly (overlap maximum 2 inches) and fasten to ground with staples driven into ground.
- D. Engage portion of netting with staple and set flush with soil surface.
- E. Use average of 1 to 1-1/2 staples per yard and maximum of 1-1/2 feet distance between staples at ends. Follow stapling procedure as recommended by manufacturer.
- F. Individual blanket size: 7.5 feet by 96 feet (80 square yards) with weight of 68 pounds plus or minus 1 pound.

END OF SECTION

Section 02400

TUNNEL SHAFTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction, maintenance, and backfilling requirements of tunnel shafts.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices for water main projects.
 - 1. Payment will be made for construction of tunnel shafts and related work on a lump sum basis only if included on Document 00300 - Bid Form. If work is not included on Document 00300 - Bid Form, include the cost for construction of tunnel shafts in unit price for related items.
 - 2. Include removal and replacement of surface improvements necessary for shaft construction, such as sidewalks, asphaltic or concrete pavement, base and subbase, curbs, curb and gutter, driveways, topsoil, sodding, and hydromulch in lump sum for shafts.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Shaft design submittals by Contractor shall be signed and sealed by Professional Engineer registered in State of Texas. If trench box is used in tunnel shaft and such utilization is in a manner other than what is indicated and certified in manufacturer's technical data, submit trench box manufacturer certification of proposed usage.
- C. Submit shaft construction drawings and seal slabs. Clearly indicate allowable surcharge loads and restrictions on surcharge capacity, including live loads, on shaft construction drawings. Indicate thrust blocks or other reactions required for pipe jacking, when applicable.
 - 1. Location of shafts by station and limits of working sites.
 - 2. Description of site security arrangements in conformance with Paragraph 3.03, Shaft Construction.

3. Description of method of extending the shaft above the flood level in conformance with Paragraph 3.03, Shaft Construction.
 4. Any geotechnical/boring undertaken by the Contractor for whatever purpose connected to Work.
- D. Shaft Monitoring Plan: Submit for review prior to construction, shaft monitoring plan that includes schedule of instrumentation design, layout of instrumentation parts, equipment installation details, manufacturer's catalog literature, and monitoring report forms.
- E. Structures Assessment. Provide preconstruction and post-construction assessment reports for critical structures located within radius of shaft center equal to shaft depth plus shaft radius, measured in plan. Include photographs or video of any existing damage to structures in vicinity of shafts in assessment reports.
- F. Submit shaft surface settlement monitoring plan for review prior to construction. Identify location of settlement monitoring points, reference benchmarks, survey frequency and procedures, and reporting formats on plan.
- G. Submit readings of monitoring plans to Project Manager as soon as readings have been taken.
- H. Submit shaft temporary deck drawings and calculations to Project Manager, signed and sealed by Contractor's Professional Engineer in event that shaft is not needed for immediate construction activity, in conformance with Paragraph 3.03, Shaft Construction.

1.04 PERFORMANCE REQUIREMENTS

- A. Shaft design must include allowance for Contractor's equipment and stored material and spoil stockpile as appropriate. Design must also allow for HS-20 highway loading if located in the vicinity of a paved area.
- B. Design shaft to withstand full hydrostatic head without failure. In case of common shaft in conformance to Section 02401 - Common Tunnel Shafts, design shaft with adequate factor of safety for full hydrostatic head.
- C. Design shaft located within 50-year floodplain with water retaining liner extending 2 feet above 50-year flood elevation. It is acceptable when liner is stored at site for immediate installation in lieu of its being installed at shaft, provided that shaft liner extends at least 2 feet above existing ground elevation.
- D. Design shaft cover for minimum 25 pounds per square foot distributed load plus 300-pound point load.
- E. Design steel plate deck, if such is required, for HS-20 loading.

PART 2 P R O D U C T S (Not Used)

PART 3 E X E C U T I O N

3.01 LOCATION OF ACCESS SHAFTS

- A. Contractor has sole responsibility for selection of shaft sites needed for construction operations unless otherwise indicated on Drawings. Location will be subject to approval of Project Manager.
- B. Locate shafts and associated work areas to avoid blocking driveways and cross streets, and to minimize disruption to business and commercial interests. Avoid shaft locations near areas identified as residential or potentially contaminated.
- C. Plan shaft locations to minimize interference with storm drainage channels, ditches, water lines, sanitary sewers, storm water sewers or culverts, which, when damaged, could result in ground washout or flooding of shafts and tunnels.

3.02 UTILITY RELOCATION

- A. Relocate utilities as shown on Drawings. Utility relocations required by Contractor for shaft construction shall take into account zone of potential settlement in vicinity of shaft.
- B. Obtain approval from Project Manager for permanent relocations prior to relocating.

3.03 SHAFT CONSTRUCTION

- A. Conform to the following for ground support systems:
 - 1. Install liner elements, bracing and shoring structural members at locations and in method sequence and tolerances defined on shaft construction drawings as excavation progresses.
 - 2. Ensure bracing and shoring are in contact with liner to provide full support as shown in shaft construction drawings. Evaluate and check modifications to liner, bracing and shoring. Obtain approval from Contractor's Professional Engineer and submit to Project Manager.
 - 3. Install seal slab as soon as final depth and stable bottom conditions have been reached and accepted by Project Manager. Construct seal slab capable of withstanding full piezometric pressure, either by pressure relief using under drains, or in case of more permeable ground condition, by use of structural reinforced slab. Construct seal slab in accordance with design provided by Contractor's Professional Engineer.

4. Design and construct entire shaft to appropriate factors of safety against yield, deformation, or instability as determined by Contractor's Professional Engineer. Shaft must withstand full hydrostatic head without failure.
 5. Special framing, bracing or shoring required around tunnel "eyes" or other penetrations shall be in-place according to shaft construction drawings before liner or any bracing or shoring at penetration is cut or removed.
 6. Securely breast and shore face of starter or back tunnels to resist both soil and hydrostatic pressure.
 7. When applicable, pressure grout voids or seepage paths around shafts and adjoining tunnels in accordance with Section 02431 - Tunnel Grout. Pressure grout bolted steel liner plates as they are installed, unless otherwise approved by Project Manager. Perform secondary or "back grouting" as ground measurement, voids or deformation of shaft liner are detected.
- B. Install suitable thrust or reaction blocks as required for pipe jacking equipment.
 - C. Provide drainage from shafts while work is in progress and until adjacent pipe joints have been sealed and shaft is backfilled. Conform to requirements of Section 01578 - Control of Ground Water and Surface Water.
 - D. Surface Water Control. Divert surface water runoff and discharge from dewatering system away from shaft. Protect shafts from infiltration or flooding.
 - E. Each surface work site is to be surrounded by chain link or equivalent security fence meeting requirements of Section 01504 - Temporary Facilities and Controls, which shall be secure at any time site is unattended by Contractor's personnel.
 - F. Protect shaft, when not in use by second chain link or equivalent security fence at perimeter of shaft or alternatively by cover designed in accordance with Paragraph 1.04, Performance Requirements.
 - G. Provide portable concrete traffic barriers at locations where work site is within 50' of highway, road, driveway, or parking lot. Angle traffic barriers in direction of lane flow. Do not place perpendicular to on-coming traffic.
 - H. Provide and maintain traffic control system in accordance with provision of Section 01555 - Traffic Control and Regulation.
 - I. Cover shaft which is constructed more than 60 days in advance of its intended use by steel plate deck designed by Contractor's Professional Engineer, and restore surface to permit full traffic flow during time shaft is not in use. Remove from site other material and equipment used by Contractor including portable concrete

traffic barriers, traffic control system, fencing, and reinstall at time shaft is re-opened for use.

- J. Construct suitable guardrail barrier around periphery of shaft, meeting applicable safety standards. Properly maintain barrier throughout period shaft remains open. Repair broken boards, supports, and structural members. Provide ladder with safety cage, when required by OSHA, in each shaft. Provide security barrier for each access shaft in which there is no construction activity or which is unattended by Contractor' personnel.
- K. Size of Shafts: Make size adequate for construction of permanent structures indicated on Drawings and to provide adequate room to meet operational requirements for tunnel construction and backfill.

3.04 BACKFILL

- A. Provide cement-stabilized sand to minimum depth of 10 feet above crown of sanitary sewer, but where shaft is located in paved area, cement-stabilized sand shall be used to within one foot of pavement subgrade elevation. Provide cement-stabilized sand in accordance with Section 02321 - Cement-Stabilized Sand. Compact cement-stabilized sand in accordance with Section 02317 - Excavation and Backfill for Utilities. In locations where backfill is not subject to traffic loading, depth above initial cement-stabilized sand may be backfilled with select backfill in accordance with Section 02316 - Excavation and Backfill of Structures. When insufficient work space exists, grout manhole or structure annular space in accordance with Section 02431 - Tunnel Grout.
- B. Remove shaft liner above level of 8 feet below ground surface, unless otherwise indicated on Drawings. Maintain sufficient ground support to meet excavation safety requirements while removing shaft structure.
- C. Where common shafts are indicated, refer to Section 02401 - Common Tunnel Shafts.

3.05 MONITORING

- A. Monitoring Instrumentation. Instrumentation specified and readings shall be accessible at all times to Project Manager.
 - 1. Install and maintain instrumentation system to monitor and detect movement of ground surface and adjacent structures. Establish vertical survey control points at distance from construction area that avoids disturbance due to ground settlement.
 - 2. Project Manager may through independent contractor or consultant, from installing instrumentation in, on, near, or adjacent to construction work. Provide access to work for such independent installations.

3. Install instruments in accordance with Drawings and manufacturer's recommendations.

B. Surface Settlement Monitoring

1. Establish monitoring points on all critical structures.
2. Record location of settlement monitoring points with respect to construction baselines and elevations. Record elevations to an accuracy of 0.01 feet for each monitoring point location. Establish monitoring points at locations and by methods that protect them from damage by construction operations, tampering, or other external influences.
3. Monitoring points to measure ground elevation are required at distance of 10 feet and 20 feet from perimeter of shaft on each of four radial lines, at 90 degrees to each other.
4. Railroads. Monitor ground settlement of track subbase at centerline of each track when within zone of potential settlement.

C. Reading Frequency and Reporting. Submit to Project Manager records of readings from various instruments and survey points.

1. Record all shaft monitoring readings at least once per week starting prior to shaft construction and continuing until shaft has been backfilled and until no more detectable movement occurs.
2. Immediately report to Project Manager any movement, cracking, or settlement which is detected.
3. Following substantial completion but prior to final completion, make final survey of all shaft related monitoring points.

3.06 DISPOSAL OF EXCESS MATERIAL

- A. Remove spoil in accordance with Section 01576 - Waste Material Disposal.

END OF SECTION

Section 02425 (Large Diameter)

TUNNEL EXCAVATION AND PRIMARY LINER FOR WATER MAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tunnel construction operation with primary lined tunnel installed during tunnel drive followed by placement of water line inside tunnel after completion of tunnel construction. This Specification is intended to be primarily functional in nature and to define in general terms work to be accomplished. Contractor granted full discretion to select method of tunnel construction, subject to review by Project Manager.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for other work performed under this Specification such as excavation, liner, grouting, or instrumentation. Include cost of such other work in contract unit prices for items listed in bid form for Section 02517 - Water Main in Tunnels.
- B. Where such effort is necessary, cost for ground water control during course of tunnel work included in unit prices for water main in tunnel.
- C. Ground water control required during course of Project to lower water table for other utility installation, to remove standing water, surface drainage seepage, or to protect ongoing work against rising waters or floods considered incidental to work being performed.

1.03 REFERENCE STANDARDS

- A. The publications listed below form part of this specification to extent referenced. Publications are referred to in text by abbreviations only.
 - 1. AREMA Manual for Railway Engineering (Applicable sections).
 - 2. American Association of State Highway and Transportation Officials (AASHTO).
 - 3. American Society for Testing and Materials (ASTM).
 - a. ASTM A36 - Standard Specifications for Carbon Structural Steel.
 - b. ASTM A82 - Standard Specifications for Steel Wire, Plain, for Concrete Reinforcement.

- c. ASTM A185 - Standard Specifications for Steel Welded Wire Fabric for Concrete Reinforcement.
 - d. ASTM A283 - Standard Specifications for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - e. ASTM A307 - Standard Specifications for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - f. ASTM A328 - Standard Specifications for Steel Sheet Piling.
 - g. ASTM A496 - Standard Specifications for Steel Wire, Deformed, for Concrete Reinforcement.
 - h. ASTM A615 - Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - i. ASTM C33 - Standard Specification for Concrete Aggregates.
 - j. ASTM C150 - Standard Specifications for Portland Cement.
 - k. ASTM C1433 - Standard Specifications for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.
4. American Water Works Association (AWWA)
- a. AWWA C200 - Steel Water Pipe 6-inches and Larger.
5. Occupational Safety and Health Administration (OSHA): Particular attention is called to Subpart S of OSHA Standards (29 CFR 1926/1920), published as U.S. Department of Labor Publication 2207, Revised Oct. 1, 1979. Second revision dated August 1, 1989. See Federal Register dated June 2, 1989 for revised standard and commentary.

1.04 DEFINITION

- A. Tunneling Work Plan defined as written description together with sketches, drawings, schedules, and other documents defining Contractor's planned methods and procedures to construct referenced item. Contractor's Construction Drawings defined as drawings by which Contractor proposes to furnish, construct, install, and operate referenced item. Submission of Tunneling Work Plans, including construction drawings, required for providing Project Manager sufficient details to verify that Contractor's planned work and work in progress is in accordance with intent of design and specification requirements.
- B. Primary Liner defined as Contractor's initial construction liner and tunnel support installed by Contractor for ground stability and safety during construction preparatory to installation of water line. Contractor chooses method of

construction in accordance with this Specification. Inclusion of various methods in specification or reviews by Project Manager of Contractor's submittals shall not be construed by Contractor as endorsement by Project Manager that all such methods are constructible or will work for specific subsurface soils encountered.

- C. Carrier Pipe is referred to as water line or permanent (secondary) liner. Such water line/permanent liner defined and installed in accordance with Section 02517 - Water Main in Tunnels or Section 02511 - Water Mains.

1.05 SUBMITTALS

- A. Review: Conform to requirements of Section 01330 - Submittals Procedures. Project Manager will review submitted plans, details and data for compliance with requirements of Specification. Such review shall not be construed to relieve Contractor of responsibilities under Contract. Contractor shall not commence work on items requiring Contractor's work plan, construction drawings or other submittals until submittals have been reviewed and accepted by Project Manager. All structural designs and other engineered components signed and sealed by Professional Engineer registered in the State of Texas.
- B. Tunneling: Submit for review Tunneling Work Plan with complete construction drawings, complete written description identifying details of proposed method of construction and sequence of operations to be performed during construction, as required by method of tunnel excavation and liner installation. Sufficiently detail construction drawings and descriptions detailed to demonstrate to Project Manager whether proposed materials and procedures will meet requirements of Specification.
 - 1. Depending on method of construction, submit Tunneling Work Plan and construction drawings on following items:
 - a. If use of mechanized excavating equipment (such as TBM or shielded excavators) is proposed, submit arrangement drawings and technical specifications of machine and trailing equipment (included modifications), experience record with this type of machine of both Contractor and proposed operator for machine.
 - b. A tunnel shield that is separate from mechanized excavation equipment or for use with hand excavation. Submit arrangement drawings, design criteria, dimensional data and method of excavation and operation of shield, including acceptable method for supporting, controlling and closing face of heading.
 - c. Complete details of equipment, methods and procedures to be used for ground support, including but not limited to primary liner installation, timing of installation in relation to excavation plan, bulkheads and equipment.

- d. Grouting techniques meeting requirements this Section and Section 02431 - Tunneling Grout.
 - e. Procedures for measuring excavation quantities versus forward progress during tunneling operation (for earth pressure balance TBM only).
 - f. Method of controlling line and grade of excavation.
 - g. Details of muck removal, including equipment type, number and disposal location.
 - h. Description of ventilation system, lighting system, and electrical system.
 - i. Proposed contingency plans for critical phases and areas of tunneling.
2. Submit for review design criteria established by Contractor's Engineer for primary liner, including design calculations and installation details.
 3. Include in Tunneling Work Plan special activities at critical utility crossings, or for work potentially effecting other facilities and existing installations, where special precautions must be taken during construction.
 4. Submit for review layout and design of proposed access shafts and shafts for permanent installations in accordance with Section 02400 - Tunnel Shafts.
 5. Ground water control system per requirements in this Section and in accordance with Section 01578 - Control of Ground Water and Surface Water, as required by construction method.
 6. All structural designs, including primary liner and other engineered items signed and sealed by qualified Professional Engineer Registered in the State of Texas unless otherwise specified.
- C. Quality Control Methods: At least 30 days prior to start of tunneling, submit description of quality control methods he proposes to use in this operation to Project Manager. Include in submittal:
1. Supervision: Supervisory control to ensure that work is performed in accordance with Drawings and Specifications and Contractor's work plan and construction drawings.
 2. Line and Grade: Procedures for surveying, controlling and checking line and grade, including field forms for establishing and checking line, and grade.

3. Tunneling Observation and Monitoring: Procedures for preparing and submitting daily logs of tunneling operations, including field forms, to meet requirement of Paragraphs 3.06, Tunneling Data and Paragraph 3.07, Control of Tunnel Line and Grade.
 4. Monitoring Instrumentation: Conform to requirements of Paragraph 3.09A, Monitoring Instrumentation.
 - a. Name of instrument installation subcontractors.
 - b. Layout of instrumentation points.
 - c. Procedures, forms and schedules for periodic submittals of readings.
 5. Settlement Survey Plan, to meet requirements of Paragraph 3.09C, Settlement Surveying. This plan may be submitted as part of Instrumentation Monitoring Plan.
 6. Building Condition/Assessment Plans: Conform to requirements of Paragraph 3.09B, Buildings and Structures Assessment.
- D. Geotechnical and Environmental Investigation: Include results of geotechnical and environmental investigations performed by Contractor as relevant to tunneling in Tunneling Work Plan.

1.06 DESIGN CRITERIA

- A. Design primary liner for appropriate loading conditions, including but not limited to: overburden and lateral earth pressures, handling and installation stresses, loads imposed by tunnel shield or tunnel boring machine thrust jacks, subsurface soil and water loads, grouting, and all other conditions of service. Design primary liner to carry thrust of jacking or other construction forces or loads anticipated.
- B. Use Cooper E-80 locomotive loading distributions in accordance with AREMA specifications for culverts for criteria at railroad crossings. Account for additive loadings for multiple tracks in design. Provide liner type for railroad crossings as specified or as otherwise required by railroad authority. Acceptable monitoring devices, such as closed circuit television, which permit continuous monitoring of conditions at face by qualified observers, from outside tunnel, may be used.
- C. Use HS-20 vehicle loading distributions for truck loading criteria in accordance with AASHTO.
- D. Compatibility of Methods:
 1. Use compatible methods of excavation, liner, and ground stabilization and ground water control.

2. Design primary lining, when used to provide thrust for propulsion of shield, to withstand this thrust without damage or distortion. Configure propulsion jacks on shield so that thrust is uniformly distributed and will not damage or distort primary liner.
3. Use compatible tunneling method with possible restrictions on work, such as influence on existing installations or potential ground water contamination.

1.07 JOB CONDITIONS

A. Safety Requirements:

1. Perform work in manner to maximize safety and avoid exposure of men and equipment to hazardous and potentially hazardous conditions, in accordance with applicable safety standards and Contractor's safety procedures.
2. Whenever there is emergency or stoppage of work which is likely to endanger tunnel excavation or adjacent structures, operate full work force for 24 hours day, including weekends and holidays, without intermission until potentially hazardous conditions no longer exist or jeopardize stability and safety of work or existing installations.
3. Perform tunnel construction in manner that minimizes movement of ground in front and surrounding tunnel. Prevent significant subsidence of surface and protect structures and utilities above, and in vicinity of, tunnel from damage.
4. Support ground continuously in manner to prevent loss of ground and keep perimeters and faces of tunnel and bottoms of shafts stable. Use filter-fabric and other means as necessary behind primary liner to prevent soil migration into tunnel.

B. Surveillance of Headings: When Contractor is not able to close face of machine because of maintenance requirements, maintain qualified personnel on duty to observe conditions that might threaten stability of heading whenever tunnel excavation is suspended or shut down. Equip personnel with approved contingency plan to take appropriate action to prevent or limit damage should conditions which threaten stability of heading occur.

C. Air Quality:

1. Conduct tunneling operations by methods and with equipment which will positively control dust, fumes, vapors, gases or other atmospheric impurities in accordance with OSHA, Federal, State and Owner requirements.

2. Provide approved mining instrumentation for testing quality of tunnel atmosphere and obtain samples, under working conditions, at prescribed intervals in accordance with above referenced requirements.
- D. Ground Conditions: Perform sufficient geotechnical exploration advance of construction to define necessary parameters for design of primary tunnel liner, planning and designing ground water control system, and for selection of tunneling method and equipment to successfully complete each tunnel reach. Present results of Contractor's geotechnical investigations in Tunnel Work Plans.

PART 2 P R O D U C T S

2.01 GENERAL

- A. Use of various construction methods for tunnel excavation and ground support, such as by tunnel boring machine (TBM), hand tunneling or shield will be allowed, provided it can be demonstrated to Project Manager proposed method will complete Project in accordance with Specifications, this Section, applicable safety codes, and Project schedules.
1. Contractor's Engineer responsible for design of primary tunnel liner system.
 2. Contractor responsible for final constructed product, materials and tools used, and for furnishing labor and qualified superintendents necessary for selected method of construction.
 3. Demonstrate that chosen method will prevent flow of water or soil into tunnel and provide stability of face under anticipated conditions.
- B. For round tunnel liner or casing, use size so minimum clearance between bottom of carrier pipe and inside of liner is minimum 4 inches, and minimum clearance between top of pipe and inside of liner or casing is in accordance with following:

<u>Carrier Pipe Net I.D.</u>	<u>Minimum Clearance to Top</u>
≥ 48"	9"
42"	7"
36"	5"
≤ 30"	3"

This clearance also applies to distance between carrier pipe and electrical conducting pipe support system. For box tunnel, provide minimum clearances shown on Drawings.

- C. Furnish TBM or shield with excavation equipment, spoil disposal systems, muck trains, hoist, grouting, signal systems, ventilation, safety equipment, and survey controls necessary to excavate and advance tunnel and construct primary tunnel liner by selected method.

2.02 LINER AND SUPPORTS

- A. The primary tunnel liner may consist of steel ribs and lagging, steel liner plates, precast concrete segments, steel casing pipe, or combinations of these. Lagging may be timber or steel. Use box tunnels with timber supports or steel sets with timber lagging at locations shown on drawings. Utilize additional support elements including shotcrete, steel sets, breasting, spilling, forepoling, crown bars, soil anchors, or fabrics, as required to provide safe, stable excavation.
- B. Use only steel liner plates, steel casing or steel lagging with steel ring beams as primary liner for tunneling under Texas Department of Transportation rights-of-way. Use only steel casing as primary liner for tunneling under railroad rights-of-way.
- C. Use steel casing as primary liner for tunneling in fault zone crossings.

2.03 MATERIALS

- A. Where use of following materials is required, conform to requirements of following minimum standards:

<u>Material</u>	<u>Reference Standards</u>
Cement	ASTM C150
Structural Concrete	See Section 03300
Reinforcing Steel Wire	ASTM A82 or A496
Reinforcing Steel Wire Fabric	ASTM A185 or A497
Reinforcing Steel Bars	ASTM A615, Grade 60
Sand and Aggregate	ASTM C33
Structural Steel	ASTM A36
Steel Piles, Sheets	ASTM A328
Rings and Ribs	ASTM A36
Steel Plates	ASTM A36 and A283
Lumber and Timber	Hardwood, sound or better, as defined by Commercial Standard C560
Steel Casing Pipe	AWWA C200

2.04 STEEL LINER PLATES

- A. Except as otherwise specified, furnish materials according to applicable requirements of AREMA Manual for Railway Engineering.

- B. Bolts and nuts: Conform to ASTM A307, Grade A. Use bolts no less than 1/2 inch in diameter for plate gauge 7 or thinner and no less than 5/8 inch in diameter for greater plate thicknesses.
- C. Punch plates for bolting on both longitudinal and circumferential seams and fabricate to permit complete erection from inside tunnel. Use plates of uniform fabrication and use interchangeable plates for those intended for one size tunnel .
- D. Use new material for construction of liner plates. Project Manager, at his option, may allow used plates provided that thickness of used plates after removal of rust is, at minimum, equal to thickness of new plates suitable for this Project; shape and dimensions meet acceptance tolerance for new plates; and used plates are free from other defects.
- E. Provide steel liner plates manufactured by Contech Construction Products (2-flange), Commercial Pantex Sika, Inc. (4-flange), or approved equal, and certified by manufacturer of compliance with specifications. Provide tensile strength, yield strength and minimum elongation of liner plates. Also, provide design calculations for either 2-or 4-flange liner plates, as appropriate for Contractor's method of construction. Steel liner plate designs shall meet following minimum factors of safety:
 - Seam Strength = 3
 - Buckling = 2
 - Maximum Deflection = 2% (of normal tunnel diameter)
- F. Maintain minimum thickness of metal for these steel plates as shown on drawings, allowing for standard mill tolerances.
- G. Equip steel liner plates with approximately 2-inch-diameter grout holes furnished with plugs. Locate holes near plate centers, such that when plates are installed there will be one line of holes along crown and along each side of tunnel, not more than 18 inches above invert. Locate holes in each line at no more than every other plate and stagger.
- H. Protective coating not required for steel liner plates, unless otherwise specified or shown on Drawings.
- I. Install gaskets between liner plates when required to control seepage, or as specified or shown in Drawings.
- J. Steel ribs used with liner plates: Conform to requirements of Paragraph 2.05, Steel Beams and Lagging.

2.05 STEEL CASING PIPE

- A. Casing pipe: Provide new uncoated welded steel pipe, manufactured in accordance with AWWA C200.

- B. Design stress in pipe wall shall be 50 percent of minimum yield point of steel or 18,000 psi, whichever is less when subjected to loading conditions.
- C. Design deflection to be used in determining wall thickness shall not exceed 3 percent of nominal casing pipe size.
- D. Bedding constant to be used in determining wall thickness shall be 0.10. Lag factors shall be 1.0 for all live loads.
- E. Minimum thickness of steel casing shall be as shown on drawing.
- F. Casing pipe design shall also include stresses due to jacking forces when pipe is to be installed by jacking method.
- G. Equip casing pipe with approximately 2-inch diameter grout holes furnished with plugs. Place holes in pattern so that each succeeding hole from top dead center is 60 degrees right, then 60 degrees left, then top dead center. Locate holes in each line no more than 9 feet apart.
- H. Casing pipe used in fault zones conform to welding and weld testing requirements specified in Section 02502 - Steel Pipe and Fittings.
- I. Casing pipe used in fault zones must be plugged at each end with clay bricks around O.D. of pipe minimum of one foot thickness measured into casing to prevent infiltration of soil into annular space.

2.06 STEEL BEAMS AND LAGGING

- A. Steel ribs and auxiliary structural members shall be free of defects which may impair or reduce structural integrity. Ribs shall be accurately curved to proper radius of tunnel section (or shaft section) for round tunnel liners. Rib segments shall fit closely for bolted connections at segmental and transverse joints. Provide steel appurtenances required for installation of ribs such as tie rod, bolts, splice plates, dutchmen and drift pins, with ribs.
- B. Minimum factors of safety:

$$\begin{aligned} \text{Buckling} &= 2 \\ \text{Stiffness} &= 3 \end{aligned}$$

2.07 FILTER FABRIC

- A. See Section 02621 - Geotextile for requirements of material and minimum installation requirements. Install fabric, and backer rods, as required to prevent loss of fine-soil sediments into tunnel.

2.08 TIMBER

- A. Use new timber for primary liner ground support without defects, of true dimensions and of quality grade and wood type defined by Contractor's Engineer.
- B. Maximum length: 4 feet.

2.09 PRECAST REINFORCED CONCRETE BOX SEWERS

- A. See Section 02612 - Precast Reinforced Concrete Box Sewers for requirements of material and minimum installation requirements.

PART 3 EXECUTION

3.01 PREPARATION

- A. Contractor shall be responsible for his means and methods of tunneling construction and shall ensure safety of work, Contractor's employees, public, and adjacent property, whether public or private.
- B. Execute work of excavating, lining, grouting, and construction of tunnel so that ground settlement or loss will be minimized. Completed primary tunnel lining shall have full bearing against earth with no voids or pockets left in work. Fill peripheral space between support elements and excavated surface no less frequently than after each shore or close by expanding support elements against ground as shield advances.
- C. Maintain clean working conditions inside tunnel and remove muck, debris, material spills, unusable supports, and other material not required for tunneling.
- D. Be aware that various existing soil borings, piezometers, or instrument wells may coincide with proposed tunnel alignment. These may or may not have been backfilled with grout and therefore caution should be used in tunneling through these existing borings. Take mitigating measures to counter effect these boreholes, piezometers, or instrument wells may have on tunneling operations.
- E. Perform tunneling under railroad embankments, highways, or streets to prevent interference with operation of railroad, highways, or streets.
- F. Do not perform any surface activities or disruptions within limits of tunnel area unless otherwise approved by Project Manager.

3.02 GROUND WATER CONTROL AND GROUND STABILIZATION

- A. Provide necessary ground water control measures to perform work and to provide safe working conditions. Prevent excessive inflow of water into excavation during construction of tunnel and installation of carrier pipe and grouting of annular space. Ground water control method shall provide means to prevent piping of fines into shafts or tunnel and other adverse effects due to ground water inflow.

Additional requirements are included in Section 01578 - Control of Ground Water and Surface Water. Other methods of construction, including tunnel work under compressed air, may be considered when Contractor is able to demonstrate that it will prevent flow of materials or water into tunnel excavation and allows construction of work to meet requirements of drawings and specifications. Additional requirements are included in Section 01578 - Control of Ground Water and Surface Water.

- B. Anticipate that portions of tunnel excavation may be below ground water table and in cohesionless soils, even when not indicated on soil borings, and in conditions which may require ground water control system for tunneling operations. Install filter fabrics, backer-rods and other means as necessary to prevent piping of fines into tunnel. Remove water that may be encountered during course of work by pumping, well pointing, deep well pumping, or other means as necessary to achieve stable conditions and applied in manner as described in Section 01578 - Control of Ground Water and Surface Water. Standing water not permitted at face, in tunnel or shafts.
- C. The ground water control method used shall not cause damage to adjacent structures or property due to lowering of water table and subsequent ground settlement.
- D. If Contractor chooses pumping installations to control ground water level or installs pervious liner through water bearing layers, install and maintain instrumentation system to monitor water level and to detect movement in adjacent structures and property. Monitor water level by recording initial water level before dewatering is started and thereafter on weekly basis. Remove water monthly from piezometers to demonstrate that they are operable. Submit weekly reports of water levels to Project Manager. Provide access to piezometers for Project Manager to perform independent measurements.
- E. Maintain dewatering system for tunnels in continuous operation until minimum of 48 hours after carrier pipe has been installed and annular space is fully grouted, or until watertight liner designed for hydrostatic pressures is installed.
- F. If eductors, well points or deep wells are used, space them adequately to provide necessary dewatering. Use sand packing, and other means to prevent pumping of fine sands or silts from subsurface and to minimize ground subsidence. Check continuously to ensure that subsurface soil is not being removed by ground water control operation or subsurface drainage into shafts or through pervious liner. Before operations begin, maintain availability of pumping equipment and other machinery on site to assure that operation of dewatering system can be maintained.
- G. When groundwater control is necessary, do not begin tunneling operations until monitoring data shows that it is safe to do so. When dewatering is sole means of ground water control, draw piezometric level down below elevation of invert of tunnel, or to lower elevation as required for excavation face and tunnel stability.

3.03 EQUIPMENT

- A. Use tunneling method, whether hand or machine, with full-face closure capabilities.
- B. Diesel, electrical, hydraulic, or air-powered equipment will be acceptable, subject to applicable Federal and State regulations. Diesel engines equipped with scrubbers are acceptable only when tunneling in free air with adequate ventilation. Provide compressed air and electricity for Contractor's operations from source outside tunnel.
- C. Tunnel Boring Machine: When tunnel boring machine is used, employ equipment that will be capable of handling various anticipated ground conditions. In addition, TBM shall:
 - 1. Be capable of minimizing loss of ground ahead of and around machine and providing satisfactory support of excavated face. Use TBM with, when necessary for ground control, earth-pressure balance or slurry-shield capabilities.
 - 2. Conform to shape of tunnel with uniform perimeter that is free of projections that could produce over-excavation or voids. TBM shield shall be continuous around its full perimeter; open-bottom shield is not acceptable.
 - 3. Have tail section long enough to enable setting of initial supports within machine, while still providing at least 12-inches of overlap beyond last installed support elements when thrusting jacks are extended to fullest extent possible.
 - 4. Have propulsion jacks capable of moving machine in forward direction while maintaining construction tolerances with respect to line and grade, without damage to previously-installed tunnel supports. Design propulsion system so that in event of failure of any element of system, there is no movement backward and there is no overstressing or distortion of tunnel supports.
 - 5. Incorporate seal in TBM tail shield to prevent leakage of grout between shield and liner into tunnel space, when grout is required immediately behind shield.
 - 6. Have motors and operating controls protected against water inflow.
 - 7. Provide bi-directional drive on cutter head wheel, or fins or grippers to control roll due to rotation.

8. Provide means for maintaining tunnel face under wet and adverse soil conditions. Use closure doors on cutter wheel or other means, such as earth-pressure balance or slurry shield, acceptable to Project Manager.
- D. Tunnel Shield: tunnel shield is used (with or without attached mechanized excavating equipment), employ shield be capable of handling various anticipated ground conditions. In addition, shield shall:
1. Conform to shape of tunnel with uniform perimeter that is free of projections that could produce over excavation or voids. Appropriately sized overcutting bead or taper along length of shield may be provided to facilitate steering. Shield shall be continuous around its full perimeter; open bottom shield is not acceptable. Although it is recognized that capability to over excavate beyond perimeter of shield may be necessary under certain conditions, make provisions to prevent accidental over excavation.
 2. Have hood, poling or breasting plates, shelves and breast jacks, breast tables, and combinations of these and other bracing as necessary to fully support face of tunnel excavation without loss of ground.
 3. Have tail section long enough to enable setting of initial supports within shield while still providing at least 12-inches of overlap beyond last-installed support elements when shield has been pushed forward to fullest extent possible.
 4. Have propulsion system for moving shield in forward direction, while maintaining construction tolerances with respect to line and grade, without damage to previously-installed tunnel support. Design propulsion system so that in event of failure of any element of system, there is no movement backward and there is no overstressing or distortion of tunnel supports.
 5. Have motors and operating controls protected against water inflow.
 6. Incorporate seal in tail of shield to prevent leakage of grout between shield and liner into tunnel space, when grout is required immediately behind shield.
- E. Air Quality: Provide equipment to adequately ventilate entire tunnel operation during construction.
1. Provide portable testing equipment for carbon monoxide gas, hydrogen sulfide gas, oxygen deficiency, and explosive gases. Monitoring for other constituents may be required while tunneling in potentially contaminated areas as defined in Contractor's safety plan.
 2. Provide audible automatic gas alarm on TBM to detect explosive gases
Locate alarm near tunnel face.

3. Equip motors and controls with automatic shutoff methane monitoring system.
- F. Lighting: Provide adequate lighting with lights at 50 feet, maximum spacing in tunnel. Fixtures shall be in watertight enclosures with suitable guards. Provide separate circuits for lighting and for electrical equipment.
- G. Electrical: Equip electrical systems utilized on TBM with appropriate ground fault system. Electrical systems are to be insulated, not permitting bare-wire exposures.
- H. Access: Provide safe access through tunnel to TBM.
 1. Provide walkway in tunnels greater than 10 feet in diameter which is separate from tracks used by spoil removal equipment.
 2. Equip locomotives or cars used for transport of personnel with necessary safety devices.
- I. Necessary equipment for tunnel excavation includes telephones, signal systems, fire extinguishers, safety equipment, and other equipment required by Contractor's method of construction, Tunnel Work Plan and safety plan. Maintain equipment in good repair, and readily available at place of work.

3.04 SHAFTS

- A. Construction of Shafts: Conform work for all shafts, with or without permanent structures in them, to requirements of Section 02400 - Tunnel Shafts. Select shaft locations in agreement with planned method of tunneling. Appropriately size shafts.

3.05 TUNNEL EXCAVATION AND PRIMARY LINER INSTALLATION

- A. Tunnel Excavation:
 1. Conduct tunneling operations in accordance with applicable safety rules and regulations, and Contractor's safety plan. Use methods which include due regard for safety of workmen, adjacent structures, utilities, and public.
 2. Limit tunnel excavation to within easements and rights-of-way indicated on Drawings, and to lines and grades designated on Drawings. Perform excavation of sufficient size to allow installation of water line to lines and grades indicated on Drawings.
 3. Locate equipment powered by combustible fuels at suitable distances from shafts to prevent possibility of explosion and fire in shafts or tunnel.
 4. During open-face excavation:

- a. Excavate face commencing at crown and proceed down to invert. Excavate both sides of heading simultaneously. Keep hood buried in soil ahead where soils include sands and silts.
 - b. Keep face breasted or otherwise supported; employ other means as necessary to maintain face stability and prevent falls, excessive ravelling, or erosion. Maintain standby face supports for immediate use when needed.
 - c. During shut-down periods, support face of excavation by positive means; do not rely solely on hydraulic pressure for support. When face is untouched for more than 24 hours, and when required by Project Manager, fully breast face and shove shield tight against it.
5. During closed-face excavation:
- a. Carefully control and monitor volume of spoil removed. For earth-pressure balance TBM, balance spoil removed with advance rate and excavation rate.
 - b. When cutting face is withdrawn, keep excavated face stabilized as required.
6. Advancing Shield: During forward movement of shield, provide sufficient support at excavation face to prevent movement of materials except materials as are physically displaced by elements of shield itself.
- B. Size of Tunnel: Determine adequate tunnel size and section to match construction methods described in work plan. Construct tunnels of sufficient size to permit efficient excavation operations, to provide sufficient working space for placing primary tunnel liner, and to allow for installation of water line. Dimensions shown on Drawings represent minimum dimensions acceptable to Project Manager and do not necessarily represent size or section suitable for construction methods or operational procedures as may be proposed or conducted by Contractor.
- C. Primary Liner:
1. Provide primary liner for tunnel which is capable of supporting ground, and hydrostatic forces until permanent water pipe has been installed and grouted in place, and to resist construction loads.
 2. Use methods that ensure full bearing of soil against primary liner without significant settlement or movement of surrounding soil. To fill void behind primary liner, either expandable liner (e.g., ring beams and timber lagging) or nonexpandable liner (e.g., bolted steel liner plates) may be used provided grout is placed behind nonexpandable liner. Where ground is excavated to true shape box tunnel may be ungrouted at contractors

discression. Grout excavation not to true shape as result of over excavation or loss of ground.

3. The primary liner's seepage inflow for each 100-foot length of tunnel shall not exceed 3 gallons per minute, including inflow through face or shield. Localized inflow shall not exceed 0.5 gallons per minute. Provide drainage facilities to remove inflow of water from tunnels and shafts. Provide means to prevent inflow of soil fines associated with water inflow by use of filter fabrics or other approved methods.
4. Expandable liner shall be continuous and shall be expanded to limits of excavation promptly after it is out of shield.
5. During excavation of tunnel, advance TBM or shield only far enough to permit construction of one primary liner ring beam set, or rings of bolted steel liner plates that can be assembled entirely within tail shield of TBM.
6. Install filter fabric around exterior of primary liner when using non-watertight liner and when tunneling through sandy or silty ground conditions. Install backer rods at ribs as required to control migration of fines. Close windows in lagging.
7. Provide hog rods, struts or similar members when required to maintain primary liner shape. After grouting liner, deflection shall be no more than 3 percent as measured by difference between maximum and minimum measured diameter divided by average diameter.

D. Hand Jacking of Casing:

1. Provide heavy-duty jacks of capacity suitable for forcing casing pipe through ground. Construct operating jacks so that even pressure is applied to all jacks used. Provide suitable jacking head, (timber, etc.), and suitable bracing between jacks and jacking head. Provide suitable jacking frame and/or back stop. Set casing pipe to be jacked on guides, (timber, etc.), properly braced together, to support section of pipe and direct it to proper line and grade. Place whole jacking assembly so as to line up with direction and grade of casing pipe.
2. Excavate ground material just ahead of casing pipe by use of air-powered tools, excavating machine or other acceptable means, and remove through casing pipe. Then force casing pipe through ground with jacks, into space thus provided. Dispose excavated material as specified.
3. Trim excavation in manner so that at least one third of circumference of excavation conforms to contour and grade of casing pipe. Provide clearance of not more than 2 inches for upper half of casing pipe with clearance tapering off to zero at point where excavation conforms to

contour of casing pipe. Cutting edge of steel plate installed around head end of casing pipe extending short distance beyond end of casing pipe with inside angles or lugs to keep cutting edge from slipping back onto casing pipe may be used.

4. In addition to requirements set for in this specification:
 - a. Excavate face commencing at crown and proceed down to invert. Excavate heading so that both sides of heading are excavated simultaneously.
 - b. At all times maintain standby face supports to allow for immediate use when needed.
 - c. At end of each shift and whenever excavation is suspended or shut down, install breast boards, or other approved methods, across full face of heading.
5. Distance that excavation extends beyond end of casing pipe shall not exceed three feet. Decrease this distance as directed by Project Manager, or due to character of material being excavated.
6. The casing pipe, insofar as practical, jack from low or downstream end. Lateral or vertical variation in final position of casing pipe from line and grade as established by Project Manager will be permitted only to extent of 1 inch in 10 feet, provided that variation is regular and only in one direction and that final grade of flow line is in direction indicated on plans. Remedy overcutting by pressure grouting entire length of installation. Use of grout mix immediately behind shield tail shall have efficient tail seal to prevent flow of grout into shield.
7. Depending on character of soil encountered during jacking operation, carry on operation without interruption, insofar as practical, to prevent casing pipe from becoming firmly set in ground.
8. Remove and replace casing pipe damaged in jacking operations by Contractor at no additional cost to Owner.
9. Backfill pits or trenches which have been excavated to aid jacking operations as soon as casing pipe is complete in place, equipment and appurtenances have been removed and structure, which is to be built in excavated zone, is in place. In no case shall shafts remain open without appropriate safety barricades, concrete traffic barriers (CTB's), railing or plates.
10. When jacking casing pipe, water jetting of casing pipe bedding or backfill is not allowed. In unconsolidated soil formations, use gel-forming colloidal drilling fluid consisting of at least 10 percent of high grade fully

hydrated bentonite to seal voids outside walls and furnish lubrication for installation of casing pipe.

E. Grouting:

1. Furnish and operate suitable equipment for grouting operations to effectively and completely fill voids outside of primary tunnel liner as quickly as possible.
2. Additional requirements pertaining to grout mix design and tunnel grouting are provided in Section 02431 - Tunneling Grout.
3. Provide in Tunneling Work Plan description of primary liner grouting operations, including:
 - a. Arrangement of grouting equipment including mixer, pumps, piping and hoses, valves, pressure gauges and injection fixtures.
 - b. Location, spacing and size of grout ports and vents.
 - c. Grouting sequence for initial backfill of voids between liner and ground, and for second stage back grouting.
 - d. Grout injection pressures and estimated volumes.
 - e. Procedure to check for remaining voids.
 - f. Sampling procedures and locations for quality control testing.
 - g. Grout production and quality shall be in accordance with Contractor's mix design and grout production plan as required by Section 02431 - Tunneling Grout.
4. Use care in grouting operations to prevent damage to adjacent utilities or other properties. Ensure that pressure used in grouting is not great enough to distort or imperil work.
5. Fill voids behind nonexpandable primary liner with sand-cement grout promptly after liner is out of shield. Grout pressure shall not exceed value that may cause damage or distortion to installed liner plate rings. Grout from bottom up and plug each grout hole promptly after grout has been placed. Provide seals on tail of TBM which will prevent grout from moving into shield.
6. Place grout behind tunnel liner at end of each day or at every 10 feet of tunnel installed, whichever is less, unless in opinion of Project Manager, ground conditions are such as to require each ring to be grouted immediately after erection. Upon completion of each grouting operation,

sound primary liner and immediately correct voids discovered by necessary means as approved by Project Manager. After all voids are successfully filled, grout holes will be packed, when necessary, with dry mortar mix and threaded taps securely placed in holes.

7. Completely and immediately fill voids outside limits of tunnel excavation created by caving or collapse of earth cover over excavation, or by other cause, with sand cement grout. Perform second grouting to fill soft spots or voids which may be detected, no later than 24 hours after initial grouting of primary liner.
8. Perform quality control sampling and testing of grout.
 - a. Grout production shall be in accordance with Section 02431 - Tunneling Grout.
 - b. Measure density of grout throughout placement procedure as directed by Project Manager. Measure grout density at discharge point and discharge grout until density is within 0.3 pounds per gallon of input density.
 - c. Take samples of well-mixed grout for 28-day compressive strength tests at beginning, middle and end of each grouting operation.

3.06 TUNNELING DATA

- A. Submit shift logs of construction events and observations within 24 hours of operation on at least following:
 1. Location of face by station and progress of tunnel drive during shift.
 2. Observation of lost ground and other signs of ground movement.
 3. Location and elevation of significant soil strata boundaries and brief soil descriptions.
 4. Ground water control operations, piezometric levels, ground water inflow location and rates.
 5. Completed field forms for establishing and checking line and grade and achieved tolerance relative to design alignment.
 6. Operation shut-down periods or other interruptions in work, and reason.
 7. Any unusual condition or event.
- B. Clearly mark primary liner every 20 feet along tunnel with distance in feet from centerline of preceding shaft.

3.07 CONTROL OF TUNNEL LINE AND GRADE

A. Construction Control:

1. Check established baseline and benchmarks indicated on Drawings at beginning of work and report errors or discrepancies to Project Manager.
2. Use baseline and benchmarks established by Project Manager to furnish and maintain reference lines and grades for construction. Use these lines and grades to establish location of tunnel, water line, and structures.
3. Establish and be fully responsible for accuracy of controls for construction of Project, including access shaft locations, structures, tunnel line, and grade. Utilize laser to insure line and grade are maintained during tunneling process.
4. Establish control points sufficiently removed from tunnel operation not to be affected by potential ground movement.
5. Maintain daily surveying records of alignment and grade and submit three copies of records to Project Manager by end of day after work performed. Locate points at top, bottom and each side of springline.
6. Check tunnel survey control against aboveground undisturbed reference at least once each week and once for each 250 feet of tunnel constructed, or more often as needed or directed by Project Manager.

B. Earth Movement:

1. Take precautions to avoid damage or settlement to buildings, structures, roads, and utilities to work in proximity of tunnel. Minimum precautions to include use of construction methods and equipment to minimize loss of earth at tunnel face and settlement of soil around primary tunnel liner.
2. Refer to Paragraph 3.09, Monitoring for detecting earth movement.
3. In event movement of ground is detected, Project Manager may order work stopped and secured. Before proceeding, correct problems causing or resulting from movement.
4. Be aware that when settlement of ground surface should occur during construction of tunnel which will affect accuracy of temporary benchmarks established by Project Manager, detect and report movement. Advise Project Manager of settlement affecting permanent monumentation benchmarks. Upon completion, submit field books pertaining to monitoring of permanent monumentation benchmarks to Project Manager.

C. Tunnel Line and Grade:

1. Survey crown, invert, and springline on each side of primary liner at 50-foot intervals, or minimum of once per shift, or more frequently when line and grade tolerances have been exceeded, to ensure alignment is within tolerances specified. Conduct survey immediately behind tunnel excavation to allow immediate correction of misalignment.
2. When excavation is off line and grade, make corrections to plan line and grade at rate of 3 inches per 100 feet.
3. Control excavation of tunnel and construction of primary liner to allow construction of carrier pipe within 6 inches on line and 4 inches on grade and to maintain circular shape of tunnel.
4. Alignment adjustments between primary tunnel liner and water main shall not encroach on minimum required clearance of 4 inches defined in Section 02517 - Water Main in Tunnels.
5. If unable to maintain specified tolerances, bear full responsibility and expense of correction (redesign, easement acquisition, etc.). when these tolerances are exceeded and redesign of structures is required, obtain services of qualified Professional Engineer registered in the State of Texas for redesign. Submit plans showing changes to Project Manager for review.
6. Backfill (grout) and reconstruct tunnel built outside tolerance or which is outside Owner's right-of-way to be within tolerance when so directed by Project Manager.

3.08 TUNNEL CONNECTIONS, TERMINATIONS, AND TEMPORARY BULKHEADS

- A. Connect new tunnels to existing structures by removing existing bulkheads, when necessary, and sealing junction as shown on Drawings.
- B. Seal terminations of tunnels, which are not connected to permanent structures, by temporary bulkhead.
- C. Design temporary bulkheads where and when required and obtain Project Manager's acceptance of design prior to constructing it. Provide bulkheads capable of resisting lateral earth and hydrostatic pressures, waterproof, and capable of being removed without damaging water line or plastic liner.

3.09 MONITORING

- A. Monitoring Instrumentation: This specification establishes minimum instrumentation requirements for tunneling. Additional instrumentation requirements for critical areas may be specified elsewhere in Specifications or on Drawings. Contractor may install more extensive system at Contractor's sole

expense. Instrumentation specified shall be accessible at all times to Project Manager.

1. Submit for review, prior to construction, Monitoring Plan including instrument installation design, instrumentation points location and layout, manufacturer's catalog literature, installation report formats.
 2. Install and maintain system of instrumentation to monitor tunneling operation and to detect movement in soil and adjacent structures. Instruments shall consist of no less than sufficient number of inclinometers and crack monitors at bridge and adjacent structures and sufficient piezometers. Use monuments sufficiently removed from construction to avoid errors in readings due to ground settlement.
 3. Installation of instrumentation shall not preclude Project Manager, through independent contractor or consultant, from installing instrumentation in, on, near, or adjacent to construction work. Provide access to work for independent installations.
 4. Install soil instruments such as piezometers, inclinometers, extensometers, and crack monitors by qualified subcontractor specializing in geotechnical work.
 5. Install extensometers to depth of 5 feet above crown of water line tunnel as shown on Drawings to measure vertical movements in soils during and subsequent to tunneling. Extensometer consists typically of three-prong anchor, 1/4-inch standard stainless steel inner pipe, and 1-inch standard Schedule 80 PVC outer pipe. Pipes are assembled in sections and fastened together with standard couplings to required anchor depths. Locate top of extensometer within flush-mounted hand hole cover capable of withstanding HS-20 truck loading. Geotechnical instrumentation installation subcontractor shall provide procedures for installation of extensometers as part of Monitoring Plan.
- B. Building and Structures Assessment: Submit for review prior to construction, Building and Structures Assessment Plan. Provide preconstruction and post-construction assessment reports for buildings and structures located within distance equal to depth of tunnel but at least 50 feet in plan from proposed tunnel centerline and shafts. Include photographs or video of existing damage to structures in vicinity of water line alignment in assessment reports.
- C. Settlement Surveying: This specification establishes minimum settlement survey requirements for structures and ground surface monitoring points.
1. Submit settlement surveying and monitoring plan for review prior to construction. Plan shall identify location of settlement monitoring points,

- reference benchmarks, survey schedules and procedures and reporting formats.
2. Locate survey points on all structures within distance equal to depth of tunnel but at least 50 feet in plan from tunnel centerline.
 3. Record horizontal coordinates and elevations (with accuracy of 0.01 feet) for each survey point location. Reference survey points so that they may be accurately re-established when lost or destroyed.
 4. Unless otherwise specified, record ground surface elevations on center line ahead of TBM and at 20 feet either side of center line at minimum of 100-foot intervals or at least three locations per tunnel drive. Starting 100 feet ahead of TBM and continuing until TBM is 100 feet beyond measurement point or until further movement is not detected, unless otherwise directed by Project Manager. Record cross-sectional points at 10-foot spacing for distance of 50 feet each side of center line or to ROW, whichever is less.
 5. Locate survey points at crossings under installations as follows:
 - a. Roads: Centerline and each shoulder.
 - b. Railroad: Track subbase at centerline of each track.
 - c. Utilities and Pipelines: Directly above and 10 feet before and after intersection.
 6. For shaft settlement see Section 02400 - Tunnel Shafts.
- D. Measure and maintain records of deformation of primary liner.
- E. Reading Schedule and Reporting: Submit readings from various instruments and survey points weekly to Project Manager. Take daily Readings as required by Project Manager when construction is approaching or near critical structures (structures, bridge piers, pipelines, etc., partially or entirely located within distance equal to depth of tunnel but at least 50 feet in plan from tunnel centerline). Take initial readings of surface points before excavation or construction is started.
1. Immediately report to Project Manager movement, cracking, or settlement which is detected and take immediate remedial action.
 2. At end of construction after water line is installed, and dewatering is discontinued, make final survey of control points established for instrumentation and observation. Submit final readings to Project Manager. Make visual inspection of structures adjacent to water line and report to Project Manager condition of structures, damage incurred during construction, and corrective action taken.

3.10 DISPOSAL OF EXCESS MATERIAL

- A. Remove spoil from job site and dispose in accordance with Section 01504 - Temporary Facilities and Controls.

END OF SECTION

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Section 02431

TUNNEL GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mix design requirements, testing, furnishing and production of grout for:
 - 1. Pressure grouting of bolted liner plates for shafts.
 - 2. Pressure grouting of primary tunnel liner.
 - 3. Pressure grouting of jacked-pipe.
 - 4. Annular grouting of cased or uncased sewer pipe.
 - 5. Grouting of annular space between carrier pipe and primary tunnel liner.
 - 6. Grouting voids in ground resulting from caving, loss of ground, or settlement.
 - 7. Grouting of manholes constructed in shafts.
- B. Compaction grouting is not part of this specification.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. No separate payment will be made for work performed under this Section. Include cost of such work in contract unit prices for work of which it is component part.
 - 2. Refer to Section 01270 - Measurement and Payment for Unit Price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

- A. Pressure Grouting. Filling void behind liner or pipe with grout under pressure sufficient to ensure void is properly filled but without overstressing temporary or permanent ground support, or causing ground heave to occur.

- B. Back Grouting. Secondary pressure grouting to ensure that voids have been filled between primary tunnel or shaft liners and surrounding ground.
- C. Annular Grouting. Filling annular space between carrier pipe and primary tunnel liner, casing, or ground, by pumping.
- D. Ground Stabilization Grouting. Filling of voids, fissures, or under-slab settlement due to caving or loss of ground by injecting grout under gravity or pressure to fill void.
- E. Carrier Pipe. Sanitary or storm sewer or water line installed inside primary tunnel support.

1.04 REFERENCE STANDARDS

- A. ASTM C 138 - Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
- B. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
- C. ASTM C 150 - Standard Specification for Portland Cement.
- D. ASTM C 494 - Standard Specification for Chemical Admixture for Concrete.
- E. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcinated Natural Pozzolan for Use as Mineral Admixture in Portland Cement Concrete.
- F. ASTM C 869 - Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
- G. ASTM C 937 - Standard Specification for Grout Fluidifier for Pre-placed Aggregate Concrete.
- H. ASTM C 942 - Standard Test Method for Compressive Strength of Grout for Pre-placed Aggregate Concrete into Laboratory.
- I. ASTM C 1017 - Standard Specification for Chemical Admixture for Use in Producing Flowing Concrete.

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit description of materials, grout mix, equipment and operational procedures to accomplish each grouting operation. Description may include sketches as appropriate, indicating type and location of mixing equipment, pumps, injection points, venting method, flow lines, pressure measurement, volume measurement,

grouting sequence, schedule, and stage volumes. Tests and certifications shall have been performed within last 12 months prior to date of submittal.

- C. Submit grout mix design report, including:
 - 1. Grout type and designation.
 - 2. Grout mix constituents and proportions, including materials by weight and volume.
 - 3. Grout densities and viscosities, including wet density at point of placement.
 - 4. Initial set time of grout.
 - 5. Bleeding, shrinkage/expansion.
 - 6. Compressive strength.
 - 7. Detailed description of grout pressure limiting equipment.
 - 8. For annular space grouting, buoyant force calculations and bulkhead designs (see Section 02517 - Water Line in Tunnel for further requirements).
- D. For cellular grout, also submit the following:
 - 1. Foam concentrate supplier's certification of dilution ratio for foam concentrate.
 - 2. A description of proposed cellular grout production procedures.
- E. Maintain and submit logs of grouting operations indicating pressure, density, and volume for each grout placement.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Grouting Materials: Conform to Section 03315 - Concrete for Utility Construction, except as modified in the following paragraphs.
- B. Grout Type Applications.
 - 1. Grout for pressure grouting, backfill grouting and annular grouting: Sand-cement mortar mix.
 - 2. Grout for annular grouting of sanitary sewer: Low density (cellular) grout, unless otherwise approved by Project Manager.

3. Grout for filling space around manholes in shafts: Sand-cement mortar mix.
 4. Ground stabilization: Sand-cement mortar mix.
- C. Do not include toxic or poisonous substances in grout mix or otherwise inject such substances underground.

2.02 GROUT

- A. Employ and pay for commercial testing laboratory, acceptable to Project Manager, to prepare and test grout mix design. Develop one or more mixes based on following criteria as applicable:
1. Size of annular void between sewer pipe and liner, or size of void between primary liner and surrounding soil.
 2. Absence or presence of groundwater.
 3. Adequate retardation.
 4. Non-shrink characteristics.
 5. Pumping distances.
- B. Prepare mixes that satisfy required application. Provide materials conforming to the following standards:
1. Cement: ASTM C 150.
 2. Fly Ash: ASTM C 618.
 3. Water: Potable.
 4. Foam: ASTM C 869.
 5. Slurry: ASTM C 138.
 6. Cellular Grout: ASTM C 138.
 7. Sand for sand-cement mortar mix: ASTM C 144.
- C. Provide grout meeting the following minimum requirements:
1. Minimum 28-day unconfined compressive strength: 1500 psi for water lines, 1000 psi for other carrier pipes for mortar grout and 300 psi for cellular grout.
 2. Determine strength by ASTM C 942.

3. Maximum allowable density: Less than 130 pcf.
- D. Fluidifier. Provide fluidifier, meeting ASTM C 937, that holds solid constituents of grout in colloidal suspension and is compatible with cement and water used in grouting operations.
- E. Admixtures.
 1. Use admixtures meeting ASTM C 494 and ASTM C 1017 as required, to improve pump-ability, control time of set, hold sand in suspension, and reduce segregation and bleeding.
 2. For cellular grout, do not use foam or admixtures that promote steel corrosion.
 3. Ensure that admixtures used in mix are compatible. Provide written confirmation from admixture manufacturers of their compatibility.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify Project Manager at least 24 hours in advance of grouting operations.
- B. Select and operate grouting equipment to avoid damage to new or existing underground utilities and structures.
- C. In selection of grouting placement consider pipe flotation, length of pipe, length of tunnel, depth from surface, type of sewer pipe, type of pipe blocking and bulkheading, grout volume and length of pipe to be grouted between bulkheads.
- D. Operate dewatering systems until grouting operations are complete and grout has reached initial set.

3.02 EQUIPMENT

- A. Batch and mix grout in equipment of sufficient size and capacity to provide necessary quality and quantity of grout for each placement stage.
- B. Use equipment for grouting of type and size generally used for work, capable of mixing grout to homogeneous consistency, and providing means of accurately measuring grout component quantities and accurately measuring pumping pressures. Use pressure grout equipment which delivers grout to injection point at steady pressure.

3.03 PRESSURE GROUTING FOR PRIMARY TUNNEL AND SHAFT LINER

- A. Perform grouting operations to fill voids outside of primary tunnel or shaft liner.
- B. For nonexpendable primary liners installed behind shield or tunnel boring machine (TBM), fill voids with sand-cement grout promptly after each ring of liner is out of shield. Keep grout pressure below value that may cause damage or distortion to installed liner plate rings. Provide seals on tail of shield or TBM which will prevent grout from spilling.
- C. For nonexpendable primary liners installed by hand mining or in shafts, grout once every 4 feet or more frequently when conditions dictate.
- D. Control grout pressures so that tunnel or shaft liner is not overstressed, and ground heave is avoided.
- E. For liner requiring grout, perform back grouting once each shift, or more often when required to ensure that all voids are filled.

3.04 ANNULAR GROUTING FOR SEWER LINE IN TUNNELS AND IN CASSED OR UNCASSED AUGERS

- A. Fill annular space between sewer pipe and tunnel primary liner, casing or ground, with grout.
- B. Placement:
 - 1. Placement Limits: Predetermine limits of each grout placement stage by size and capacity of batching equipment and initial set time of proposed grout. Under no circumstances shall placement continue at grout port longer than that period of time for mix to take initial set. Locate grout hole spacing and locations according to number of stages necessary to grout tunnel liners. Stage or lift cannot be installed on another lift until proper set has been attained. Have placement procedures approved by admixture or additive manufacturer.
 - 2. Limit pressure on annular space to prevent damage or distortion to pipe or liner. Define limiting and estimated required pressure range. Provide an open ended, high point tap or equivalent vent and monitor it at bulkhead opposite to point of grouting.
 - 3. Pump grout until material discharging is similar in consistency to that at point of injection.
 - 4. In primary lined tunnel, limit length of pipe installed to 200 feet or less before grouting same length of sewer line. Repeat this cycle until all pipe is installed and grouted.

- C. Remove temporary bulkheads installed for grouting.
- D. Batch and mix cellular grout mechanically to ensure consistency of mix. Wet solids thoroughly before introduction of foaming agent. Operate batching system to maintain slurry weight within 3 percent of design density. Introduce foam into slurry in accordance with manufacturer=s recommendations.

3.05 PRESSURE GROUTING FOR JACKED PIPE

- A. For jacked pipe 60 inches in diameter or greater, pressure grout annulus after installation, displacing bentonite lubrication. Jacked pipes less than 60-inch diameter may be left ungrouted unless excavated diameter exceeds external pipe diameter by more than one inch.
- B. Inject grout through grout holes in sewer pipe. Drilling holes from surface or through carrier pipe walls is not allowed. Perform grouting by injecting it at pipe invert with bentonite displacement occurring through high point tap or vent.
- C. Control ground water as necessary to permit completion of grouting without separation of grout materials.
- D. Limit pressures to prevent damage or distortion to pipe or to keep flexible pipe within acceptable tolerances.
- E. Pump grout until material discharging is similar in consistency to that at point of injection.

3.06 GROUND STABILIZATION GROUTING

- A. Completely fill voids outside limits of excavation caused by caving or collapse of ground. Fill with gravity or pressure injected sand-cement grout as necessary to fill void.
- B. Take care in grouting operations to prevent damage to adjacent utilities or public or private property. Grout at pressure that will not distort or imperil portion of work or existing installations or structures.
- C. Verify that void has been filled by volumetric comparisons and visual inspection. In case of settlement under existing slabs, take cores as directed by Project Manager, at no additional cost to Owner, to demonstrate that void has been filled.

3.07 FIELD QUALITY CONTROL

- A. Pressure Grouting for Primary Tunnel and Shaft Liners.
 - 1. For each shaft, make one set of four compressive test specimens for each 30-foot depth and one set for remaining portion less than 30-foot increment.

2. Make one set of four compressive test specimens for every 200 feet of primary lined (non-expandable) tunnel requiring grout.
- B. Annular Grouting for Sewer Line in Tunnels and in Cased or Uncased Augers.
1. Make one set of four compressive test specimens for every 200 feet of sewer pipe installed in primary lined tunnel.
 2. For cased or uncased augers, make one set of four compressive test specimens for each grouting operation, or for each 100 feet of pipe installed, whichever is more frequent.
 3. For cellular grout, check slurry density both at point of batching and placement at least twice each hour in accordance with ASTM C 138. Record density, time, and temperature. Density must be within 3 percent of design density at point of batching and 5 percent of design density at point of placement.
- C. Pressure Grouting for Jacked Pipe. Make one set of four compressive test specimens for every 400 feet of jacked pipe pressure grouting.
- D. Ground Stabilization Grouting. Make one set of four compressive test specimens for every location where ground stabilization grouting is performed.

END OF SECTION

Section 02447

AUGERING PIPE AND CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installing water service pipe by methods of augering or casing by jacking and boring.
- B. Installing Telecommunication Conduit along or under Public Ways.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for augering pipe for water lines under this Section. Include payment in unit price for Section 02511 - Water Lines.
 - 2. When open-cut construction is requested by Contractor for his convenience in areas designated for augering, and when approved in advance by Project Manager, such areas shall be paid for at Unit Price for Section 02511 - Water Lines.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

- A. Auger Method: Installation of steel casing by excavating soil at advancing end of casing and transporting spoil through casing by otherwise uncased auger, while advancing casing by jacking at same rate as auger excavation progresses.
- B. Slurry Auger Method: Installation of casing or pipe by first drilling small diameter pilot hole from pit to pit, followed by removing excess soil and installing pipe or conduit by pull-back or jacking method.

1.04 REFERENCE STANDARDS

- A. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

- B. ASTM D 648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- C. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- D. ASTM D 790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.05 REGULATORY REQUIREMENTS

- A. Conform to TxDOT for installations under state highways. Owner will obtain required permits for State Highway crossings.
- B. Installations Under Railroads:
 - 1. Secure and comply with requirements of right-of-entry for crossing railroad company's easement or right-of-way from railroad companies affected. Comply with railroad permit requirements.
 - 2. Use auger method only.
 - 3. Damages due to delays caused by railroad requesting work to be done at hours which will not inconvenience railroad will be at no additional cost to Owner.
 - 4. Maintain equipment and excavations minimum 35-foot clearance from centerline of tracks.

1.06 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit product data for casing insulators, spacing of insulators for specific pipe and location on project.
- C. Prior to installation of pits obtain Project Manager's approval for pit locations, size, depth, and areas for storage, material, and spoil handling. Acceptance of Project Manager does not relieve Contractor from responsibility to obtain specified results.
- D. Show actual pit locations dimensioned on as-built drawings so that they can be identified in field.
- E. Submit copy of executed railroad company rights of entry to Project Manager.

1.07 CRITERIA FOR SELECTION OF MATERIAL

- A. Contractor shall be responsible for selection of casing, pipe, and pipe joints to carry anticipated thrust of jacks or loads.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Piping and Fittings: As required by Specification or Drawings.
- B. Casings: Where shown on Drawings, in accordance with Section 02502 - Steel Pipe and Fittings.
- C. Casing Spacers: Where casings are shown on Drawings, use casing spacer width 8 inches for pipe sizes 4 to 12 inches; 12 inches for pipe sizes 14 inches and larger. Wood skids or concrete donuts are not acceptable.
 - 1. For welded steel pipe 12 inches and smaller, use Pipeline Seal & Insulator Model PE, or approved equal.
 - 2. For other pipe materials, use Pipeline Seal & Insulator Model C8G-2 or approved equal for pipe sizes up to 12 inches.
 - 3. For all pipe sizes above 12 inches, use Pipeline Seal & Insulator Model C12G-2 or approved equal.
 - 4. Obtain approval for equal product in writing from Project Manager prior to bid.
 - 5. Use ISO-9002 registered casing spacer manufacturer or supplier. Submit copy of current certificate with submittal package.
- D. Casing End Seals: Provide Pipeline Seal and Insulator Model C, or approved equal.
- E. Casing Spacers (for Pipe Diameters 16 Inches or Greater): Bolt-on style with shell made of two sections of 14-gauge carbon steel, hot rolled, cleaned, and lined with PVC liner, 0.090 inch thick with Durometer A 85-90 overlapping edges to secure liner to spacer; deep embossed flanges for added strength; coated prior to installation of liner and runner with fusion-bonded PVC powder of 14 to 20 mils thickness; electroplated studs, nuts, and washers.
 - 1. Runners (for Pipe Diameters 16 Inches or Greater): Supported by 10-gauge carbon steel MIG risers welded to shell. Total length of weld beads shall be at least 50 percent of the length of the runner. Fill bolt holes with caulk or approved equal to provide a watertight seal. Minimum requirements: glass reinforced plastic conforming to the following tests:

- a. Tensile Strength: ASTM D 638; 17,600 psi.
- b. Flexural Strength: ASTM D 790; 25,300 psi.
- c. Compression Strength: ASTM D 695; 18,000 psi.
- d. Deflection Temperature at 264 psi: ASTM D 648; 405 F.
- e. Polyethylene runners are not acceptable.

PART 3 EXECUTION

3.01 LIMITS ON AUGER LENGTH WITHOUT CASING

- A. Do not exceed 100 feet for length of auger hole without receiving pit.
- B. Do not exceed 75 feet for length of auger hole for PVC pipe 12 inches and less in diameter without receiving pit.
- C. Do not exceed 100 feet for length of auger hole for PVC pipe 14 inches to 24 inches in diameter without receiving pit.

3.02 PREPARATION

- A. Conform to applicable provisions of Section 02233 - Clearing and Grubbing.
- B. Utility Relocations: Relocate utility lines clear of pit and zone of potential significant settlement or other ground disturbance.
- C. Install casings as required by Drawings, in accordance with this Section.
- D. Install temporary solid plug at open end of water line to prevent contamination.

3.03 TRAFFIC CONTROL

- A. Conform to applicable provisions of Section 01555 - Traffic Control and Regulation.
- B. Secure right-of-entry for crossing railroad company's easement or right-of-way.
- C. During construction operations, furnish and maintain barricades and lights to safeguard traffic and pedestrians, until such time as backfill has been completed and removed from site. Provide additional barricades and lights as directed by Project Manager.

3.04 PITS

- A. Construct pits on segments of line and within right-of-way. Locate auger pits where there is minimum interference with traffic or access to property. Avoid locating pits close to storm drainage channels, ditches, storm water lines, culverts, or near potentially contaminated areas.
- B. Pit Size: Size pits to provide adequate room to meet operational requirements for auger construction as well as structures indicated on Drawings. Provide minimum 6-inch space between pipe and walls of auger pit. Maximum allowable width of pit shall be 5 feet. Width of pit at surface shall not be less than at bottom. Maximum allowable length of pit shall be no more than 5 feet longer than one full section of pipe and shall not exceed 25 feet.
- C. Excavate bore pits to finished grade at least 6 inches lower than grade indicated by stakes.
- D. Backfill in accordance with Section 02317 - Excavation and Backfill for Utilities.
- E. Auger pits that are excavated and backfilled as part of open-cut water line construction shall be in accordance with Section 02317 - Excavation and Backfill for Utilities.
- F. Provide and properly maintain safety protection against traffic, and accidental or unauthorized entry. Provisions to include concrete traffic barriers or other suitable barrier around periphery of pit. Fully cover and secure pits where no construction activity is in progress.
- G. Install sheeting, lining, shoring, and bracing required for protection of workmen and public in accordance with Section 02260 - Trench Safety Systems.
- H. Provide groundwater control and drainage from pits while work is in progress and until pit is properly backfilled. Conform to requirements of Section 01578 - Control of Groundwater and Surface Water.

3.05 AUGERING (BORING)

- A. Auger from approved pit locations. Excavate for pits and install shoring as outlined above under Paragraph 3.04, Pits. Auger mechanically with use of pilot hole entire length of crossing and check for line and grade. Diameter of auger hole not to exceed pipe bell diameter plus 2 inches. Place excavated material outside working pit and dispose of as specified. Use water or other fluids in connection with boring operation only to lubricate cuttings; jetting is not permitted.
- B. In unconsolidated soil formations, gel-forming colloidal drilling fluid may be used. Fluid is to consist of at least 10 percent of high-grade processed bentonite and shall consolidate cuttings of bit, seal walls of hole, and shall furnish lubrication for subsequent removal of cuttings and installation of pipe.

- C. Depending on character of soil encountered during augering operation, conduct operations without interruption, insofar as practical, to prevent hole from collapsing or pipe from seizing up in hole before installation is complete.
- D. Allowable variation from line and grade shall be as specified under Paragraph 3.08, Jacking.
- E. Remove and replace pipe damaged in augering operations.

3.06 AUGERING OF CASING

- A. Provide jacks, mounted on frame or against backstop, of capacity suitable for forcing excavating auger and casing through soil conditions to be encountered. Operate jacks so that even pressure is applied to casing.
- B. Provide steerable front section of casing to allow vertical grade adjustments. Provide water level or other means to allow monitoring of grade elevation of auger casing.
- C. Bentonite slurry may be used to lubricate casing during installation. Use of water to facilitate removal of spoil and to lubricate exterior casing is permitted; however, water jetting for excavation of soil is not allowed when jacking casing.
- D. Tolerances from lines and grades shown on Drawings for gravity sewer pipe installed in casing are plus or minus 6 inches in horizontal alignment, and plus or minus 1-1/2 inches in elevation.

3.07 FILLING ANNULAR SPACE

- A. For installation of water line, block void space around pipe in augered hole with approximately 12 inches of packed clay or approved equal material to prevent bedding or backfill from entering void around pipe in augered hole when compacted. For pipe diameters 4 inches through 8 inches use minimum 1/2-cubic-foot clay; for pipe diameters 12 inches through 16 inches use minimum 3/4-cubic-foot clay.

3.08 JACKING

- A. Comply with Section 02260 - Trench Safety for all pits, end trenches, and other excavations relating to work required by specifications. Dewater as required to provide safe working conditions.
- B. Wherever end trenches are cut into sides of embankment or beyond it, sheath securely and brace such work to prevent earth caving.
- C. Make up only one joint at time in pit or trench prior to jacking.

- D. Do not interfere with operation of railroad, street, highway, or other facility, nor to weaken or damage embankment or structure.
- E. Use heavy-duty jacks sized for forcing casing through embankment. Use appropriate jacking head, usually of timber, and bracing between jacks and jacking head and jacking frame or backstop. Apply jacking pressure uniformly around ring of casing. Set casing to be jacked on guides, properly braced together, to support section of casing and to direct it in proper line and grade. Place jacking assembly in line with direction and grade of casing. Excavate embankment material just ahead of casing and remove material through casing. Force casing through embankment with jacks into excavated auger hole.
- F. Conform excavation for underside of casing to contour and grade of casing, for at least one third of circumference of casing. Provide clearance of not more than 2 inches for upper half of casing. Taper off upper clearance to zero at point where excavation conforms to contour of casing.
- G. Excavation may extend beyond end of casing depending on character of material, but shall not exceed 2 feet. Decrease advance excavation at direction of Project Manager, when character of material being excavated makes it desirable to keep advance excavation closer to end of casing.
- H. Jack casing from low or downstream end. Lateral or vertical variation in final position of casing from line and grade as shown on Drawings will be permitted only to extent of 1 inch in 10 feet, provided such variation is regular and only in one direction and that final grade of flow line is in direction indicated on Drawings.
- I. Use cutting edge of steel plate around head end of casing extending short distance beyond end of casing with inside angles or lugs to keep cutting edge from slipping back onto casing.
- J. Once jacking of casing is begun, carry on without interruption, insofar as practicable, to prevent casing from becoming firmly set in embankment.
- K. Remove and replace casing damaged in jacking operations.
- L. Backfill pits or trenches excavated to facilitate jacking operations immediately after completion of jacking of casing.
- M. Grout annular space between casing and excavated hole when loss of embankment occurs or when clearance of 2 inches is exceeded.

3.09 SPACER INSTALLATION

- A. There must be no inadvertent metallic contact between casing and carrier pipe. Place spacers to ensure that carrier pipe is adequately supported throughout length,

particularly at ends, to offset settling and possible electrical shorting unless otherwise approved by Owner. Place end spacer within 6 inches of end of casing pipe, regardless of size of casing and carrier pipe or type of spacer used. Spacing between spacers depends largely on load bearing capabilities of pipe coating and flexibility of pipe.

- B. Grade bottom of trench adjacent to each end of casing to provide firm, uniform, and continuous support for carrier pipe. When trench requires some backfill to establish final trench bottom grade, place backfill material in 6-inch lifts and compact to density of undisturbed soil.
- C. Install casing spacers in accordance with manufacturer's instructions. Take special care to ensure that sub-components are correctly assembled and evenly tightened, and that no damage occurs during tightening of insulators or carrier pipe insertion.
- D. Seal annulus between carrier pipe and casing with casing end seals at each end of casing.
- E. Insulator Spacing:
 - 1. Spacing shall be as shown on Drawing with maximum distance between spacers to be 10 feet for pipe sizes 4 to 14 inches and 8 feet for pipe sizes 16 to 30 inches.
 - 2. For ductile iron pipe or bell-and-spigot pipe, install spacers within one foot on each side of bell or flange and one in center of joint when 18- to 20-foot-long joints are used.
 - 3. If casing or carrier pipe is angled, bent, or dented, reduce spacing as directed by Project Manager. Provide casing with smooth, continuous interior surface.

3.10 SETTLEMENT MONITORING

- A. Monitor ground surface elevation along length of augering operation. Locate and record settlement monitoring points with respect to construction baseline and elevations. Record elevations to accuracy of 0.01 feet for each monitoring point location.
 - 1. Railroads: Track subbase at centerline of each track.
 - 2. Product Pipelines: Directly above and 10 feet before and after pipeline intersection.
- B. Reading Frequency and Reporting. Take settlement survey readings:
 - 1. Prior to auger excavation reaching point.

2. After auger reaches monitoring point in plan.
 3. After grouting of ground supporting casing is complete.
- C. Immediately report to Project Manager movement, cracking, or settlement which is detected.
 - D. Following substantial completion but prior to final completion, make final survey of monitoring points.
- 3.11 DISPOSAL OF EXCESS MATERIAL
- A. Conform to applicable provisions of Section 01576 - Waste Material Disposal.

END OF SECTION

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Section 02502

STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel pipe and fittings for water lines for aerial crossings, aboveground piping, and encasement sleeves. Do not bury steel pipe, unless it is large diameter water line.
- B. Specifications identify requirements for small-diameter less than or equal to 20 inches.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices
 - 1. No payment will be made for steel pipe and fittings under this Section. Refer to Section 02511 – Water Lines for measurement and payment.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO – Standard Specifications for Highway Bridges.
- B. ASME B 16.1 – Cast-Iron Pipe Flanges and Flanged Fittings.
- C. ASTM A 36 – Standard Specification for Carbon Structural Steel.
- D. ASTM A 53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- E. ASTM A 105 – Standard Specification for Carbon Steel Pipe Forgings for Piping Applications
- F. ASTM A 106 – Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
- G. ASTM A 135 – Standard Specification for Electric-Resistance-Welded Steel Pipe.
- H. ASTM A 139 – Standard Specification for Electric-Fusion (ARC) – Welded Steel Pipe (NPS 4 and Over).

- I. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - J. ASTM D 4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - K. AWWA C 200 – Standard for Steel Water Pipe 6 in. and Larger.
 - L. AWWA C 206 – Standard for Field Welding of Steel Water Pipe.
 - M. AWWA C 207 – Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 in. through 144 in.
 - N. AWWA C 210 – Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
 - O. AWWA M 11 – Steel Pipe – A Guide for Design and Installation
 - P. SSPC Good Painting Practice, Volume 1.
 - Q. SSPC SP 1 – Surface Preparation Specification No. 1 Solvent Cleaning.
 - R. SSPC SP 5 – Joint Surface Preparation Standard White Blast Cleaning.
 - S. SSPC SP 6 – Surface Preparation Specification No. 6 Commercial Blast Cleaning.
 - T. SSPC SP 10 – Surface Preparation Specification No. 10 Near-White Blast Cleaning.
 - U. SSPC VIS 1 – Visual Standard for Abrasive Blast Cleaned Steel.
 - V. AWWAC 218 – Coating the Exterior of Above Ground Steel Water Pipelines and Fittings.
 - W. NACE RPO188 – Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
- 1.04 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures. For aerial crossings and above ground piping, include lay schedule of new pipe and fittings indicating alignment and grade, laying dimensions, lining and coating systems, proposed welding procedures, fabrication, fitting, flange, and special details. Show station numbers for pipe and fittings corresponding to Drawings.
 - B. Submit manufacturer’s certifications that pipe and fittings are new and unused.

- C. Submit manufacturer's certifications that pipe and fittings have been hydrostatically tested at factory in accordance with AWWA C 200.
- D. Submit manufacturer's affidavits that coatings and linings comply with applicable requirements of this Section and:
 - 1. Polyurethane coatings were applied in strict accordance with manufacturer's recommendation and allowed to cure at temperature 5 degrees above dew point.
 - 2. Linings were applied and allowed to cure at temperature above 32°F.
- E. Submit certification from NACE Certified Coatings Inspector, having Level III certification for coatings and linings, that steel pipe furnished on project was properly inspected and defective coatings detected were properly repaired.

1.05 QUALITY CONTROL

- A. Prior to start of work, provide proof of certification of qualification for welders employed for type of work, procedures, and positions involved. Provide welder qualifications in accordance with AWWA C 206.
- B. Shop-applied coatings and linings; provide services of an independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Perform inspection by NACE trained inspectors under supervision of NACE Level III Certified Coatings Inspector verifying compliance with same requirements specified in paragraph 3.02.
- C. Coatings: Measure temperature and dew point of ambient air before applying coatings. Inspect physical dimensions and overall condition of coatings. Inspect for visible surface defects, thickness, and adhesion of coating to surface and between layers.
- D. Final Inspection:
 - 1. Before shipment, inspect each finished pipe, fitting, special and accessory for markings, metal thickness, coating thickness, lining thickness (if shop applied), joint dimensions, and roundness.
 - 2. Inspect for coating placement and defects. Test exterior coating for holidays.

Inspect linings for thickness, pitting, scarring, and adhesion.
- E. Ensure workmen engaged in manufacturing are qualified and experienced in performance of their specific duties.

PART 2 PRODUCTS

2.01 STEEL PIPE

- A. Manufacture pipe with nominal diameter 20 inches and less but more than 2 inches to conform to ASTM A106 or A 53 Grade B, standard weight.
- B. Provide steel pipe and encasement sleeves designed and manufactured in conformance with AWWA C 200 and AWWA M 11 except as modified herein. Steel to be minimum of ASTM A 36, ASTM A 1011 Grade 36, ASTM A 53 Grade B, ASTM A 135 Grade B, or ASTM A 139 Grade B.
- C. Minimum Allowable Steel-Wall Thickness:

CARRIER PIPE			
Nom. Pipe Size (in.)	Min. Wall		Approx. Wt. Per Lin. Ft. Uncoated (lb.)
	O.D. (in.)	Thick. (in.)	
4	4.50	0.250	11.35
6	6.625	0.280	18.97
8	8.625	0.322	28.55
10	10.75	0.365	40.48
12	12.75	0.375	49.56
16	16.00	0.375	62.58
20	20.00	0.375	78.60

Notes – Carrier Pipe:

- 1. Review pipe and fitting design for conditions exceeding those specified herein.
- 2. Provide pipe with wall thickness of no less than listed in table above.

MINIMUM DIAMETER CASING PIPE (ENCASEMENT SLEEVES)			
Corresp. Casing Pipe Size (in.)	Min. Wall		Approx. Wt. Per Lin. Ft. Uncoated (lb.)
	O.D. (in.)	Thick. (in.)	
8	8.625	0.219	19.64
10	10.75	0.219	24.60
12	12.75	0.219	29.28
16	16.00	0.219	36.86
18	18.00	0.25	47.39
20	20.00	0.250	52.73
24	24.00	0.250	63.41

Notes – Casing Pipe:

1. Provide casing pipe with wall thickness of no less than listed in table above.
 2. Casing pipe: AWWA C 200 new uncoated welded steel.
 3. Verify casing diameter required with dimensions of casing spacer.
- D. Provide pipe sections in lengths of no less than 16 feet except as required for special sections, and no greater than 40 feet.
- E. Provide short sections of steel pipe no less than 4 feet in length unless indicated on Drawings or specifically permitted by Project Manager.
- F. Fittings: Factory forged for sizes 4 inches through 20 inches; long radius bends; beveled ends for field butt welding; wall thickness equal to or greater than pipe to which fitting is to be welded unless otherwise shown on Drawings.
- G. Joints:
1. Standard field joint for steel pipe and encasement sleeve: AWWA C 206. Single-welded, butt joint.
 2. Provide mechanically coupled or flanged joints for valves and fittings, as shown on Drawings. Flanges: AWWA C 207, Class D; same diameter and drilling as Class 125 cast iron flanges ASME B 16.1. Maintain electrically isolated flanged joints between steel and cast iron by using flange isolation kits. See Specification Section 16061 – Joint Bonding and Electrical Isolation.
 3. Elbows to be standard weight seamless elbows per ASTM A106, Grade A or B.
 4. Flanges for pipe 20 inches in diameter and smaller shall be ANSI 150 lb. flat face, slip on or weld neck flanges, meeting ASTM A105 requirements. Where flanges are to join to valves with raised face flanges, use ANSI 150 lb. raised flange.
 5. Provide same coating for exposed portions of nuts and bolts as flanges which they secure.
- H. Fabricate flanges with over-size bolt holes, with flanges drilled in pairs, to accommodate insulating sleeves.

2.02 INTERNAL LINING SYSTEMS FOR STEEL PIPE, ALL INSTALLATIONS

- A. Supply steel pipe with epoxy lining, capable of conveying water at temperatures not greater than 140°F. Provide linings conforming to American National Standards Institute/National Sanitation Foundation (ANSI/NFS) Standard 61 and certification to be from organization accredited by ANSI. Unless otherwise noted,

coat exposed (wetted) steel parts of flanges, blind flanges, bolts, access manhole covers, etc., with epoxy lining, as specified.

- B. Epoxy Lining AWWA C 210, white, or approved equal for shop and field joint applied, except as modified in this Section. Provide material from same manufacturer. For pipe larger than 2 inches in diameter protect interior surface with liquid two-part chemically cured epoxy primer specified for interior surfaces.

Surface Preparation 2.0 to 3.0 mils surface profile	SSPC-5 (64) White Blast Clean
Prime Coat 4.0 to 6.0 mils DFT	ACRO 4460 NSF Certified Epoxy - Buff, or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	ACRO 4460 NSF Certified Epoxy - Buff, or approved equal
Finish Coat 4.0 to 6.0 mils DFT	ACRO 4460 NSF Certified Epoxy - White, or approved equal

1. Total allowable dry film thickness for system:
 - a. Minimum: 12.0 mils.
 - b. Maximum: 18.0 mils.
 - c. Minimum field adhesion: 700 psi.
2. Dry film thicknesses for approved alternate products in accordance with product manufacturer's recommendations.
3. Lining system may consist of three or more coats of same approved alternate epoxy lining without use of separate primer.

2.03 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVEGROUND AND IN VAULTS (EXPOSED)

- A. Provide a three-coat system consisting of a prime coat of two-component, rust-inhibitive, pigmented, catalyzed epoxy primer followed by an intermediate coat of catalyzed epoxy with a finish coat of a two-component aliphatic polyurethane as described as coating system No. 4 in AWWAC 218, except as modified in this Section. (See table.)

Surface Preparation 2.0 to 3.0 mils surface profile	SSPC SP 10 Near White Blast Clean
Prime Coat 2.0 to 4.0 mils DFT	ACRO 4422 Inhibitive Epoxy Primer, or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	ACRO 4460 Chemical Resistant Epoxy, or approved equal
Finish Coat 1.5 to 2.5 mils DFT	ACRO 4429 Polyurethane, or approved equal

- B. Total Allowable Dry Film Thickness (DFT) for System:
1. Minimum: 9.5 mils
 2. Maximum: 12.5 mils
- C. Clean bare pipe free from mud, mill lacquer, oil, grease, or other contaminant. Inspect and clean surfaces according to SSPC-SP-1 to remove oil, grease, and loosely adhering deposits prior to blast cleaning. Remove visible oil and grease spots by solvent wiping. Use only approved safety solvents which do not leave residue. Use preheating to remove oil, grease, mill scale, water, and ice provided pipe is preheated in uniform manner to avoid distortion.
- D. Remove surface imperfections such as slivers, scabs, burrs, weld spatter, and gouges, presence of metallic defects may be cause for rejection of pipe.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

- A. Conform to applicable provisions of Section 02511 – Water lines, except as modified in this Section.
- B. Comply with the following:
1. Bedding and Backfilling: Conform to requirements of Section 02317 – Excavation and Backfill for Utilities.
 2. For pipes with coating: Do not roll or drag pipe on ground, move pipe in such a manner as not to damage pipe or coating. Carefully inspect pipe for abrasions and repair damaged coating before pipe is installed.
- C. Static Electricity:
1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.

2. Electrically test where required after installation is complete.
- 3.02 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVE GROUND AND IN VAULTS (EXPOSED) AND EPOXY INTERNAL LINING SYSTEM.
- A. Safety: Paints, coatings, and linings specified in this Section are hazardous materials. Vapors may be toxic or explosive. Protective equipment, approved by appropriate regulatory agency, is mandatory for personnel involved in painting, coating, and lining operations.
 - B. Workmanship:
 1. Application: By qualified and experienced workers who are knowledgeable in surface preparation and application of high-performance industrial coatings.
 2. Paint Application Procedures: SSPC Good Painting Practices, Volume 1.
 - C. Surface Preparation:
 1. Prepare surfaces for painting by using abrasive blasting.
 2. Schedule cleaning and painting so that detrimental amounts of dust or other contaminants do not fall on wet, newly-painted surfaces. Protect surfaces not intended to be painted from effects of cleaning and painting operations.
 3. Prior to blasting, clean surfaces to be coated or lined of grease, oil, and dirt by steaming or detergent cleaning in accordance with SSPC SP 1.
 4. Metal and Weld Preparation: Remove surface defects such as gouges, pits, welding and torch-cut slag, welding flux, and spatter by grinding to 1/4-inch minimum radius.
 5. Abrasive Material:
 - a. Blast only as much steel as can be coated same day of blasting.
 - b. Use sharp, angular, properly graded abrasive capable of producing depth of profile specified herein. Transport abrasive to job site in moisture-proof bags or airtight bulk containers. Copper slag abrasives are not acceptable.
 - c. After abrasive blast cleaning, verify surface profile with replica tape such as Tes-Tex Coarse or Extra Coarse Press-O-Film Tape, or approved equal. Furnish tapes to Project Manager.

- d. Do not blast if metal surface may become wet before priming commences, or when metal surface is less than 5°F above dew point.
 6. Evaluate degree of cleanliness for surface preparation with use of SSPC Pictorial Surface Preparation Standards for Painting Steel Surfaces, SSPC-Vis 1.
 7. Remove dust and abrasive residue from freshly blasted surfaces by brushing or blowing with clean, dry air. Test cleanliness by placing $\frac{3}{4}$ -inch by 4-inch piece of clear Scotch type tape on blasted surface, then removing and placing tape on 3 x 5 white index card. Reclean areas exhibiting dust or residue.
- D. Coating and Lining Application:
1. Environmental Conditions: Do not apply coatings or linings when ambient temperature is less than 45°F; when metal surface temperature is less than 5°F above dew point; when expected weather conditions are such that ambient temperature will drop below 40°F within 6 hours after application; or when relative humidity is above 85 percent. Measure relative humidity and dew point by use of sling psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. Provide dehumidifiers for field-applied coatings and linings to maintain proper humidity levels.
 2. Application Procedures:
 - a. Apply in accordance with manufacturer's recommendations and requirements of this Section. Provide finish free of runs, sags, curtains, pinholes, orange peel, fish eyes, excessive over spray, or delaminations.
 - b. Thin materials only with manufacturer's recommended thinners. Thin only amount required to adjust viscosity for temperature variations, proper atomization and flow-out. Mix material components using mechanical mixers.
 - c. Discard catalyzed materials remaining at end of day.
 3. Thoroughly dry pipe before primer is applied. Apply primer immediately after cleaning surface. Apply succeeding coats before contamination of undersurface occurs.
 4. Cure a minimum of 24 hours at 77°F before successive coats are applied. During curing process, provide force air ventilation in volume sufficient to maintain solvent vapor levels below published threshold limit value.

Apply successive coats within recoat threshold time as recommended by coating or lining manufacturer on printed technical data sheets or through written communications. Brush blast joints of pipe which have been shop primed and are to receive intermediate and finish coats in field prior to application of additional coats. After interior coatings are applied, provide forced air ventilation in sufficient volume and for sufficient length of time to ensure proper curing before filling pipe with water.

E. Testing of Coatings and Linings:

1. Inspect pipe for holidays and damage to coating:

If test indicates no holidays and coating is damaged, remove damaged layers of coating and repair in accordance with coating manufacturers recommendations.

2. Perform holiday test in accordance with NACE Standard Recommended Practice, RPO 188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
3. Begin testing of completed coating after coating has sufficiently cured, usually 1 to 5 days. Consult coating manufacturer for specific curing schedule.
4. Perform adhesion test on pipe in accordance with ASTM D 4541.
5. For coating thickness of 20 mils or less, test with wet sponge low-voltage holiday detector. For coating thickness in excess of 20 mils, test with high-voltage holiday detector. Perform electrical holiday test with 60-cycle current audio detector. Select test voltage as suggested in table below.

MINIMUM VOLTAGES FOR HIGH VOLTAGE SPARK TESTING

Total Dry Film Thickness (mils)	Suggested Inspection (V)
20 to 40	3,000
41 to 55	4,000
56 to 80	6,000

3.03 JOINTS AND JOINTING

A. Welded Joints:

1. Conform to requirements of Section 02511 – Water Lines.

2. Field weld to be full penetration butt welded joints for steel pipe and encasement sleeves for entire circumference.
 3. The Authority will employ an independent certified testing laboratory to perform weld acceptance tests on welded joints. Testing Laboratory will test by x-ray methods for butt welds, for 100 percent of joint welds. Program Manager has final decision as to suitability of welds tested.
- B. Flanged Joints: Conform to requirements of Section 02511 – Water Lines.
- C. Joint Grouting and Testing: Conform to requirements of Section 02511 – Water Lines.
- D. Joint Coating and Lining: Conform to requirements of Section 02511 – Water Lines.

3.04 COATINGS AND LININGS INSPECTION RESPONSIBILITIES

CONTRACTOR is responsible for quality control of coatings and linings applications and testing and inspection stipulated in this Section. Project Manager is responsible for quality assurance and reserves the right to inspect or acquire services of an independent third-party inspector who is fully knowledgeable and qualified to inspect surface preparation and application of high-performance coatings at all phases of coatings and linings work, field- or shop-applied. CONTRACTOR is responsible for proper application and performance of coatings and linings whether or not Project Manager provides such inspection.

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Section 02503

COPPER TUBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Copper tubing for water service lines.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

- 1. No payment will be made for copper tubing under this Section. Include cost in unit price for water taps and service lines.
- 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM B 88 - Standard Specification for Seamless Copper Water Tube.
- B. AWWA C 800 - Standard for Underground Service Line Valves and Fittings.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit certified test results of ASTM B 88.
- C. Submit manufacturer's testing certification that copper tubing conforms to requirements of ASTM B 88. Number of samples for testing of each size of tubing is modified as follows:
 - 1. For each 7500 feet of tubing: 1 sample.
 - 2. For each set of tubing less than 7500 feet: 1 sample.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Provide Type K annealed, seamless, copper tubing, 3/8-inch to 2-inch in diameter conforming to requirements of ASTM B 88.
- B. Provide 3/8-inch and 1-inch tubing in coils of minimum 60 feet in length, and 1-1/2-inch and 2-inch tubing in coils 40 feet in length.
- C. Provide tubing manufactured in United States of America. Tubing shall be inspected and tested by laboratory designated by Project Manager at point of manufacture or locally. Furnish tubing, at no additional cost to designated testing laboratory, along with mill compliance certificates.
- D. Provide flared or compression-type brass fittings for use with Type K annealed copper tubing in accordance with AWWA C 800.

PART 3 E X E C U T I O N

3.01 INSTALLATION

- A. Conform to installation requirements of Section 02512 - Water Tap and Service Line Installation, except as modified in this Section.

3.02 JOINTS

- A. Minimum joint spacing for 3/4-inch and 1-inch tubing shall be 60 feet and for 1-1/2-inch and 2-inch tubing shall be 40 feet.
- B. Cut copper tubing squarely by using cutting tools designed specifically for purpose and avoid procedures that cause pipe to bend or pipe walls to flatten.
- C. After tubing has been cut, but before flaring, use reamer to remove inside rolled lip from tubing. Expand flared ends by use of flaring tool using care to avoid splitting, crimping, or overstressing metal. Provide at least 10 inches of straight pipe adjacent to fittings.
- D. When compression fittings are used, cut copper tubing squarely prior to insertion into fitting. Assemble in accordance with manufacturer's recommended procedure.

3.03 BENDS

- A. Bend tubing by using appropriately sized bending tool. No kinks, dents, flats, or crimps shall be permitted. Cut out and replace damaged section. Install no bends

with radius smaller than radius of coil of tubing as packaged by manufacturer. Copper tubing shipped in straight lengths conforms to the following:

1. For 2-inch diameter: Maximum of one 45-degree bend per 4-foot section.
2. For 1-1/2-inch diameter: Maximum of one 45-degree bend per 3-foot section.

END OF SECTION

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Section 02506

POLYVINYL CHLORIDE PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Polyvinyl chloride pressure pipe for water transmission and distribution, in nominal diameters 4 inches through 30 inches.
- B. Polyvinyl chloride sewer pipe for gravity sewers in nominal diameters 4 inches through 48 inches.
- C. Polyvinyl chloride pressure pipe for gravity sewers and force mains in nominal diameters 4 inches through 30 inches.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. No separate payment will be made for PVC pipe under this Section. Include cost in unit price for work included as specified in the following sections:
 - a. Section 02531 - Gravity Sanitary Sewers
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ANSI A 21.16 (AWWA C 116) - Protective Fusion Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile Iron and Grey Iron Fittings for Water Supply Service.
- B. ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
- C. ASTM D 1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- D. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

- E. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- F. ASTM D 2444 - Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
- G. ASTM D 2680 - Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
- H. ASTM D 3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- I. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- J. ASTM D 3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- K. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- L. ASTM F 679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- M. ASTM F 794 - Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
- N. ASTM F 949 - Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.
- O. ASTM F 1674 – Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
- P. AWWA C 110 - American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 Inches Through 48 Inches for Water.
- Q. AWWA C 111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- R. AWWA C 605: Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
- S. AWWA C 900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inches Through 12 Inches for Water Distribution.
- T. AWWA C 905 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In., for Water Transmission and Distribution.

- U. AWWA C 909 - Standard for Molecularly-Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 Inches through 12 Inches (100 mm through 300 mm), for Water Distribution.
- V. PPI TR3 - Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.
- W. Texas Administrative Code (TAC) Rule §290.44 – Texas Commission on Environmental Quality Rules and Regulations for Public Water Systems.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit shop drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.
- C. For pipes 20 inches in diameter and greater, submit shop drawings signed and sealed by a Professional Engineer registered in the State of Texas showing the following:
 - 1. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, fitting, flange, and special details, with plan view of each pipe segment sketched, detailing pipe invert calculations, horizontal bends, restrained joints, and other critical features. Indicate station numbers for pipe and fittings corresponding to Drawings. Provide final approved lay schedule on CD-ROM in Adobe portable document format (*.pdf).
 - 2. Calculations and limits of thrust restraint.
 - 3. Class and length of joint.

1.05 QUALITY CONTROL

- A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C 900, AWWA C 909 or AWWA C 905 for pressure pipe applications, or appropriate ASTM standard specified for gravity sewer pipe.
- B. Submit manufacturer's certification that every standard length of PVC pressure pipe for water lines has been hydrostatically pressure tested in accordance with either AWWA C 900, AWWA C 909 or AWWA C 905. Hydrostatically test each length of pipe, including the integral bell, to four (4) times the rated pressure for minimum two (2) minutes. For 14-inch diameter and greater (AWWA C 905), maximum pressure for hydrostatic test shall not exceed 500 psi.

- C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from another source is not acceptable. Furnish copies of test reports to Owner's Representative for review. Cost of testing paid by Contractor.
- D. Markings: All PVC pipe shall be clearly marked in accordance with the pipe standard. Intervals shall not exceed 5 feet.
- E. Acceptance: Pipe may be rejected for failure to comply with any requirement of this specification.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Use PVC compounds in manufacture of pipe that contain no ingredient in amount that has been demonstrated to migrate into water in quantities considered to be toxic.
- B. Furnish PVC pressure pipe manufactured from Class 12454 PVC compound as defined in ASTM D 1784, latest version. PVC pipe conforming to AWWA C 900, AWWA C905, and AWWA C909 shall carry the National Sanitation Foundation (NSF) seal of approval and shall be listed with Underwriters Laboratories, Inc. (U.L.). Use compounds qualifying for rating of 4000 psi for water at 73.4 F per requirements of PPI TR3. Provide pipe which is homogeneous throughout, free of any significant voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches that are deeper than 10 percent of the minimum wall thickness. Joining surfaces of spigots and joints must be free of gouges and imperfections which could cause leakage.

- C. Water Distribution.

Provide PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.

- D. Gaskets:

1. Gaskets shall meet requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
2. Flat Face Mating Flange: Full faces 1/8 inch thick ethylene propylene (EPR) rubber.

- 3. Raised Face Mating Flange: Flat ring 1/8 inch ethylene propylene (EDR) rubber, with filler gasket between OD of raised face and flange OD to protect flange from bolting moment.
- F. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.
- G. Do not use PVC in potentially or known contaminated areas unless proof of acceptable chemical resistance of the pipe and gasket are provided to the Owner's Representative.
- H. Do not use PVC in areas exposed to direct sunlight unless a suitable coating is applied to the pipe.

2.02 WATER DISTRIBUTION AND TRANSMISSION PIPE

- A. Pipe 4-inch through 12-inch in diameter: AWWA C 900, AWWA C 909, Class 150, DR 18; AWWA C 900, Class 200, DR 14 as alternate to offset pipe sections; nominal 20-foot lengths; cast-iron equivalent outside diameters.
- B. Pipe 14-inch through 30-inch in diameter: AWWA C 905; Pressure Rated 165 psi; DR 25 minimum; nominal 20-foot lengths; cast-iron equivalent outside diameter.
- C. Make curves and bends by deflecting joints, using high deflection couplers, or large angle fittings, unless otherwise specified. Do not exceed maximum deflection
- D. Hydrostatic Test: Per AWWA C 900, AWWA C 905, AWWA C 909, ANSI A 21.10 (AWWA C 110); at point of manufacture; submit manufacturer's written certification. Perform hydrostatic test in accordance with Paragraph 1.05 B of this Section.

2.03 GRAVITY SEWER PIPE

- A. PVC gravity sanitary sewer pipe and storm sewer pipe shall be in accordance with provisions in following table:

Wall Construction	Manufacturer	ASTM Designation	SDR (Max.)/ Stiffness (Min.)	Diameter Size Range
Solid	JM Eagle	D3034	SDR 26 / PS 115	4" to 15"
	CertainTeed	D3034	SDR 35 / PS 46	4" to 15"
	Can-Tex	F679	SDR 35 / PS 46	18" to 48"
	Carlton	AWWA C900	DR 18 / N/A	4" to 12"
	Diamond Plastics North American	AWWA C909	PC150 / N/A	6" to 12"

Wall Construction	Manufacturer	ASTM Designation	SDR (Max.)/ Stiffness (Min.)	Diameter Size Range
		AWWA C905	DR 18 / N/A	14" to 36"
Truss (Gasketed)	Contech	D2680	N/A /200 psi	8" to 15"
Profile	Contech A-2000	F949	N/A / 46 psi	12" to 36"
	Contech A-2026	F949	N/A / 115 psi	8" to 10"
	JM Eagle, Ultra-Rib	F794	N/A / 46 psi	8" to 24"
	JM Eagle, Ultra-Corr	F794/F949	N/A / 46 psi	21" to 36"

- B. When solid wall PVC pipe 18 inches to 48 inches in diameter is required in PS 115, provide pipe conforming to ASTM F 679, except provide wall thickness as required for SDR 26 and pipe stiffness of 115 psi.
- C. For sewers crossing water lines, conform to requirements of Texas Administrative Code (TAC) Rule § 290.44.
- D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. Manufacturer shall test sample from each batch conforming to requirements ASTM D 2444.
- E. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.
- F. Conditioning. Conditioning of samples prior to and during tests are subject to approval by Owner’s Representative. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D 618 at 73.4 degrees F plus or minus 3.6 degrees F and 50 percent relative humidity plus or minus 5 percent relative humidity for not less than 40 hours prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.
- G. Pipe Stiffness. Determine pipe stiffness at 5% deflection in accordance with Test Method D 2412. Minimum pipe stiffness shall be 46 psi. For diameters 4 inches through 18 inches, test three specimens, each a minimum of 6 inches (152 mm) in length. For diameters 21 inches through 48 inches, test three specimens, each a minimum of 12 inches (305 mm) in length.

- H. Flattening. Flatten three specimens of pipe, prepared in accordance with Paragraph 2.04F, in suitable press until internal diameter has been reduced to 60 percent of original inside diameter of pipe. Rate of loading shall be uniform. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking, or separation of pipe walls or bracing profiles. Perform the flattening test in conjunction with pipe stiffness test.
- I. Joint Tightness. Test for joint tightness in accordance with ASTM D 3212, except that joint shall remain watertight at minimum deflection of 15%. Manufacturer will be required to provide independent third party certification for joint testing each diameter of storm sewer pipe.
- J. Purpose of Tests. Flattening and pipe stiffness tests are intended to be routine quality control tests. Joint tightness test is intended to qualify pipe to specified level of performance.

2.04 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

- A. Bends and Fittings: ANSI A 21.10 or ANSI A 21.53, ductile iron; ANSI A 21.11 single rubber gasket push-on type joint; minimum 150 psi pressure rating. Certa-Lok PVC restrained joints, 250 psi, may be provided for up to 12 inches in diameter (water or sanitary).
- B. Provide approved restrained joint fittings: Integral restrained joint fittings and pipe do not require secondary restraint.
- C. For 24-inch and larger ductile iron fittings, provide polyethylene wrap in accordance with Section 02528 – Polyethylene Wrap.

PART 3 EXECUTION

3.01 PROTECTION

Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with manufacturer's recommendations.

3.02 INSTALLATION

- A. Conform to requirements of Section 02531 - Gravity Sanitary Sewers, as applicable.
- B. Install PVC pipe in accordance with Section 02317 - Excavation and Backfill for Utilities, AWWA C 605, ASTM D 2321 for Sewer Pipe, and manufacturer's recommendations.
- C. Install PVC water service pipe to clear utility lines and have minimum depth of cover below property line grade of street, unless otherwise required by Drawings:
 - 1. Water service pipe 12 inches in diameter and smaller 4 feet of cover.

2. Water service pipe 16 inch thru 30-inch in diameter, 6 feet of cover.

- D. Avoid imposing strains that will overstress or buckle pipe when lowering pipe into trench.
- E. Hand shovel pipe bedding under pipe haunches and along sides of pipe barrel and compact to eliminate voids and ensure side support.
- F. Store PVC pipe under cover out of direct sunlight. Protect pipe from excessive heat or harmful chemicals. Prevent damage by crushing or piercing.
- G. Allow PVC pipe to cool to ground temperature before backfilling when assembled out of trench to prevent pullout due to thermal contraction.

3.03 PVC RESTRAINED MECHANISM

- A. Do not apply lubricant to spline or pipe or coupling spline grooves.
- B. Do not use excessive force while inserting the spline through coupling.
- C. Insert spline until it is fully seated around circumference of pipe.
- D. Field Cutting of Pipe Ends:
 - 1. Perform by workers certified by manufacturer.
 - 2. Use a PVC pipe cutter and provide square ends.
 - 3. Use manufacturer approved power routing and grooving tool to field fabricate required pipe groove.

END OF SECTION

Section 02507

PRESTRESSED CONCRETE CYLINDER PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prestressed concrete cylinder pipe (PCCP) and fittings for buried water lines sizes 20 inches and larger.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

- 1. No separate payment will be made for PCCP under this Section. Include cost in price for water lines.
- 2. Maintain on site minimum of two 3-degree and two 5-degree grade angle adapters. Adapters are considered "extra unit price." When used during construction, adapter will be paid at unit price.
- 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO - Standard Specifications for Highway Bridges.
- B. AREA - Manual of Railway Engineering, Volume II, Chapter 15.
- C. ASTM A 648 - Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Pipe.
- D. ASTM C 33 - Standard Specification for Concrete Aggregates.
- E. ASTM C 35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.
- F. ASTM C 150 - Standard Specification for Portland Cement.
- G. ASTM C 497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

- H. ASTM C 1107 (CRD C-621) - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - I. ASTM D 512 - Standard Test Methods for Chloride Ion In Water.
 - J. ASTM D 1293 - Standard Test Methods for pH of Water.
 - K. ASTM E 165 - Standard Test Methods for Dye Penetration.
 - L. ASTM E 340 - Standard Test Methods for Macroetching Metals and Alloys.
 - M. ASTM E 709 - Standard Test Methods for Magnetic Particle Testing.
 - N. ASTM E 1032 - Standard Test Methods for Radiographic Examination of Weldments.
 - O. ANSI/AWS A3.0 - Standard Welding Terms and Definitions.
 - P. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
 - Q. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 in. through 144 in.
 - R. AWWA C 301 - Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids.
 - S. AWWA C 304 - Standard for Design of Prestressed Concrete Cylinder Pipe.
 - T. AWWA M 9 - Standard for Concrete Pressure Pipe.
 - U. NSF 61 - Drinking Water System Components - Health Effects.
 - V. SSPC SP 7 - Surface Preparation Specification No. 7 - Brush Off Blast Cleaning.
- 1.04 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
 - B. Submit shop drawings and certification signed and sealed by Professional Engineer registered in State of Texas showing following:
 - 1. Manufacturer's pipe design calculations.
 - 2. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, welding procedures, fabrication, fitting, flange, and special details, with plan view of each pipe segment sketched, detailing pipe invert elevations, horizontal bends, welded joints, and other critical features. Indicate station numbers for pipe and fittings corresponding to Drawings. Do not start production of pipe and fittings prior to review and

- approval by Project Manager. Provide final approved lay schedule on CD-ROM in Adobe portable document format (*.PDF).
3. Include hot tapping procedure.
 4. Submit certification from manufacturer that design was performed for project in accordance with requirements of this section.
- C. Within 30 calendar days following Notice to Proceed and before initiation of manufacture of prestressing wire, submit following:
1. Name and location of prestressing wire manufacturer.
 2. General description of quality control procedures used by wire manufacturer. Include physical and chemical property tests utilized, testing frequency and test records; and description of methods employed to assure compliance with AWWA C301 regarding wire surface temperature, type of thermometer, location of temperature measurement, frequency of temperature tests and test records.
 3. Approximate dates when wire will be manufactured for use in pipe.
 4. Hydrogen embrittlement sensitivity test report for wire.
- D. Submit inspection procedures to be used by manufacturer and for quality control and assurance for materials and welding. Submit standard repair procedures that describe in detail shop and field work to be performed.
- E. Submit following within 45 days after manufacturing of pipe and fittings:
1. Prestressing wire records.
 - a. ASTM A 648 for wire.
 - b. Steel reports as required in AWWA C301, Section 4.4.7.
 - c. Records of testing accomplished to measure wire surface temperature as required in AWWA C301, Section 4.4.8.
 - d. Results of other tests of steel reinforcement required in AWWA C301, Section 4.4.
 - e. Wire tension records required in AWWA C301, Section 4.4.8. Indicate heat and coil of prestressing wire used.
 2. Test results.
 - a. Hydrostatic testing, acid etching, dye penetration, magnetic particle and x-ray weld test reports as required.

- b. Compressive strength (28 day) test results for each type of coating, lining and core mix design.
 3. Pipe manufacturer's certification that PCCP:
 - a. Cylinder assembly has been hydrostatically tested at factory for two (2) minutes minimum in accordance with Section 2.01 J and AWWA C301.
 - b. Mortar coatings and linings were applied or allowed to cure at temperature above 32 degrees F.
- F. Submit following for nonshrink grout for special applications:
 1. Manufacturer's technical literature including specifications for mixing, placing, and curing grout.
 2. Results of tests performed by certified independent testing laboratory showing conformance to ASTM C 1107, Nonshrink Grout and requirements of this specification.
 3. Certification product is suitable for use in contact with potable water.
- G. Submit certification for welder and welding operator demonstrating their certification within past 6 months in accordance with AWWA C 301. Indicate certified procedures and position each welder is qualified to perform.
- H. Submit certification showing calibration within last 12 months for equipment such as scales, measuring devices, and calibration tools used in manufacture of pipe. Each device used in manufacture of pipe is required to have tag recording date of last calibration. Devices are subject to inspection by Project Manager.

1.05 QUALITY CONTROL

- A. Manufacturer to have permanent quality control department and laboratory facility capable of performing inspection and testing required. Inspection procedures and manufacturing process are subject to inspection by Project Manager. Perform manufacturer tests and inspections required by AWWA C 301 as modified by these Specifications. Repair defects when as substandard welds, excessive radial offsets (misalignment), pitting, gouges, cracks, other nonconforming conditions.
 1. Cylinder and Joint Ring Assembly:
 - a. Review mill certifications for conformance to requirements of Specifications.
 - b. Perform physical testing of each heat of steel for conformance to applicable ASTM standards.

- c. Inspect physical dimensions and overall condition of joint rings and cylinder/joint ring assembly to verify compliance with requirements of AWWA C 301.
 - d. Test cylinder/joint ring weld for tensile strength. Test one specimen for each 500 cylinder/joint ring assemblies in addition to those tests required by AWWA C 301.
 - e. Reject pipe with dented steel cylinders.
2. Prestressing Wire:
- a. Inspect wire spacing during wire placement on core.
 - b. Test wire splices for each production run or a minimum of once a week, whichever is less, for conformance with minimum strength criteria.
3. Pipe Cores and Coating:
- a. Review mill certificates for each load of cement for conformance to ASTM C 150.
 - b. Perform sieve analysis weekly for each source of coarse and fine aggregate for conformance to ASTM C 33.
 - c. Inspect kiln recorder charts daily to confirm proper curing environment.
 - d. Prior to prestressing, inspect each core for voids, chips, cracks, deleterious surfaces and foreign matter.
 - e. Check outer core moisture of each pipe core immediately prior to applying mortar coating.
 - f. Check mortar batch proportions, moisture content and slurry application rate. Check coating thickness over wire on each pipe.
 - g. Check physical integrity of cured mortar coating.
 - h. Reject pipe with cracks in mortar coating exceeding 0.01 inches wide.
4. Protective Coatings: Check daily application rate and resulting dry film thickness.

- B. Gaskets: Randomly test rubber cord for diameter, tensile strength, elongation, compression set, hardness, and specific gravity after oven aging on one out of 100 gaskets.
- C. Weld Testing:
 - 1. Perform macroetching tests for full-penetration production welds on normal production weld tests. Complete joint penetration welds are defined in ANSI/AWS A3.0. Verify complete joint penetration by means of macroetch of joint weld cross section. Macroetch technique in accordance with ASTM E 340.
 - 2. Perform ultrasonic or x-ray testing of manual butt welds for fittings and special pipes. Perform dye penetration testing of manual lap welds for fittings and special pipes and for joint ring weld onto cylinder.
 - 3. Perform minimum of one set of weld test specimens in accordance with ANSI/AWS A3.0 on each size, grade and wall thickness at minimum of every 3,000 feet of pipe manufactured. Perform no less than one test per project by each welding machine and each operator.
- D. Cast four standard test cylinders each day for each 50 cubic yards of mortar coating or portion thereof for each coating and lining placed in day. Perform compressive strength test at 28 days. No cylinder test result shall be less than 80 percent of specified strength.
- E. Make available copy of Physical and Chemical testing reports for steel cylinders and provide reports at request of Project Manager.
- F. Check physical dimensions of pipe and fittings: Physical dimensions to include pipe lengths, pipe LD., pipe O.D. and bend angles.

PART 2 PRODUCTS

2.01 PRESTRESSED CONCRETE CYLINDER PIPE

- A. Furnish pipe by same manufacturer.
- B. Provide prestressed concrete cylinder pipe in conformance with AWWA C 301, AWWA C 304 and AWWA M 9 except as modified in this Section. Use of pipe from inventory is permitted only if specifications and certifications are met. Provide testing records for pipe.
- C. Do not use prestressed concrete cylinder pipe in aerial crossings, exposed or other unburied areas.
- D. Pipe Manufacture:

1. Must have minimum of 5 years of manufacturer's pipe installations that have been in successful and continuous service.
 2. Must maintain on site or in plant minimum of four 22.5-degree bends per 10,000 linear feet of water line. Any combination of bends may be substituted at manufacturer's option (i.e. two 11.25-degree bends are equivalent to one 22.5-degree bend and will be counted as one fitting). Must be capable of delivering bends to job site within 12 hours of notification. These fittings are in addition to fittings called out on Drawing and must be available at all times.
- E. Pipe Design Conditions:
1. Working pressure: 100 psi.
 2. Hydrostatic field test pressure: 150 psi.
 3. Maximum pressure due to surge: 150 psi.
 4. Minimum pressure due to surge: -5 psi.
 5. Unit weight of soil: 120 pcf minimum, unless otherwise specified.
 6. Minimum trench width: O.D. of pipe + four (4) feet.
 7. Pipe and Fittings: Designed to withstand most critical simultaneous application of external loads including construction loads and internal pressures.
 8. Design: Based on minimum of AASHTO HS-20 loading, AREA Cooper E-80 loads when under railroads, and depths of bury as indicated. Design pipe with Marston's earth loads for transition width trench for all heights of cover.
 - a. Calculate moments and thrusts in wall based on height of earth load.
 - b. For earth load heights up to 16 feet, use bedding sand as bedding material and use 90-degree Olander coefficients for earth load and water weight contained in pipe along with 15-degree Olander coefficients for pipe weight.
 - c. For earth load heights 16 feet and greater, use cement stabilized sand as bedding material below springline of pipe, and use 150-degree Olander coefficients for earth load and water weight.
 9. Groundwater Level: Assume below pipe for pipe design. Assume equal to natural ground surface for other conditions.

10. Design pipe for transmitting potable water, unless otherwise shown on Drawings.
 11. Manufacture pipe for adverse environmental conditions in accordance with Section 7.5.5 of AWWA C304.
 12. Design pipe for buried conditions and kept empty for up to 365 days.
 13. Tunnel and Augered Sections: Provide constant outside diameter from bell to spigot end for pipe. Exclude structural benefits associated with primary liner. Design pipe and pipe joints to carry loads including but not limited to: overburden and lateral earth pressures, subsurface soil, grouting, other conditions of service, thrust of jacks, and stress anticipated during handling and installation.
- F. Coatings and Linings:
1. Provide Portland cement; ASTM C 150, Type I or II. Provide one type of cement for entire project.
 2. Water Absorption Test: ASTM C 497, Method A; perform on samples of cured mortar coating taken from each working shift. Cure mortar coating samples in same manner as pipe.
 - a. Test Value: Average minimum of 3 samples taken from same working shift, no greater than 9 percent for average value, 11 percent for individual value.
 - b. Test Frequency: Perform tests each working shift until conformance to absorption requirements has been established by 10 consecutive passing test results, at which time testing may be performed weekly. Resume testing for each working shift when absorption test results fail until conformance to absorption requirements is reestablished by 10 consecutive passing test results.
 3. Apply one coat of primer to exposed steel parts of steel bell and spigot rings. Prior to coating, blast clean in accordance with SSPC-SP7 (Brush Off Blast Cleaning). Apply primer in accordance with manufacturer's recommendations.
 4. Coat and line access inlets, service outlets, test inlets and air release/vacuum relief riser pipe with same coating and lining of water line in accordance with AWWA C 301, Section 4, unless otherwise indicated on Drawings.
 5. Do not exceed two hours between application of first and last course when cement mortar is applied in more than one course; otherwise, do not defer placing of coating of any portion of pipe length. Verify cement mortar

coating thickness on each size of pipe by nondestructive method before removing pipe from coating machine.

6. Remove and replace disbonded lining or coating. Reject pipe requiring patches larger than 100 square inches or 12 inches in greatest dimension. Allow no more than one patch on either lining or coating of pipe. Provide WELD-CRETE Probond Epoxy Bonding Agent ET-150, parts A and B; Sikadur 32 Hi-Mod, or approved equal bonding agent for pipe patching.

G. Fittings and Specials:

1. Design fittings to same internal and external loads as straight pipe.
2. Manufacture in accordance with Section 02518 - Steel Pipe and Fittings for Large Diameter Water Lines.
3. Provide fabricated bends or fittings with minimum radius of 2-1/2 times pipe diameter.
4. Design test plugs to withstand forces generated by hydrostatic test and test pressure from either side. Do not exceed 50 percent of minimum yield for design stresses due to hydrostatic pressure. Assume opposite side of plug does not contain water.
5. Provide no specials less than 4 feet in length unless indicated on Drawings or approved by Project Manager.
6. Butt Straps for Closure Piece: Provide at locations indicated on Drawings or authorized by Project Manager. Minimum 12-inch-wide split butt strap; minimum plate thickness equal to thinnest member being joined; fabricated from material equal in chemical and physical properties to thinnest member being joined. Permit no angular deflection at butt-strap joints.
7. Provide minimum 6-inch welded outlet for inspecting each closure section, unless access manway is within 40 feet of closure section.
8. Provide Densco petroleum based tape or approved equal for exposed portions of nuts and bolts.

H. Joints:

1. AWWA C 301 rubber-gasketed or welded bell-and-spigot type except where flanged joints are required for valves and fittings as shown on Drawings. Refer to Section 02511 - Water Lines for details on joints and jointing.
2. Rubber-Gasketed Joints: Single weld bell and spigot ring onto steel cylinder. In thrust areas, double weld bell-and-spigot onto steel cylinder.

Bond as shown on Drawings to provide electrical continuity along entire pipeline.

3. Restrained Joints: Restrain joints by welding or harnessing joints.
 - a. Design Pressure: 1.5 times working pressure.
 - b. Harnessed Joints: AWWA M 9, clamp or snap ring type, except where prohibited.
 - c. Groundwater Level: Assumed to be equal to natural ground surface.
 - d. Provide restrained joint pipe with adequate cylinder thickness to transmit full thrust generated by internal pressure across joints.
 - 1) Calculate distance of restrained joints based on resistance along each leg of bend with thrust based on bend angle.
 - 2) Calculate cylinder thickness not to be less than that defined in following table:

Inside Diameter (inches)	Gauge Size
Greater than 84	6
72 to 84	8
48 to 66	10
Less than 48	12

- 3) Allow cylinder thickness to reduce linearly from maximum calculated thickness or from minimum cylinder thickness (as determined in Paragraph 2.01 H.3.d.1, whichever controls, to minimum thickness required by design over required length (as determined in Paragraph 2.01 H.3.d.1) of restrained joints.
4. Use only fully circumferentially welded joints in areas considered potentially petroleum contaminated, within tunnels and under foreign pipelines. Perform welding in accordance with Section 02502 - Steel Pipe and Fittings and 02518 - Steel Pipe and Fittings for Large Diameter Water Lines.
5. Pipe Flanges: AWWA C 207 for standard steel flanges of pressure class corresponding to pipe class.

- I. Pipe Lengths: Provide pipe sections in standard lengths with minimum length of 16 feet and maximum length of 25 feet, and as indicated on approved shop Drawings or approved by Project Manager. Gasketed joints are allowed on standard lengths of pipe. Non-standard pipe lengths must be approved by Project Manager and joints must be welded as specified herein to achieve equal to or greater than standard pipe length before gasketed joints can be used. Internally and externally mark pipe section with durable marking to show location and pipe pressure.
- J. Hydrostatic Test of Cylinder: AWWA C 301, Section 4.6.4.3, at point of manufacture. Hold test for minimum 2 minutes for thorough inspection of cylinder. Repair or reject cylinders revealing leaks or cracks.
- K. Transport fittings 42 inches in diameter and larger with end caps and stulls. Remove end caps just prior to installation. Remove stulls after completion of backfill operation.
- L. Provide radius of curve as indicated on Drawings unless approved by Project Manager. Make curves and bends by deflecting joints, by use of beveled joints, or by combination of two methods, unless otherwise indicated on Drawings. Do not exceed deflection angle recommended by pipe manufacturer. Provide beveled pipe sections of standard length used in curved alignment, except when shorter sections are required to limit radius of curvature. In such case, provide sections throughout curve of substantially equal length.
- M. When manufacturing straight pipe sections, manual welding is allowed for following:
 - 1. Tack welding of coils and plates during continuous pipe making process.
 - 2. Rewelding and repairing structural defects in plate and automatic machine welds.
 - 3. Attaching new coil of steel to previous coil.
- N. Prior to arrival on project site, identify pipe sections within limits of thrust restraint with permanent, brightly colored, and highly visible markings on outer pipe coating as approved by Project Manager.

2.02 PRESTRESSING WIRE

- A. General:
 - 1. Conform to requirement of ASTM A 648, AWWA C 301 and this specification.

2. Furnish test results from independent manufacturer (i.e., manufacturer with no legal or financial ties to pipe manufacturer). Tests must have been performed within 12 months prior to submittal or when supplier changes.
 3. Test foreign manufactured wire by local independent laboratory.
 4. Prestressing wire surface temperature: not more than 360 degrees at any point in drawing process. Audit surface temperature of wire throughout length of wire drawing process daily for each working shift producing ASTM A 648 wire.
 5. Do not use wire with visible pitting or rust that cannot be wiped off.
 6. Do not use wire that fails, for no observable mechanical reason other than tension force, during circumferential wrap. Do not splice, but reject this section of wire.
- B. Perform mechanical tests per AWWA C301 - Steel Reinforcement except as modified below:
1. Retest coil for which failed torsion test sample has radial, spiral (that is, longitudinal) split visible to unaided eye or evidenced by abrupt offset in wire surface detectable with fingernail.
 2. Test sample, for mechanical requirements, from 1 of each 10 consecutively produced coils or fraction thereof in each lot. Pipe manufacturer to establish procedures so samples are randomly selected from entire length of wire coils.
- C. Perform hydrogen embrittlement sensitivity testing on samples of prestressing wire. Test one set of pre-qualified samples for each anticipated wire manufacturing source anticipated by pipe manufacturer for project. Perform tension, wrapping, and torsion on wire samples. Perform pre-qualification testing prior to pipe manufacturing and for each source of supply for wire. Do not use wire failing to conform to test requirements of specification. Utilize only wire that meets both of following:
1. Passed aforementioned test.
 2. Manufactured from same source and manufacturing procedures.
- D. Hydrogen embrittlement sensitivity test.
1. Apply tensile force using lever apparatus, closed still frame in either vertical or horizontal orientation, or stable hydraulic loading system equipped with force indicator. Use chronometer with precision of at least 0.1 hour and capable of being stopped automatically on fracture of sample.

2. Use cylindrical ammonium thiocyanate (NH_4SCN_1) cell constructed of material which is inert to ammonium thiocyanate. Expose minimum 150 mm long sample to solution. Open and closed test cells permitted. Minimum internal diameter of cell (D_i): provide minimum 5 ml of solution per cm^2 of surface area of sample in contact with solution. Calculate minimum diameter as follows:

$$D_i \leq [(200 + d) \times d]^{0.5} \text{ in mm, where } d \text{ is wire diameter.}$$

3. Solution replacement is recommended, but not required, during test. When replacement is performed, continuously replace cell volume at rate not less than two times per 24hour period.
4. Sample from lot of wire in which mechanical properties have been previously determined in accordance with ASTM A 648 and AWWA C301. Provide sample consisting of minimum of one (1) full loop of wire from each of minimum of ten (10) coils. Tag each loop with appropriate heat number and coil number permanently identifying source of wire.
5. Provide certified mill report for each heat represented in sample, showing chemical composition, including as minimum:

Carbon (C)	Titanium (Ti)
Manganese (MN)	Nickel (Ni)
Silicon (SI)	Chromium (Cr)
Phosphorus (P)	Vanadium (V)
Sulfur (S)	Copper (Cu)
Nitrogen (N)	Molybdenum (Mo)
Aluminum (Al)	

6. Analyze dissolved hydrogen concentration for purposes of establishing baseline value prior to conducting hydrogen embrittlement sensitivity tests.
7. Test minimum of ten (10) pieces, at least one (1) piece chosen from each of ten (10) or more coils represented in lot, in ammonium thiocyanate solution for determination of time to failure.
8. Clean each test piece by wiping with soft cloth and degreased in acetone, or in trichlorethylene, and air dry. Protect test piece by varnish or similar means, as necessary, in zones where it enters test cell to prevent crevice corrosion failures at these locations. When necessary, extend protection at least 25 mm into cell.
9. Place ammonium thiocyanate, solution concentration of 200 grams (99 percent) pure NH_4SCN per 800 ml of water, cell on test sample. Seal in place and then place cell/test sample assembly in tensioning device.

10. Apply load to test piece until force equal to 70 percent of ASTM A 648 class minimum tensile load is indicated. Maintain force within ± 2.0 percent for duration of test.
 11. Upon completion of application of force, fill cell with ammonium thiocyanate solution, preheated to temperature of 50 degree C ± 1 degree C. Fill cell within one minute. Upon completion, set chronometer to zero to indicate test starting point.
 12. Check applied force and adjust as necessary to ensure force is maintained within specified range at appropriate time intervals throughout test. Record times when force was checked or adjusted.
 13. Adjust temperature of test solution in cell to 50 degree C ± 1 degree C within 5 minutes of starting test. Maintain temperature throughout test.
 14. Test is completed on fracture of sample or test time reaching 150 hours. Note time to fracture on chronometer, recorded to nearest 0.1 hour.
 15. When fracture occurs elsewhere than within exposed test length, test is invalid. Record no time.
- E. Hydrogen embrittlement sensitivity report, include following:
1. Test samples:
 - a. Wire manufacturer.
 - b. Size and class of wire with heat number.
 - c. Mechanical properties indicated by mean results from other required physical tests.
 - d. Chemical composition.
 2. Test conditions:
 - a. Cell design: open or closed, with or without solution replacement and replacement rate.
 - b. Physical length of test sample (exposed).
 - c. Deviations from specified procedure.
 - d. Copy of this specification and statement that procedures described herein have been followed, except where noted otherwise.
 3. Report results:

- a. Description of type of fracture and presence or absence of pitting and splits for each sample.
 - b. Position of sample fracture in relation to test cell.
 - c. Table of individual sample times to failure.
 - d. Mean lifetime to failure and standard deviation for samples of diameter and class from wire manufacturer, using same wire drawing procedures.
4. Evaluate performance of wire in general, and specific performance as defined by following pass/fail criterion:
- a. Pass/fail criterion for ASTM A 648 prestressing wire. Wire considered passing provided mean time to failure minus one standard deviation for ten samples tested exceeds 75 hours.
 - b. Time to failure in hydrogen charging test of individual sample from group of ten (10) samples tested and reported less than 75 hours. When one sample from group of ten (10) samples tested fails in less than 75 hours, single sample retest is permitted on sample from same loop of wire.
 - 1) Reject lot when retest is less than 75 hours.
 - 2) When retest is greater than 75 hours, use time (to failure) to replace rejected data in ten (10) sample groups mean and standard deviation from adjusted result.

2.03 GROUT FOR JOINTS AND SPECIAL APPLICATION

A. Joint Grout:

1. Cement Grout Mixture: One part cement to two parts of fine, sharp clean sand. Mix interior joint mortar with as little water as possible until very stiff but workable. Mix exterior joint mortar with water until it has consistency of thick cream.
2. Water: Potable water with total dissolved solids less than 1000 mg/l; ASTM D 512 chloride ions less than 100 mg/l for slurry and mortar cure; ASTM D 1293 pH greater than 6.5. Use potable water with 250 ppm limit on chlorides and sulfates.
3. Portland Cement: ASTM C 150, Type I or II. Provide one type of cement for entire project.
4. Sand:

- a. Interior joints: ASTM C 35 fine graded plaster sand.
 - b. Exterior joints: ASTM C 33 natural sand with 100 percent passing No. 16 sieve.
5. Mix cement grout to specific gravity of 19 lb/gallon or greater as measured by grout/slurry balance. Use balance manufactured grout/slurry by Baroid or approved equal. Perform test in presence of and at request of Project Manager. Add additional cement grout or water to mixed cement grout to bring mix to proper moisture content or specific gravity. Discard cement grout that has been mixed more than 20 minutes and is not at proper specific gravity or moisture content.
- B. Provide approved Nonshrink Grout for Special Applications, Patches and Repairs.
1. Conform to requirements of ASTM C 1107, Nonshrink Grout.
 2. Pre-blended factory-packaged material manufactured under rigid quality control.
 3. Contain non-metallic natural aggregate, be non-staining and non-corrosive.
 4. Meeting NSF 61 Standard suitable for use in contact with potable water supply.
 5. Exterior: Highly flowable to fill joint wrapper without leaving voids or trapped air. Interior capable of being placed with plastic consistency.
 6. Non-bleeding and non-segregating at fluid consistency.
 7. Contain no chlorides or additives which may contribute to corrosion of prestressed concrete cylinder pipe.
 8. Free of gas-producing, gas-releasing agents.
 9. Resist attack by oil or water.
 10. Mix, place, and cure in accordance with manufacturer's recommendations. Upon 72 hours notice, provide services of qualified representative of nonshrink grout manufacturer to aid in use of product under job conditions.
 11. Mix non-shrink grout to specific gravity of 17.7 lb/gallon or greater as measured by grout/slurry balance. Use grout/slurry balance manufactured by Baroid or approved equal. Perform test in presence of and at request of Project Manager. Add additional cement grout or water to bring mix to proper moisture content or specific gravity. Discard grout that has been mixed more than 20 minutes and is not at proper specific gravity or moisture content.

12. Compressive strength: ASTM C 1107 2500 psi minimum 7-day unconfined; 5000 psi minimum 28-day unconfined.
- C. Finished surface of lining and interior joint to be comparable to surface rubbed with No. 16 carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections, and to produce smooth, dense surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.
- D. Joint Wrapper: Minimum width of 9 inches for 33-inch diameter and smaller; minimum width of 12 inches for diameters greater than 33 inch hemmed at edge to allow threading with minimum 5/8-inch-wide steel strap. Provide minimum 6-inch-wide wire Ethafoam strip sized, positioned, and sewn circumferential in center of wrapper.

2.04 CATHODIC PROTECTION

- A. Connect each joint of pipe with bonding straps or approved devices to maintain continuity of current. Provide bonding straps free of foreign material.
- B. Electrically isolate water line from other connections. Use insulating type joints or nonmetallic pipe unless otherwise indicated on Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Conform to requirements of Section 02511 - Water Lines. Do not install pipe without approved lay schedule.
- B. Manufacturer will make available services of representative, throughout project duration when deemed necessary by Project Manager, to advise aspects of installation including but not limited to handling, storing, cleaning and inspecting, coatings and linings repairs, and general construction methods affecting pipe.
- C. Bedding and Backfilling:
 1. Conform to requirements of Section 02317 - Excavation and Backfill for Utilities.
 2. Align pipe at proper grade prior to joint connection and do not shift after jointing operation has been completed.
 3. Do not move trench support system (trench safety system) once bedding material is compacted.

4. Excavate outside specified trench section for bell holes, and for spaces sufficient to permit removal of slings. Provide bell holes at proper locations for unrestricted access to joint. Form bell holes large enough to facilitate joint wrapping and to permit visual examination of process. Enlargement of bell holes as required or directed by Project Manager. Subsequent backfilling thereof will not be considered as authorized additional excavation and backfill. Backfill bell holes and spaces to satisfaction of Project Manager.
 5. Remove blocking after placing sufficient backfill to hold pipe in position.
 6. Use cement-stabilized sand in areas of trench excavation 16 feet and greater, as bedding material up to springline of pipe.
- D. Follow nonshrink grout manufacturer's specifications for nonshrink grouting.
- E. Deviation of installed pipe in any one pipe section from line and grade shown on approved shop drawing layout will not exceed 2 inches from grade and 3 inches from line. No deviation from line and grade at contact interfaces are allowed.
- F. Install each pipe section in sequence identified on lay schedule. Deviations from lay schedule sequence shall be approved by Project Manager and denoted on final lay schedule.
- G. Use adequate surveying methods, procedures and employ competent surveying personnel to ensure pipe sections are laid to line and grade and within stipulated tolerances. Measure and record, in form approved by Project Manager, in-place survey data for pipe laid each day and submit copy of data to Project Manager at end of that day. Survey data to include unique pipe number, deflection angle at pipe joint and whether beveled ends were used, invert elevation at pipe joint, deviation of joint from project line, deviation of joint from project grade, inside pipe joint lap measured at top, bottom, and at springline (each side).
- H. Static Electricity:
1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.
 2. Electrically test where required after installation of pipeline is complete.

3.02 CLOSURES AND APPROVED PIPE MODIFICATIONS

- A. No modifications of standard pipe for closures will be permitted in field. No field cutting of pipe or exposure of prestressed wire is permitted without written approval from Project Manager.
- B. Pipe manufacturer's representative and Project Manager to entirely witness closures and approved pipe modification efforts.

- C. Provide minimum lap of 4 inches between member being joined and end of butt strap. Weld on both interior and exterior, unless otherwise approved by Project Manager.
- D. Provide full circumferential welds on joints required to be welded. Employ independent certified testing laboratory, approved by Project Manager, to perform weld tests on field welds. Include cost of testing in contract unit price for water line. Use magnetic particle test method for lap welds or X-ray methods for butt welds, for 100 percent of joint welds. Maintain records of tests. When defective weld is revealed, repair defective weld, and retest. Use wire and flux from same manufacturer throughout entire project.
- E. Fill wrapper in field and allow excess grout water to seep out. Refill wrapper as necessary. When joint mortar level has stabilized and begun to mechanically stiffen, lap Ethafoam wrapper over top of joint, and secure in place.
- F. Stretch test each gasket splice to twice its unstretched length and inspect for defects.

3.03 VISIBLE CRACKS

- A. No visible cracks longer than 6 inches, measured to be within 15 degrees of line parallel to pipe longitudinal axis, are permitted except:
 - 1. In surface laitance of centrifugally cast concrete,
 - 2. In sections of pipe with steel reinforcing collars or wrappers, or
 - 3. Within 12 inches of pipe ends.
- B. Repair interior lining cracks that exceed 1/16-inch (0.0625 inches) wide.
- C. Reject pipe with exterior coating cracks that exceed 0.01 inches wide.
- D. Immediately remove pipe from site when pipe has cracks exceeding limitations and cracks are not repairable.

3.04 FIELD REPAIR PROCEDURES FOR COATING/LINING

- A. Areas less than or equal to 6 inches in diameter: Patch honeycomb and minor defects in concrete surfaces with non shrink grout conforming to section 2.03 B. Use only manual or small (low pressure) air chisels to chip away mortar coating or lining. Cut out unsatisfactory material and replace with nonshrink grout, securely bonded to existing coating or lining. Finish junctures between patches and existing concrete as inconspicuous as possible. Strike off nonshrink grout flush with surrounding surface after patch has stiffened sufficiently to allow for greatest portion of shrinkage. Finish surface in accordance with lining requirements.

- B. Pipe with defective coating areas greater than 6 inches in diameter cannot be used. Immediately remove pipe from project.
- C. Reject pipe when steel cylinder is dented while making field repair. Immediately remove pipe from project.

END OF SECTION

Section 02511

WATER LINES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of water lines.
- B. Specifications identify requirements for both small diameter water lines and large diameter water lines. When specifications for large diameter water lines differ from those for small diameter water lines, large diameter specifications will govern for large diameter pipe.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for water lines installed by open-cut, augered with or without casing, aerial crossing, pipe offset section or within limits of Potentially Petroleum Contaminated Area (PPCA) is on linear foot basis for each size of pipe installed. Separate pay items are used for each type of installation.
 - a. Mains: Measure along axis of pipe and include fittings and valves.
 - b. Branch Pipe: Measure from axis of water line to end of branch.
 - 2. Payment for interconnection is on lump sum basis for each interconnection identified on Drawings. Payment will include tapping sleeve and valves piping, connections and other related work necessary for construction as shown on Drawings or specified herein.
 - 3. Payment for removal of existing internal elliptical or dished head plug is on unit price basis for each internal elliptical or dished head plug removed. Payment will include deletion of plug, drainage or dewatering of water lines, repair of damaged linings, rechlorination and items incidental to operation.
 - 4. Payment for plug and clamp is on a unit price basis for each size of pipe.
 - 5. Payment for drainline connection with service manhole is on unit price basis for each drainline shown on drawings. Payment includes valve, access manhole and connection.
 - 6. Payment for cylindrical corrosion barriers is on a unit price basis for each pipe fitting installed with one or more barriers.

7. When directed by Project Manager to install extra fittings as required to avoid unforeseen obstacles, payment will be based on the following:
 - a. Each extra fitting requested by Project Manager and delivered to jobsite will be paid according to unit price for "Extra Fittings in Place."
 - b. Payment will include and be full compensation for items necessary for installation and operation of water line.
8. No separate payment is to be made for pavement removal and replacement for augering, tunneling, or other trenchless methods of installation.
9. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ANSI A 21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- B. ANSI/NSF Standard 61 - Drinking Water System - Health Components.
- C. ASTM A 36 - Standard Specification for Carbon Structural Steel.
- D. ASTM A 536 - Standard Specification for Ductile Iron Castings.
- E. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- F. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
- G. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
- H. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod and Bar.
- I. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
- J. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
- K. ASTM E 709 - Standard Guide for Magnetic Particle Examination.

- L. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
- M. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
- N. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inches through 144 Inches.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Conform to submittal requirements of applicable Section for type of pipe used.
- C. Photographs: Submit photographs conforming to requirements of Section 01321 - Construction Photographs prior to commencement of construction.
- D. Submit videotapes conforming to requirements of Section 01323 - Construction Videotapes, if applicable.
- E. Submit Lone Star notification transmittal number prior to beginning excavation.
- F. Submit, a minimum of 15 days before beginning pipe laying operations, layout drawing identifying proposed sections for disinfecting, hydrostatic testing and site restoration for entire project for review and approval. Layout drawing to identify sequence of sections for:
 - 1. Disinfection; not to exceed 4,000 linear feet per section.
 - 2. Hydrostatic testing and transfer of services; to immediately follow sequence of disinfected section.
 - 3. Site restoration; not to exceed limits specified; sequence in order of disturbance.

PART 2 P R O D U C T S

2.01 PIPE MATERIALS

- A. Install pipe materials which conform to following:
 - 1. Section 02501 - Ductile Iron Pipe and Fittings.
 - 2. Section 02502 - Steel Pipe and Fittings. Water line piping within plant site and aerial crossings to be welded joint steel pipe with flange or approved restraint joint connections, unless otherwise shown on Drawings.
 - 3. Section 02506 - Polyvinyl Chloride Pipe.

4. Section 02507 - Prestressed Concrete Cylinder Pipe.
 5. Section 02518 - Steel Pipe and Fittings for Large Diameter Water Lines.
 6. Section 02613 - Bar-Wrapped Steel Cylinder Pipe.
- B. Conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and have certified by an organization accredited by ANSI.
- C. Type of pipe materials used is Contractor's option unless specifically identified on Drawings.
- D. Provide minimum of 3/8 inch inside joint recess between ends of pipe in straight pipe sections.
- 2.02 WELDED JOINT PROTECTION FITTING FOR SMALL DIAMETER STEEL PIPE
- A. Cylindrical Corrosion Barrier: Provide approved cylindrical corrosion barrier.
- B. O-rings: Conform to National Sanitary Foundation requirements.
- 2.03 RESTRAINED JOINTS
- A. Ductile-Iron Pipe: See Section 02501 - Ductile Iron Pipe and Fittings.
- B. PVC Pipe: See Section 02506 - Polyvinyl Chloride Pipe. Perform hydrostatic testing in accordance with ASTM F 1674.
- C. Prestressed Concrete Cylinder Pipe, Bar-Wrapped Pipe and Steel Pipe: Welded joints (see Paragraph 3.06C).
- D. As an alternative to pipe with an integral restrained joint system, restrained joint fittings may be provided where required on DIP and PVC pipe meeting the following requirements:
1. Restraint Devices: Manufacture of high-strength ductile iron, ASTM A 536 up to 24 inches, and ASTM A 36 for sizes greater than 30 inches. Working pressure rating twice that of design test pressure.
 2. Bolts and Connecting Hardware: High-strength low-alloy material in accordance with ANSI A21.11/AWWA C111.
- E. Ductile Iron Pipe in auger holes must be provided with integral restrained joints at both the bell and the spigot.

2.04 COUPLINGS AND APPURTENANCES FOR LARGE DIAMETER WATERLINE

A. Flexible (Dresser-type) Couplings:

1. Install where shown on Drawings or where allowed by Project Manager for Contractor's convenience. Use galvanized flexible couplings when installed on galvanized pipe which is cement lined, or when underground. Provide gaskets manufactured from neoprene or Buna-N.
2. For steel pipe, provide approved sleeve-type flexible couplings. Thickness of middle ring equal to or greater than thickness of pipe wall.
3. Provide approved flanged adapter couplings for steel pipe.
4. Use Type 316 stainless steel bolts, nuts and washers where flexible couplings are installed underground. Coat entire coupling with 20-mil of approved coal-tar coating.

B. Flap Valves: Provide approved flap valves on discharge of manhole drainline as shown on Drawings.

1. Body and Flap: ASTM A 126-B cast iron.
2. Seats: ASTM B 21-CA482 or ASTM B 301-CA145 bronze.
3. Resilient Seat:
4. Hinge Arms: ASTM B 584-CA865 high tensile bronze.
5. Hinge Pins: ASTM B 98-CA655 silicon bronze.

PART 3 EXECUTION

3.01 PREPARATION

- A. Conform to applicable installation specifications for types of pipe used.
- B. Employ workmen who are skilled and experienced in laying pipe of type and joint configuration being furnished. Provide watertight pipe and pipe joints.
- C. Lay pipe to lines and grades shown on Drawings.
- D. Confirm 9 feet minimum separation from gravity sanitary sewers and manholes or separation of 4 feet minimum from force mains as specified in this Section in all directions unless special design is provided on Drawings.

- E. Where above clearances cannot be attained, and special design has not been provided on Drawings, obtain direction from Project Manager before proceeding with construction.
- F. Inform Project Manager if unmetered sprinkler or fire line connections exist which are not shown on Drawings. Make transfer only after approval by Project Manager.
- G. For projects involving multiple subdivisions or locations, limit water line installation to maximum of two project site locations. Maximizing two pipe installation crews shall be permitted, unless otherwise approved by Project Manager.
- H. Owner Utility Operations Division will handle, at no cost to Contractor, operations involving opening and closing valves for wet connections and for chlorination. Contractor is responsible for handling necessary installations and removal of chlorination and testing taps and risers.
- I. If asbestos-cement (A.C.) pipe is encountered, follow safety practices outlined in American Water Works Association's publication, "Work Practices for A/C Pipe." Strictly adhere to "recommended practices" contained in this publication and make them "mandatory practices" for this Project.
- J. For pipe diameters 36 inches and greater, clearly mark each section of pipe and fitting with unique designation on inside of pipe along with pressure class. Locate unique identifying mark minimum of 5 feet away from either end of each section of pipe. Provide one unique identifying mark in middle of each fitting. Place markings at consistent locations. Use permanent black paint and minimum letter height of 4 inches to mark designations.
- K. Contractor is responsible for assuring chosen manufacturer fulfills requirements for extra fittings and, therefore, is responsible for costs due to downtime if requirements are not met.
- L. Do not remove plugs or clamps during months of peak water demands; June, July and August, unless otherwise approved by Project Manager.

3.02 HANDLING, CLEANING AND INSPECTION

- A. Handling:
 - 1. Place pipe along project site where storm water or other water will not enter or pass through pipe.
 - 2. Load, transport, unload, and otherwise handle pipe and fittings to prevent damage of any kind. Handle and transport pipe with equipment designed, constructed and arranged to prevent damage to pipe, lining and coating.

- Do not permit bare chains, hooks, metal bars, or narrow skids or cradles to come in contact with coatings. Where required, provide pipe fittings with sufficient interior strutting or cross bracing to prevent deflection under their own weight.
3. Hoist pipe from trench side into trench by means of sling of smooth steel cable, canvas, leather, nylon or similar material.
 4. For large diameter water lines, handle pipe only by means of sling of canvas, leather, nylon, or similar material. Sling shall be minimum 36 inches in width. Do not tear or wrinkle tape layers.
 5. Use precautions to prevent injury to pipe, protective linings and coatings.
 - a. Package stacked pipe on timbers. Place protective pads under banding straps at time of packaging.
 - b. Pad fork trucks with carpet or other suitable material. Use nylon straps around pipe for lift when relocating pipe with crane or backhoe.
 - c. Do not lift pipe using hooks at each end of pipe.
 - d. Do not place debris, tools, clothing, or other materials on pipe.
 6. Repair damage to pipe or protective lining and coating before final acceptance.
 7. For cement mortar line and coated steel pipe and PCCP, permit no visible cracks longer than 6 inches, measured within 15 degrees of line parallel to pipe longitudinal axis of finished pipe, except:
 - a. In surface laitance of centrifugally cast concrete.
 - b. In sections of pipe with steel reinforcing collars or wrappers.
 - c. Within 12 inches of pipe ends.
 8. Reject pipe with visible cracks (not meeting exceptions) and remove from project site.
- B. **Cleaning:** Thoroughly clean and dry interior of pipe and fittings of foreign matter before installation, and keep interior clean until Work has been accepted. Keep joint contact surfaces clean until jointing is completed. Do not place debris, tools, clothing or other materials in pipe. After pipe laying and joining operations are completed, clean inside of pipe and remove debris.

- C. Inspection: Before installation, inspect each pipe and fitting for defects. Reject defective, damaged or unsound pipe and fittings and remove them from site.

3.03 EARTHWORK

- A. Conform to applicable provisions of Section 02317 - Excavation and Backfilling for Utilities and Section 02447 - Augering Pipe and Conduit.
- B. Bedding: Use bedding materials in conformance with Section 02320 - Utility Backfill Materials.
- C. Backfill: Use bank run sand or earth or native soil as specified in Section 02320 - Utility Backfill Materials. Backfill excavated areas in same day excavated. When not possible, cover excavated areas using steel plates on paved areas and other protective measures elsewhere.
- D. Place material in uniform layers of prescribed maximum loose thickness and wet or dry material to approximately optimum moisture content. Compact to prescribed density. Water tamping is not allowed.
- E. Pipe Embedment: Including 6-inch pipe bedding and backfill to 12 inches above top of pipe.

3.04 PIPE CUTTING

- A. Cut pipe 12 inches and smaller with standard wheel pipe cutters. Cut pipe larger than 12 inches in manner approved by Project Manager. Make cuts smooth and at right angles to axis of pipe. Bevel plain end with heavy file or grinder to remove sharp edges.

3.05 PIPING INSTALLATION

- A. General Requirements:
 - 1. Lay pipe in subgrade free of water.
 - 2. Make adjustments of pipe to line and grade by scraping away subgrade or filling in with granular material.
 - 3. Properly form bedding to fully support bell without wedging or blocking up bell.
 - 4. Open Cut Construction: Keep pipe trenches free of water which might impair pipe laying operations. Grade pipe to provide uniform support along bottom of pipe. Excavate for bell holes after bottom has been graded and in advance of placing pipe. Lay not more than nominal Owner block length of not more than 300 feet of pipe in trench ahead of backfilling operations. Cover or backfill laid pipe if pipe laying operations are

interrupted and during non-working hours. Place backfill carefully and simultaneously on each side of pipe to avoid lateral displacement of pipe and damage to joints. If adjustment of pipe is required after it has been laid, remove and re-lay as new pipe.

- B. Install pipe continuously and uninterrupted along each street on which work is to be performed. Obtain approval of Project Manager prior to skipping any portion of Work.
- C. Protection of Pipeline: Securely place stoppers or bulkheads in openings and in end of line when construction is stopped temporarily and at end of each day's work.
- D. Perform Critical Location as shown on Drawings. Refer to Section 02317 - Excavation and Backfill for Utilities for additional requirements at critical locations.
- E. Laying Large Diameter Water Line:
 - 1. Lay not more than 50 feet of pipe in trench ahead of backfilling operations.
 - 2. Dig trench proper width as shown. When trench width below top of pipe becomes 4 feet wider than specified, install higher class of pipe or improved bedding, as determined by Project Manager. No additional payment will be made for higher class of pipe or improved bedding.
 - 3. Use adequate surveying methods and equipment; employ personnel competent in use of this equipment. Horizontal and vertical deviations from alignment as indicated on Drawings shall not exceed 0.10 feet. Measure and record "as-built" horizontal alignment and vertical grade at maximum of every 100 feet on record drawings.
 - 4. Prevent damage to coating when placing backfill. Use backfill material free of large rocks or stones, or other material which could damage coatings.
 - 5. Before assembling couplings, lightly coat pipe ends and outside of gaskets with cup grease or liquid vegetable soap to facilitate installation.
 - 6. Prior to proceeding with critical tie-ins, submit sequence of work based on findings from "critical location" effort.
- F. Perform following additional procedures when working on plant sites.
 - 1. Seventy-two hours prior to each plant shutdown or connection, schedule coordination meeting with Project Manager and Water Production personnel. At this meeting, present proposed sequencing of Work and

- verification of readiness to complete Work as required and within time permitted. Do not proceed with Work until Project Manager agrees key personnel, equipment and materials are on hand to complete Work.
2. Prior to fully excavating around existing piping, excavate as minimal as possible to confirm type and condition of existing joints. Verify size, type, and condition of pipe prior to ordering materials or fully mobilizing for Work.
 3. Do not proceed with connections to existing piping and identified critical stages of work unless approved by Project Manager and Owner's operator is present to observe.
 4. Coordinate with Owner's operator to obtain reduction in operating pressures prior to performing connections to existing piping.
 5. Make connections to existing piping only when two valves are closed off between connection and source of water pressure. Do not make connection relying solely on one valve, unless otherwise approved by Project Manager.
 6. Perform critical stages of Work identified on Drawings at night or during low water demand months as specified in Section 01110 - Summary of Work.
 7. Excavation equipment used on plant sites to have smooth bucket; no teeth or side cutters.
 8. Submit to Project Manager Lone Star Notification transmittal number prior to beginning excavation.
 9. Before each "dig" with mechanical excavator, probe ground to determine potential obstructions. Repeat procedure until existing pipe is located or excavation reaches desired elevation. Perform excavations within one foot to existing piping by hand methods.
 10. Provide adequate notice to pipe manufacturer's representative when connecting or modifying existing prestressed or pretension concrete cylinder pipe.
 11. Provide field surveyed (horizontal and vertical elevations) "as-builts" of new construction and existing underground utilities encountered. Submit in accordance with Section 01330 - Submittal Procedures.
 12. Prior to performing plant work to be done on weekend, provide list of sites and contact person with phone numbers to Project Manager by noon on Thursday of week. Contact person must be accessible during weekend,

have Houston Metro Area phone number, and be authorized to make emergency decisions.

13. No night work or plant shutdown will be scheduled to begin two working days before or after designated Owner Holidays.

- G. For tie-ins to existing water lines, provide necessary material on hand to facilitate connection prior to shutting down existing water line. Provide Owner a minimum of two weeks notice prior to shutting down existing water line.

3.06 JOINTS AND JOINTING

- A. Rubber Gasketed Bell-and-Spigot Joints for Concrete Cylinder Pipe, Bar Wrapped Pipe PVC, Steel, and DIP:

1. After rubber gasket is placed in spigot groove of pipe, equalize rubber gasket cross section by inserting tool or bar recommended by manufacturer under rubber gasket and moving it around periphery of pipe spigot.
2. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined.
3. Fit pipe units together in manner to avoid twisting or otherwise displacing or damaging rubber gasket.
4. After pipe sections are joined, check gaskets to ensure that no displacement of gasket has occurred. If displacement has occurred, remove pipe section and remake joint as for new pipe. Remove old gasket, inspect for damage and replace if necessary before remaking joint.
5. Where preventing movement of 16-inch diameter or greater pipe is necessary due to thrust, use restrained joints as shown on Drawings.
 - a. Include buoyancy conditions for soil unit weight when computing thrust restraint calculations.
 - b. Do not include passive resistance of soil in thrust restraint calculations.
6. Except for PVC pipe, provide means to prevent full engagement of spigot into bell as shown on Drawings. Means may consist of wedges or other types of stops as approved by Project Manager.

- B. Flanged Joints where required on Concrete Cylinder Pipe, Bar Wrapped Pipe, Ductile Iron Pipe, or Steel Pipe:

1. AWWA C 207. Prior to installation of bolts, accurately center and align flanged joints to prevent mechanical prestressing of flanges, pipe and

- equipment. Align bolt holes to straddle vertical, horizontal or north-south center line. Do not exceed 3/64 inch per foot inclination of flange face from true alignment.
2. Use full-face gaskets for flanged joints. Provide 1/8-inch-thick cloth inserted rubber gasket material. Cut gaskets at factory to proper dimensions.
 3. Use galvanized or black nuts and bolts to match flange material. Use stainless steel nuts and bolts underground. Tighten bolts progressively to prevent unbalanced stress. Maintain at all times approximately same distance between two flanges at points around flanges. Tighten bolts alternately (180° apart) until all are evenly tight. Draw bolts tight to ensure proper seating of gaskets. Provide Densco petroleum-based tape or approved equal for all exposed portions of nuts, bolts and pipe.
 4. Full-length bolt isolating sleeves and washers shall be used with flanged connections. Furnish kits in accordance with Owner's Approved Products List.
 5. For in-line flange joints 30 inches in diameter and greater and at butterfly valve flanges, provide Pyrox G-10 with nitrite seal, conforming to ANSI A 21.11 mechanical joint gaskets. For in-line flange joints sized between 12 inches in diameter and greater and 24 inches in diameter and smaller, provide Phenolic PSI with nitrite seal gasket conforming to ANSI A 21.11 mechanical joint gaskets.
- C. Welded Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe, Steel Pipe):
1. Prior to starting work, provide certification of qualification for welders employed on project for type of work procedures and positions involved.
 2. Joints: AWWA C 206. Full-fillet, single lap-welded slip-type either inside or outside, or double butt-welded type; use automatic or hand welders; completely penetrate deposited metal with base metal; use filler metal compatible with base metal; keep inside of fittings and joints free from globules of weld metal which would restrict flow or become loose. Do not use mitered joints. For interior welded joints, complete backfilling before welding. For exterior field-welded joints, provide adequate working room under and beside pipe. Use exterior welds for 30-inch and smaller.
 3. Furnish welded joints with trimmed spigots and interior welds for 36-inch and larger pipe.
 4. Bell-and-Spigot, Lap-Welded Slip Joints: Deflection may be taken at joint by pulling joint up to 3/4 inch as long as 1-1/2-inch minimum lap is maintained. Spigot end may be miter cut to take deflections up to 5

- degrees as long as joint tolerances are maintained. Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to 5 degrees.
5. Align piping and equipment so that no part is offset more than 1/8 inch. Set fittings and joints square and true, and preserve alignment during welding operation. For butt-welded joints, align abutting ends to minimize offset between surfaces. For pipe of same nominal wall thickness, do not exceed 1/16 inch offset. Use line-up clamps for this purpose; however, take care to avoid damage to linings and coatings.
 6. Protect coal-tar-epoxy lining during welding by draping an 18-inch-wide strip of heat-resistant material over top half of pipe on each side of lining holdback to avoid damage to lining by hot splatter. Protect tape coating similarly if external welding is required.
 7. Welding Rods: Compatible with metal to be welded to obtain strongest bond, E-70XX.
 8. Deposit metal in successive layers to provide at least 2 passes or beads for automatic welding and 3 passes or beads for manual welding in completed weld.
 9. Deposit no more than 1/4 inch of metal on each pass. Thoroughly clean each individual pass with wire brush or hammer to remove dirt, slag or flux.
 10. Do not weld under weather condition that would impair strength of weld, such as wet surface, rain or snow, dust or high winds, unless work is properly protected.
 11. Make tack weld of same material and by same procedure as completed weld. Otherwise, remove tack welds during welding operation.
 12. Remove dirt, scale, and other foreign matter from inside piping before tying in sections, fittings, or valves.
 13. Welded Joints for Large Diameter Water Lines:
 - a. Furnish pipe with trimmed spigots and interior welds for 36-inch and larger pipe.
 - b. Use exterior welds for 30-inch and smaller.
 - c. Only one end may be miter cut. Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to 2-1/2 degrees.

- d. For large diameter water lines, employ an independent certified testing laboratory, approved by Project Manager, to perform weld acceptance tests on welded joints. Include cost of such testing and associated work to accommodate testing in contract unit price bid for water line. Furnish copies of test reports to Project Manager for review. Project Manager has final decision as to suitability of welds tested.
 - 1) Weld acceptance criteria:
 - a) Conduct in accordance with ASTM E165 - Standard Test Method for Liquid Penetrant Examination and ASTM E709 - Standard Guide for Magnetic Particle Examination. Use X-ray methods for butt welds, for 100 percent of joint welds.
 - b) Examine welded surfaces for the following defects:
 - i. Cracking.
 - ii. Lack of fusion/penetration.
 - iii. Slag which exceeds one-third (t) where (t) equals material thickness.
 - iv. Porosity/Relevant rounded indications greater than 3/16 inch; rounded indication is one of circular or elliptical shape with length equal to or less than three times its width.
 - v. Relevant linear indications in which length of linear indication exceeds three times its width.
 - vi. Four or more relevant 1/16-inch rounded indications in line separated by 1/16 inch or less edge to edge.
14. After pipe is joined and prior to start of welding procedure, make spigot and bell essentially concentric by jacking, shimming or tacking to obtain clearance tolerance around periphery of joint except for deflected joints.
15. Furnish each welder employed steel stencil for marking welds, so work of each welder can be identified. Mark pipe with assigned stencil adjacent to weld. When welder leaves job, stencil must be voided and not duplicated. Welder making defective welds must discontinue work and leave project site. Welder may return to project site only after recertification.

16. Provide cylindrical corrosion barriers for epoxy-lined steel pipe 24-inch diameter and smaller, unless minimum wall thickness is 0.5 inch or greater.
 - a. In addition to welding requirements contained here in Paragraph 3.06, conform to protection fitting manufacturer's installation recommendations.
 - b. Provide services of technical representative of manufacturer available on site at beginning of pipe laying operations. Representative to train welders and advise regarding installation and general construction methods. Welders must have 12 months prior experience installing protection fittings.
 - c. All steel pipe is to have cutback 3/4 inch to no greater than 1 inch of internal diameter coating from weld bevel.
 - d. Furnish steel fittings with cylindrical corrosion barriers with shop welded extensions to end of fittings. Extension length to measure no less than diameter of pipe. Shop apply lining in accordance with AWWA C 210 or AWWA C 213.
 - e. All steel pipe receiving field adjustments are to be cold cut using standard practices and equipment. No cutting using torch is to be allowed.

D. Harnessed Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe):

1. Use of snap-ring type restrained joints on pipe is limited to 20-inch through 48-inch diameters.
2. Position snap-ring joint bolt on top (12 o'clock portion). Provide minimum 1/2-inch joint recess. Use joint "diapers" minimum of 12 inches wide.
3. For field adjustments with deflections beyond manufacturer's recommendations:
 - a. Field trim spigot.
 - b. Do not engage ring.
4. Harnessed joints are not permitted in areas defined on Drawings as potentially petroleum contaminated material, in tunnels, or at bend greater than 5 degrees.
5. Install harness type joints including snap rings at straight sections of pipe.

E. Restrained Joints:

1. For existing water lines and water lines less than 16 inches in diameter, restrain pipe joints with concrete thrust blocks.
2. Thrust restraint lengths shown on Drawings are minimum anticipated lengths. These lengths are based on deflections indicated and on use of prestressed concrete cylinder pipe for large diameter lines and ductile iron pipe for small diameter lines. Adjustments in deflections or use of other pipe material may result in reduction or increase of thrust lengths. Perform calculations by pipe manufacturer to verify proposed thrust restraint lengths. Submit calculations for all pipe materials sealed by a registered Professional Engineer in State of Texas for review by Project Manager. Make adjustments in thrust restraint lengths at no additional cost to Owner.
3. Passive resistance of soil will not be permitted in calculation of thrust restraint.
4. For 16-inch lines and larger use minimum 16-foot length of pipe in and out of joints made up of beveled pipe where restraint joint lengths are not identified on Drawings. Otherwise, provide restraint joints for a minimum length of 16 feet on each side of beveled joints.
5. Installation.
 - a. Install restrained joints mechanism in accordance with manufacturer's recommendations.
 - b. Examine and clean mechanism; remove dirt, debris and other foreign material.
 - c. Apply gasket and joint NSF 61 FDA food grade approved lubricant.
 - d. Verify gasket is evenly seated.
 - e. Do not over stab pipe into mechanism.
6. Prevent any lateral movement of thrust restraints throughout pressure testing and operation.
7. Place 2500 psi concrete conforming to Section 03315 - Concrete for Utility Construction, for blocking at each change in direction of existing water lines, to brace pipe against undisturbed trench walls. Finish placement of concrete blocking, made from Type I cement, 4 days prior to hydrostatic testing of pipeline. Test may be made 2 days after completion of blocking if Type II cement is used.

F. Joint Grout (Concrete Cylinder Pipe, Bar Wrapped Pipe, Steel Pipe):

1. Mix cement grout mixture by machine except when less than 1/2 cubic yard is required. When less than 1/2 cubic yard is required, grout may be hand mixed. Mix grout only in quantities for immediate use. Place grout within 20 minutes after mixing. Discard grout that has set. Retempering of grout by any means is not permitted.
2. Prepare grout in small batches to prevent stiffening before it is used. Do not use grout which has become so stiff that proper placement cannot be assured without rettempering. Use grout for filling grooves of such consistency that it will adhere to ends of pipe.
3. Surface Preparation: Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces with wire brush or hammer to sound, clean surface. Remove rust and foreign materials from metal surfaces in contact with grout.
4. Follow established procedures for hot and cold weather concrete placement.
5. Complete joint grout operations and backfilling of pipe trenches as closely as practical to pipe laying operations. Allow grouted exterior joints to cure at least 1 hour before compacting backfill.
6. Grouting Exterior Joint Space: Hold wrapper in place on both sides of joint with minimum 5/8-inch-wide steel straps or bands. Place no additional bedding or backfill material on either side of pipe until after grout band is filled and grout has mechanically stiffened. Pull ends of wrapper together at top of pipe to form access hole. Pour grout down one side of pipe until it rises on other side. Rod or puddle grout to ensure complete filling of joint recess. Agitate for 15 minutes to allow excess water to seep through joint band. When necessary, add more grout to fill joint completely. Protect gap at top of joint band from backfill by allowing grout to stiffen or by covering with structurally protective material. Do not remove band from joint. Proceed with placement of additional bedding and backfill material.
7. Interior Joints for Pipe 24 Inches and Smaller: Circumferentially butter bell with grout prior to insertion of spigot, strike off flush surplus grout inside pipe by pulling filled burlap bag or inflated ball through pipe with rope. After joint is engaged, finish off joint grout smooth and clean. Use swab approved by Project Manager for 20-inch pipe and smaller.
8. Protect exposed interior surfaces of steel joint bands by metallizing, by other approved coatings, or by pointing with grout. Joint pointing may be omitted on potable water pipelines if joint bands are protected by zinc metallizing or other approved protective coatings.

9. Remove and replace improperly cured or otherwise defective grout.
 10. Strike off grout on interior joints and make smooth with inside diameter of pipe.
 11. When installed in tunnel or encasement pipe and clearance within casing does not permit outside grout to be placed in normal manner, apply flexible sealer, such as Flex Protex or equal, to outside joint prior to joint engagement. Clean and prime surfaces receiving sealer in accordance with manufacturer's recommendations. Apply sufficient quantities of sealer to assure complete protection of steel in joint area. Fill interior of joint with grout in normal manner after joint closure.
 12. Interior Joints for Water Lines 30 Inches and Larger: Clean joint space, wet joint surfaces, fill with stiff grout and trowel smooth and flush with inside surfaces of pipe using steel trowel so that surface is smooth. Accomplish grouting at end of each work day. Obtain written acceptance from Project Manager of inside joints before proceeding with next day's pipe laying operation. During inspection, insure no delamination of joint mortar has occurred by striking joint mortar lining with rubber mallet. Remove and replace delaminated mortar lining.
 13. Work which requires heavy equipment to be over water line must be completed before mortar is applied to interior joints.
- G. Large Diameter Water Main Joint Testing: In addition to testing individual joints with feeler gauge approximately 1/2 inch wide and 0.015-inch thick, use other joint testing procedure approved or recommended by pipe manufacturer which will help ensure watertight installation prior to backfilling. Perform tests at no additional cost to Owner.
- H. Make curves and bends by deflecting joints or other method as recommended by manufacturer and approved by Project Manager. Submit details of other methods of providing curves and bends which exceed manufacturer's recommended deflection prior to installation.
1. Deflection of pipe joints shall not exceed maximum deflection recommended by pipe manufacturer, unless otherwise indicated on Drawings.
 2. If deflection exceeds that specified but is less than 5 percent, repair entire deflected pipe section such that maximum deflection allowed is not exceeded.
 3. If deflection is equal to or exceeds 5 percent from that specified, remove entire portion of deflected pipe section and install new pipe.

4. Replace, repair, or reapply coatings and linings as required.
 5. Assessment of deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection or similar average measurement methods will not be deemed as meeting intent of standard.
 6. When rubber gasketed pipe is laid on curve, join pipe in straight alignment and then deflect to curved alignment.
- I. Closures Sections and Approved Field Modifications to Steel, Concrete Cylinder Pipe, Bar Wrapped Pipe and Fittings:
1. Apply welded-wire fabric reinforcement to interior and exterior of exposed interior and exterior surfaces greater than 6 inches in diameter. Welded-wire fabric: minimum W1; maximum spacing 2 inches by 4 inches; 3/8 inch from surface of steel plate or middle third of lining or coating thickness for mortar thickness less than 3/4 inch.
 2. Fill exposed interior and exterior surfaces with nonshrink grout.
 3. For pipe diameters 36 inches and greater, perform field welds on interior and exterior of pipe.
 4. For large diameter water lines, provide minimum overlap of 4 inches of butt strap over adjacent piece on butt-strap closures.

3.07 CATHODIC PROTECTION APPURTENANCES

- A. Where identified on Drawings, modify pipe for cathodic protection as detailed on Drawings and specified. Unless otherwise noted, provide insulation kits including test stations at connections to existing water system or at locations to isolate one type of cathodic system from another type, between water line, access manhole piping and other major openings in water line, or as shown on Drawings.
- B. Bond joints for pipe installed in tunnel or open cut, except where insulating flanges are provided. Weld strap or clip between bell and spigot of each joint or as shown on Drawings. No additional bonding required where joints are welded for thrust restraint. Repair coatings as specified by appropriate AWWA standard, as recommended by manufacturer, and as approved by Project Manager.
- C. Bonding Strap or Clip: Free of foreign material that may increase contact resistance between wire and strap or clip.

3.08 SECURING, SUPPORTING AND ANCHORING

- A. Support piping, as shown on Drawings and as specified in this Section, to maintain line and grade and prevent transfer of stress to adjacent structures.

- B. Where shown on Drawings, anchor pipe fittings and bends installed on water line by welding consecutive joints of pipe together to distance each side of fitting. Restrained length, as shown on Drawings, assumes that installation of pipe and subsequent hydrostatic testing begin upstream and proceed downstream, with respect to normal flow of water in pipe. If installation and testing differs from this assumption, submit for approval revised method of restraining pipe joints upstream and downstream of device used to test against (block valve, blind flange or dished head plug).
- C. Use adequate temporary blocking of fittings when making connections to distribution system and during hydrostatic tests. Use sufficient anchorage and blocking to resist stresses and forces encountered while tapping existing water line.

3.09 POLYETHYLENE WRAP FOR DUCTILE IRON PIPE

- A. Double wrap pipe and appurtenances (except fire hydrants and fusion bond or polyurethane coated fittings) with 8-mil polyethylene film.
- B. Conform to requirements of Section 02528 - Polyethylene Wrap.

3.10 CLEANUP AND RESTORATION

- A. Provide cleanup and restoration crews to work closely behind pipe laying crews and, where necessary, during disinfection and hydrostatic testing, service transfers, abandonment of old water lines, backfill and surface restoration.
- B. Unless otherwise approved by Project Manager, comply with the following:
 - 1. Once water line is installed to limits approved in layout submitted, immediately begin preparatory work for disinfection effort.
 - 2. No later than three days after completing disinfection preparatory work, submit to Owner appropriate request for disinfection.
 - 3. If Owner fails to perform initial disinfection of lines in accordance with Section 02514 - Disinfection of Water Lines, within seven days from submission of appropriate request, and if approved by Project Manager, pipe laying operations may continue beyond approved limits until the Owner responds.
 - 4. Immediately after transfer of services, begin abandonment of old water lines and site restoration.
 - 5. Do not exceed a total of 50% of total project linear feet of disturbed right-of-way and easement until site is restored in accordance with Section 01740 - Site Restoration.

6. Exceeding any of the above footage limitations shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.

 - C. For large diameter water lines, do not install more than 2,000 linear feet of water line, without previous 2,000 linear feet being restored in accordance with Section 01740 - Site Restoration. Schedule paving crews so repaving work will not lag behind pipe laying work by more than 1,000 linear feet. Failure to comply with this requirement shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.
- 3.11 CLEANING PIPING SYSTEMS
- A. Remove construction debris or foreign material and thoroughly broom clean and flush piping systems. Provide temporary connections, equipment and labor for cleaning. Owner must inspect water line for cleanliness prior to filling.
- 3.12 DISINFECTION OF WATER LINES
- A. Conform to requirements of Section 02514 - Disinfection of Water Lines.
- 3.13 FIELD HYDROSTATIC TESTS
- A. Conform to requirements of Section 02515 - Hydrostatic Testing of Pipelines.

END OF SECTION

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Section 02513

WET CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet connections for new water lines and service lines to existing water lines.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for wet connections shown on Drawings is on unit price basis for each wet connection. Separate payment will be made for each size of water line.
2. No compensation will be given for extra work or for damages occurring as result of incomplete shutoff.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract; payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 800 - Standard for Underground Service Line Valves and Fittings.

1.04 DEFINITIONS

- A. Wet connections consist of isolating sections of pipe to be connected with existing valves, draining isolated sections, and completing connections.
- B. Connection of 2-inch or smaller lines, which may be referred to on Drawings as "2-inch standard connections" or "gooseneck connections" will be measured as 2-inch wet connections. This item is not to be used as part of 2-inch service line.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe shall conform to requirements of applicable portions of Sections 02501 through 02528 related to piping materials and to water distribution.

- B. Corporation cocks and saddles shall conform to requirements of Section 02512 - Water Tap and Service Line Installation.
- C. Valves shall conform to requirements of Section 02521 - Gate Valves.
- D. Brass fittings shall conform to requirements of AWWA C 800.

PART 3 EXECUTION

3.01 CONNECTION OPERATIONS

- A. Plan wet connections in manner and at hours with least inconvenience public. Notify Project Manager at least 72 hours in advance of making connections.
- B. Do not operate valves on water lines in use by Owner. Owner operator will handle, at no cost to Contractor, operations involving opening and closing valves for wet connections.
- C. Conduct connection operations when Inspector is at job site. Connection work shall progress without interruption until complete once existing water lines have been cut or plugs have been removed for making connections.

3.02 2-INCH WET CONNECTIONS

- A. Tap water line. Use corporation cocks, saddles, copper tubing as required for line and grade adjustment, and brass fittings necessary to adapt to existing water line. Use 2-inch valves when indicated on Drawings for 2-inch copper gooseneck connections.

END OF SECTION

Section 02514

DISINFECTION OF WATER LINES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Disinfection of potable water lines.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:

1. No separate payment will be made for disinfection of water lines under this Section. Include cost in unit price of water lines being disinfected.
2. Contractor may be required to return to project after installation of water lines to conduct disinfection of water lines if water is not available at the time of completion of installation. In such case, Owner will pay for Remobilization for Disinfection of Water Lines.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 651 - Standard for Disinfecting Water Mains.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit water line disinfection plan for approval before commencing disinfection work.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 CONDUCTING DISINFECTION

- A. Promptly disinfect water lines constructed before tests are conducted on water lines and before water lines are connected to Owner's water distribution system.
- B. Water for disinfection and flushing will be furnished by Contractor.
- C. Contractor will conduct disinfection operations.
- D. Coordinate chlorination operations through Owner Operator and inspector.

3.02 PREPARATION

- A. Provide temporary blind flanges, cast-iron sleeves, plugs, necessary service taps, copper service leads, risers and jumpers of sizes, location and materials, and other items needed to facilitate disinfection of new water lines prior to connection to Owner water distribution system. Normally, each valved section of water line requires two each 3/4-inch taps. A 2-inch minimum blow-off is required for water lines up to and including 6-inch diameter.
- B. Use fire hydrants as blow-offs to flush newly constructed water lines 8-inch diameters and above. Where fire hydrants are not available on water lines, install temporary blow-off valves and remove promptly upon successful completion of disinfection and testing.
- C. Slowly fill each section of pipe with water in manner approved by Project Manager. Average water velocity when filling pipeline should be less than one foot per second and shall not, under any circumstance, exceed 2 feet per second. Before beginning disinfection operations, expel air from pipeline.
- D. Backfill excavations immediately after installation of risers or blow-offs.
- E. Install blow-off valves at end of water line to facilitate flushing of dead-end water lines. Install permanent blow-off valves according to Drawings.

3.03 DISINFECTION BY CONTRACTOR

- A. The following procedure will be used when disinfection by Contractor is required by Contract Documents:
 - 1. Use not less than 100 parts of chlorine per million parts of water.
 - 2. Introduce chlorinating material to water lines in accordance with AWWA C651.
 - 3. After contact period of not less than 24 hours, flush system with clean water until residual chlorine is no greater than 1.0 parts per million parts of water.

4. Open and close valves in lines being sterilized several times during contact period.
5. If chemical compound is used for sterilizing agent, place in pipes as directed by Project Manager.

3.04 BACTERIOLOGICAL TESTING

- A. After disinfection and flushing of water lines, bacteriological tests will be performed by Owner or testing laboratory in accordance with Section 01454 - Testing Laboratory Services. When test results indicate need for additional disinfection of water lines based upon Texas Department of Health requirements, perform additional disinfection operations.

3.05 COMPLETION

- A. Upon completion of disinfection and testing, remove risers except those approved for use in subsequent hydrostatic testing, and backfill excavation promptly.

END OF SECTION

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Section 02515

HYDROSTATIC TESTING OF PIPELINES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Field hydrostatic testing of newly installed water pipelines.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

- 1. No payment will be made for hydrostatic testing of pipelines under this Section. Include cost in unit price of pipelines being tested.
- 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Disinfect water system pipelines prior to hydrostatic testing.
- B. Hydrostatically test newly installed water pipelines after disinfection, when required, and before connecting to Owner water distribution system.
- C. Water for testing will be charged to Contractor in accordance with Owner Ordinances. Prior to hydrostatic testing, obtain a transient meter from the Owner. Deposit is required for transient meter.
- D. Test small diameter pipelines in lengths between valves or plugs of not more than 1,500 feet. Test large diameter pipelines in lengths between valves or plugs of not more than 4,400 feet.
- E. Conduct hydrostatic tests in presence of Project Manager. When testing a section of pipe between valves, applying hydrostatic pressure to the opposite side of an isolation valve is not allowed, unless otherwise approved by Project Manager.

3.02 TEST PROCEDURES

- A. Furnish, install, and operate connections, pump, meter and gages necessary for hydrostatic testing.
- B. Allow pipeline to sit minimum of 24 hours from time it is initially disinfected until testing begins, to allow pipe wall or lining material to absorb water. Periods of up to 7 days may be required for mortar lining to become saturated.
- C. For small diameter pipelines, expel air and apply minimum test pressure of 125 psi. For large diameter water lines, expel air and apply minimum test pressure of 150 psi.
- D. Begin test by 9:00 a.m. unless otherwise approved by Project Manager. Maintain test pressure for 8 hours. When large quantity of water is required to maintain pressure during test, discontinue testing until cause of water loss is identified and corrected.
- E. Keep valves inside pressure reducing stations closed during hydrostatic pressure test. When testing a section of pipe between valves, applying hydrostatic pressure to the opposite side of an isolation valve is not allowed, unless otherwise approved by Project Manager,

3.03 ALLOWABLE LEAKAGE FOR WATERLINES

- A. During hydrostatic tests, no leakage will be allowed for sections of water lines consisting of welded joints.
- B. Maximum allowable leakage:
 - 1. Water lines with non-welder joints: 3.19 gallons per inch nominal diameter per mile of pipe per 24 hours while testing. Welded and flanged joints shall not be included in measurement of pipe length for determining allowable leakage. For pipe sections that are welder or flanged on one side only, included half of the pipe section in the total length if pipe for allowable length.
 - 2. Water lines with welded and flanged joints only: zero allowable leakage.
 - 3. No leakage is allowed through any valve.
- C. For meter run installation, when work cannot be isolated and line fails pressure test, visual inspection of work by Project Manager for leakage during pressure test may be used to fulfill requirements of this section.

3.04 CORRECTION FOR FAILED TESTS

- A. Upon discovering a leak during the hydrostatic test, identify location of pipe leak. Determine magnitude and extent of impact to surrounding soil. Based on this information, Project Manager may require additional removal and replacement of surrounding pavement with no separate pavement.
- B. Repair joints showing visible leaks on surface regardless of total leakage shown on test. Check valves and fittings to ensure that no leakage occurs that could affect or invalidate test. Remove cracked or defective pipes, fittings, and valves discovered during pressure test and replace with new items.
- C. Project Manager may require failed lines to be disinfected after repair and prior to retesting. Conduct and pay for subsequent disinfection operations in accordance with requirements of Section 02514 - Disinfection of Water Lines. Pay for water required for additional disinfection and retesting.
- D. Repeat test until satisfactory results are obtained.

3.05 COMPLETION

- A. Upon satisfactory completion of testing, remove risers remaining from disinfection and hydrostatic testing, and backfill excavation promptly.

END OF SECTION

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Section 02517

WATER LINE IN TUNNELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Handling, transporting, and installing water line in primary liner tunnels, including invert cleanup and blocking and water line in casings that will be backfilled with concrete or grout.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

- 1. Payment of water line installed by tunneling is by linear foot along center line of completed water line as designated on Drawings.
- 2. Payment for installation of water line in tunnel constructed according to Section 02425 - Tunnel Excavation and Primary Liner will be authorized by Project Manager in three parts. Pay estimates for partial payments will be made as measured above according to following schedule:
 - a. 60 percent of installation will be authorized when excavation and primary liner installation is complete.
 - b. 95 percent of installation will be authorized when water line installation and grouting is complete.
 - c. 100 percent of installation will be authorized when section successfully hydrostatically tested.
- 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCE STANDARDS

- A. ASME B 40.1 - Pressure Gauge and Gauge Attachments.

1.04 SUBMITTALS

- A. Submit work plan including following information in accordance with Section 01330 - Submittals.

1. Method of transporting pipes into tunnel.
2. Method of hoisting and positioning pipe in tunnel.
3. Method of jointing and aligning pipe.
4. Method of supporting and blocking pipe.
5. Tunnel ventilation while setting pipe and completing joints, when applicable.
6. Material, equipment and procedures for grout placement and other information required by Section 02431 - Tunnel Grout.

B. Submit results of tunnel primary liner survey in accordance with Paragraph 3.02, Tunnel Survey.

C. Submit results of installed water line survey in accordance with Paragraph 3.10, As-built Survey and Installation Tolerances.

1.05 PROCEDURES

A. Joints: Prepare joints as recommended by pipe manufacturer and in accordance with Section 02511 - Water Lines.

B. Handling: Handle, store, and transport pipe in accordance with pipe manufacturer=s recommendations and to prevent damage to pipe ends, pipe barrel, steel reinforcement, and pipe protective linings.

C. Grouting: Perform grouting of annular space between water line and tunnel liner to fill voids with grout, without dislocating or damaging pipe.

PART 2 PRODUCTS

2.01 ANNULAR GROUT

A. Specified in Section 02431 - Tunnel Grout.

2.02 CONCRETE

A. Meeting requirement of Section 03315 - Concrete for Utility Construction, Class B concrete.

2.03 PIPE MATERIAL AND FITTINGS

A. Manufacture and deliver pipe material and fittings as described in Section 02511 - Water Lines.

2.04 SPACERS

- A. Unless otherwise noted on Drawings, use casing spacers between water line and casing tunnel liner for water lines less than 36 inches in diameter. Refer to Paragraph 3.01 for exception. See Section 02447 - Augering Pipe for Water Lines for spacer requirements and installation.

PART 3 EXECUTION

3.01 APPLICATION

- A. Grout in place tunnels for water lines with diameters of 36 inches or greater. When tunnel liner plate is used, grout water line in place regardless of water line diameter.

3.02 TUNNEL SURVEY

- A. Prior to installing water line in tunnel: Perform survey of tunnel in accordance with Paragraph 3.10B. Verify tunnel has been constructed within specified tolerances for line, grade, and roundness and water line to be placed in tunnel can be placed in conformance with tolerances specified. Should misalignment of tunnel preclude proper installation of water line, notify Project Manager of proposed correction method. Project Manager will make final decision on acceptability of correction.

3.03 PIPE TRANSPORT

- A. Transport pipe in tunnel for final placement so that no damage occurs to pipe ends or pipe barrel and interior lining or exterior coating. Repair pipe damaged during transport or final placement in tunnel in manner acceptable to Project Manager prior to joining. Remove damaged pipe from tunnel and replace, when directed by Project Manager, at no additional cost to Owner.

3.04 TUNNEL CLEANUP

- A. Remove temporary tunnel utilities, loose material, dirt, and debris prior to pipe placement. Broom clean concrete invert. Control seepage and remove standing water in invert.
- B. Temporary construction tracks or pipe skids may be left in place when they do not interfere with alignment of water line, short circuit cathodic protection system, or interfere with final placement of annular grout.

3.05 INVERT PIPE SUPPORT

- A. Construct invert pipe support of screeded concrete, steel beam, or other method, as approved, to final grade of outside of water line. Secure invert support to primary

liner to prevent movement. Cure concrete support minimum of 48 hours prior to setting pipe. Maintain minimum of 4 inches clearance between outside of water line and steel beam or steel member.

3.06 JOINING PIPE IN TUNNELS

- A. Lay pipe in accordance with pipe manufacturer's recommendations, and as specified in this Section. Join pipe segments so as to properly compress gaskets and allow for correct final positioning of pipe for line and grade. Closely align pipe and bring loosely together by means of hydraulic jacks, locomotives, pipe mobiles, or winches. Once pipes have been loosely joined, pull home by means of hydraulic tugger or other similar methods suitably protecting pipe and joints against damage. Impact joining, such as ramming with locomotives or other mechanical equipment, is not permitted.

3.07 BLOCKING PIPE IN TUNNEL AND BULKHEADS

- A. Develop and submit pipe blocking system that will prevent water line from floating and deforming beyond specified limits. Loads imposed on pipe, primary liner and surrounding soil during grouting shall be determined by Registered Professional Engineer in State of Texas. Show essential details in plan for supporting system. Position water line in tunnel to allow minimum of 4 inches of grout to be placed between water line and tunnel primary liner or casing.
- B. Prevent pipe from floating during backfill operations by properly installed blocking. Remove and replace segment of pipe which is distorted or moved from final line and grade.
- C. Secure blocking in place so that it cannot be dislodged during adjacent pipe laying and during grouting operations.
- D. Construct bulkheads of material, compatible with grout, to withstand imposed grout pressure without leakage. Provide bulkheads at frequency to allow completion of grouting in continuous operation and to permit timely removal of pipe and grout which may be needed as result of pipe distortion or movement. Modifications to bulkhead spacing will be reviewed by Project Manager. Provide adequate venting for bulkheads.

3.08 ANNULAR GROUT

- A. Fill annular void between water line and tunnel primary liner or casing with grout, in accordance with Section 02431 - Tunnel Grout.
- B. Test annular grout material, equipment, and procedures in accordance with approved submittal. Perform test on first 200 feet of water line to be backfilled. When grout does not totally fill annular space or other problems occur, correct

defects in first test section and adjust method or mix and rerun test on next 200 feet. Repeat procedure as necessary.

C. Placement:

1. Placement Limits: Predetermine limits of each grout placement stage by size and capacity of batching equipment and initial set time of proposed grout. Under no circumstances shall placement at grout port continue longer than period of time for mix to take initial set. Locate grout hole spacing and locations according to number of stages necessary to backfill tunnel liner. Do not install another lift until proper set has been attained. Placement procedures shall be approved by admixture or additive manufacturers.
2. Equipment - Pumps: Pumping equipment must be of sufficient size and capacity to place grout to distances and volumes compatible with batching and mixing equipment. Maintain equipment and clean thoroughly each day. No hydrocarbons shall enter pumping chamber. Under no circumstances shall grout be pumped in excess of 1000 linear feet without prior approval by Project Manager. Pumping test and verification testing of resulting grout quality will be required for approval.
3. Slickline: Convey grout to point of placement in clean steel or rubber hoses designed to handle safely pump pressure and volumes during placement. Do not allow hardened grout or concrete to obstruct or coat steel pipe or hose internally.
4. Grout Connections: Grout connections shall be sized minimum of 2-inch inside diameter, consisting of grout hose attached immediately to pressure gauge. Gauged pumping pressure shall not exceed water line manufacturer's recommendations. Monitor grout pressure.
5. Gauges:
 - a. Type: Instrument oil-filled and attached to saddle-type diaphragm seal (gauge saver) to prevent clogging with grout.
 - b. Calibration: Certified and calibrated in accordance with ASME B 40.1.
 - c. Range: Not more than 100 percent greater than design grout pressure.
 - d. Accuracy: No more than one-half percent error over full range of gauge.

- e. Fitting: Attach gauge to valve immediately attached to grout port in tunnel liner. Provide T-fitting in injection line for sampling.
 - 6. Limit pressure on annular space to prevent damage to pipe or liner. Define limiting and estimated required pressure range. Provide and monitor open ended, high point tap or equivalent vent at bulkhead opposite point of grouting.
 - 7. Pump grout until grout within 5 percent of specified density discharges from end opposite injection point to ensure grout is not diluted by extraneous water in annulus.
 - 8. Drilling of access holes from surface to facilitate grouting shall not be allowed.
 - 9. Communication: There shall be constant communications via telephone between headerman at point of injection and pump, batch plant, and supervisor. Under no circumstance shall grouting continue without continuity of communications.
 - 10. The headerman at point of placement shall advise batch plant of variations of density and make corrections as necessary. Record and submit to Project Manager for each day's pour variations and corrections.
- D. Delay grouting until all significant differential movement has stopped as determined by monitoring.
 - E. Remove bulkheads unless constructed of masonry.
 - F. Repair or replace damage or distortion to water line.

3.09 GROUTING JOINTS

- A. Materials and procedures for filling interior joint recesses shall conform to Section 02511 - Water Lines.

3.10 AS-BUILT SURVEY AND INSTALLATION TOLERANCES

- A. Perform as-built survey on installed water line. Determine horizontal and vertical location for invert of each pipe joint.
- B. Acceptable Tolerances: Within plus or minus 3 inches of horizontal alignment, within plus or minus 2 inches of vertical alignment.
- C. Correct pipe section outside acceptable tolerances.

3.11 FINAL CLEANUP

- A. Clean interior to pipe after interior work is completed. Remove loose material, dirt, and debris from completed pipeline. After completion of work inside pipe, prevent dirt, water, and other debris from entering until water line work is completed.

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Section 02518

STEEL PIPE AND FITTINGS
FOR LARGE DIAMETER WATER LINES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Large diameter (24 inches and greater) steel pipe and fittings for water lines and pumping facilities.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. No payment will be made for steel pipe and fittings under this Section. Include cost in unit price for water lines, pumping facilities, and encasement sleeves.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO - Standard Specifications for Highway Bridges.
- B. AREMA - Manual for Railway Engineering, Volume II, Chapter 15.
- C. ASTM A 36 - Standard Specification for Structural Steel.
- D. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- E. ASTM A 135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
- F. ASTM A 139 - Standard Specification for Electric-Fusion (ARC) - Welded Steel Pipe (NPS 4 and Over).
- G. ASTM A 570 - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
- H. ASTM C 33 - Standard Specification for Concrete Aggregates.

- I. ASTM C 35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.
- J. ASTM C 150 - Standard Specification for Portland Cement.
- K. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- L. ASTM C 595 - Standard Specification for Blended Hydraulic Cements.
- M. ASTM C 881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- N. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- O. ASTM D 512 - Standard Test Methods for Chloride Ion in Water.
- P. ASTM D 1293 - Standard Test Methods for pH of Water.
- Q. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test.
- R. ASTM D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tests.
- S. ASTM D 4752 - Standard Test Method for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub.
- T. AWWA C 200 - Steel Water Pipe 6 in. and Larger.
- U. AWWA C 205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe.
- V. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
- W. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 in. through 144 in.
- X. AWWA C 208 - Dimensions for Fabricated Steel Water Pipe Fittings; Addendum C 208A.
- Y. AWWA C 209 - Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections and Fittings for Steel Water Pipelines.
- Z. AWWA C 210 - Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
- AA. AWWA C 214 - Tape Coating Systems for the Exterior of Steel Water Pipelines.

- BB. AWWA C216 - Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - CC. AWWA C 602 - Cement-Mortar Lining of Water Pipelines - 4 in. (100 mm) and Larger - In Place.
 - DD. AWWA M 11 - Steel Pipe-A Guide for Design and Installation.
 - EE. SSPC Good Painting Practice, Volume 1.
 - FF. SSPC SP 1 - Surface Preparation Specification No. 1 Solvent Cleaning.
 - GG. SSPC SP 5 - Joint Surface Preparation Standard White Blast Cleaning.
 - HH. SSPC SP 6 - Surface Preparation Specification No. 6 Commercial Blast Cleaning.
 - II. SSPC SP 10 - Surface Preparation Specification No. 10 Near-White Blast Cleaning.
 - JJ. SSPC VIS 1 - Visual Standard for Abrasive Blast Cleaned Steel.
- 1.04 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
 - B. Submit shop drawings signed and sealed by Professional Engineer registered in State of Texas showing following:
 - 1. Manufacturer's pipe design calculations.
 - 2. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, welding procedures, fabrication, fitting, flange, and special details, with plan view of each pipe segment sketched, detailing pipe invert elevations, horizontal bends, welded joints, and other critical features. Indicate station numbers for pipe and fittings corresponding to Drawings. Do not start production of pipe and fittings prior to review and approval by Project Manager. Provide final approved lay schedule on CD-ROM in Adobe portable document format (*.PDF).
 - 3. Include hot tapping procedure.
 - 4. Submit certification from manufacturer that design was performed for project in accordance with requirements of this section. Certification to be signed and sealed by professional Engineer registered in State of Texas.
 - C. Submit manufacturer's certifications that pipe has been hydrostatically tested at factory in accordance with AWWA C 200.

- D. Submit certification from NACE Certified Coatings Inspector, under supervision of inspector having Level III certification for coatings and linings, that steel pipe furnished on project was properly inspected and defective coatings detected properly repaired.
- E. Submit inspection procedures to be used by manufacturer and for quality control and assurance for materials and welding. Submit, at least 30 days prior to repair work, procedures that describe in detail shop and field work to be performed. Repair defects such as substandard welds, excessive radial offsets (misalignment), pitting, gouges, cracks, etc.
- F. Submit following for nonshrink grout for special applications:
 - 1. Manufacturer's technical literature including specifications for mixing, placing, and curing grout.
 - 2. Results of tests performed by certified independent testing laboratory showing conformance to ASTM C 1107, Nonshrink Grout and requirements of this specification.
 - 3. Certification product is suitable for use in contact with potable water.
- G. Submit proof of certification for welders. Indicate certified procedures and position each welder is qualified to perform. Ensure welder and welding operator have been certified within past 6 months in accordance with AWWA C206.
- H. Within 45 calendar days after manufacturing of all pipe, submit affidavit of compliance that materials and work furnished comply with applicable requirements of referenced standards and these specifications. Make available copy of physical and chemical testing reports.
- I. Within 45 days of manufacturing of all pipe, submit manufacturer's affidavits that coatings and linings comply with applicable requirements of this Section and:
 - 1. Polyurethane coatings were applied in accordance with manufacturer's recommendation and allowed to cure at temperature 5 degrees above dew point.
 - 2. Mortar coatings and linings were applied and allowed to cure at temperature above 32 degrees F.
 - 3. Test Results:
 - a. Compressive strength (7 and 28 day) test results for mortar coating.
 - b. Hydrostatic testing, magnetic particle and x-ray weld test reports as required.

- J. Prior to start of field-applied cement mortar lining operation, submit comprehensive plan which identifies and describes as minimum:
1. Equipment used for batching, weighing, mixing, transporting and placing mortar.
 2. Qualifications and specific experience of machine operators.
 3. Source and type of cement, pozzolan, sand and admixtures used and certifications from suppliers that materials meet specifications.
 4. Mix proportions to be used and slump limits (max. and min.).
 5. A quality control plan which identifies quality control material tests and documented inspections necessary to ensure compliance with specified requirements.
- K. Submit certification showing calibration within last 12 months for equipment such as scales, measuring devices, and calibration tools used in manufacture of pipe. Each device used in manufacture of pipe is required to have tag recording date of last calibration. Devices are subject to inspection by Project Manager.

1.05 QUALITY CONTROL

- A. Manufacturer to provide permanent quality control department and laboratory facility capable of performing inspections and testing as required by specifications. Material testing, inspection procedures, and manufacturing process are subject to inspection by Project Engineer. Perform manufacturer's tests and inspections required by referenced standards and these specifications, including the following. Correct nonconforming conditions.
1. Steel Plate and Coils. Review mill certifications for conformance to requirements of specifications; perform physical and chemical testing of each heat of steel for conformance to applicable ASTM standards.
 2. Pipe:
 - a. Inspect thickness, circumference, roundness, strength and size of seam welds (spiral or longitudinal), and squareness of pipe ends to verify compliance with AWWA C200.
 - b. Inspect physical dimensions and overall conditions of all joints for compliance with AWWA C200, approved submittals, and Specifications.
 - c. Hydrostatically test finished pipe section to 75 percent of specified minimum yield strength of steel being used with zero leakage.

- d. For wall thickness greater than 1/2 inch, perform Charpy V-Notch (CVN) Test in accordance with AWWA C200.
3. Linings:
 - a. Inspect unlined pipe for overall condition of inside barrel. Maintain inside barrel free of corrosive products, oil, grease, dirt, chemical, and deleterious material.
 - b. Inspect lined pipe for physical dimensions and overall condition of lining, visible surface defects, thickness of lining, and adhesion to steel surface.
 - c. Review certifications by manufacturers of lining components for conformance to AWWA standards and these Specifications.
4. Coatings: Measure temperature and dew point of ambient air before applying coatings. Inspect physical dimensions and overall condition of coatings. Inspect for visible surface defects, thickness, and adhesion of coating to surface and between layers.
5. Final Inspection:
 - a. Before shipment, inspect finished pipe, fittings, specials and accessories for markings, metal, coating thickness, lining thickness (if shop applied), joint dimensions, and roundness.
 - b. Inspect for coating placement and defects. Test exterior coating for holidays.
 - c. Inspect linings for thickness, pitting, scarring, and adhesion.
- B. Shop-applied coatings and linings; provide services of independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Perform inspection by NACE trained inspectors under supervision of NACE Level III Certified Coatings Inspector.
- C. Ensure workmen engaged in manufacturing are qualified and experienced in performance of their specific duties.
- D. Cast four standard test cylinders each day for each 50 cubic yards of mortar coating or portion thereof for each coating and lining placed in a day. Perform compressive strength test at 28 days. No cylinder test result will be less than 80 percent of specified strength.
- E. Dented steel cylinders will result in rejection of pipe.

- F. Make available copy of physical and chemical testing reports for steel cylinders and provide reports at request of Project Manager.
- G. Check physical dimensions of pipe and fittings. Physical dimensions to include at least pipe lengths, pipe I.D., pipe O.D. and bend angles.

1.06 INSPECTION

- A. Project Manager may witness manufacture and fabrication of pipe and appurtenances. Independent testing laboratory under contract to Project Manager may perform tests at direction of Project Manager to verify compliance with these specifications. Provide assistance to accomplish such testing, including equipment and personnel, at no additional cost to Owner.

PART 2 PRODUCTS

2.01 STEEL PIPE

- A. Furnish pipe by same manufacturer.
- B. Furnish pipe smaller than 24-inch in accordance with Section 02502 - Steel Pipe and Fittings.
- C. Fabricate and supply miscellaneous steel pipe and fittings with nominal diameter of 24 inches and larger in accordance with AWWA C200, C207, C208 and AWWA M11 except as modified herein. Steel to be minimum of ASTM A 36, ASTM A 570 Grade 36, ASTM A 53 Grade B, ASTM A 135 Grade B, or ASTM A 139 Grade B.
- D. Provide pipe sections in lengths no greater than 40 feet and no less than 10 feet except as required for special fittings or closure sections.
- E. Provide shop-coated and shop-lined steel pipe with minimum of one coat of shop-applied primer approved for use in potable water transmission on all exposed steel surfaces. Primer for tape-coated steel pipe to be used for field-applied coatings shall have no less than 5 percent solids. Provide primer compatible with coating system and in accordance with coating manufacturer's recommendations.
- F. Provide closure sections and short sections of steel pipe not less than 4 feet in length unless indicated on Drawings or specifically permitted by Project Manager.
- G. Square flanges with pipe with bolt holes straddling both horizontal and vertical axis. Provide 1/2-inch gap between pipe ends to be coupled with sleeve coupling unless otherwise indicated on Drawings.
 - 1. Provide standard ring or hub type flanges, conforming to AWWA C207, Class D.

2. Apply Densco petroleum-based tape or approved equal to exposed portions of nuts and bolts.

H. Pipe Design Conditions:

1. Design: Design pipe and fittings to withstand most critical simultaneous application of external loads and internal pressures. Base design on minimum of AASHTO HS-20 loading, AREMA E-80 loads and depths of bury as indicated on Drawings. Design pipes with Marston's earth loads for transition width trench for all heights of cover.
2. Groundwater Level: Design for most critical ground water level condition.
3. Working pressure = 100 psi.
4. Hydrostatic field test pressure = 150 psi.
5. Maximum pressure due to surge = 150 psi.
6. Minimum pressure due to surge = -5 psi.
7. Modulus of elasticity (E) = 30,000,000 psi.
8. Maximum deflection from specified diameter: Two percent for mortar coating; three percent for flexible coatings and three percent for mortar lining.
9. Design stress due to working pressure to be no greater than 50 percent of minimum yield, and stress not to exceed 16,500 psi for mortar coated pipe.
10. Design stress due to maximum hydraulic surge pressure to be no greater than 75 percent of minimum yield, and stress not to exceed 24,750 psi for mortar coated pipe.
11. Modulus of soil reaction (E') < 1500 psi. If E' > 1000 psi, do not use silty sand (SM) for embedment.
12. Unit weight of fill (w) > 120 pcf.
13. Deflection lag factor (D1) = 1.2.
14. Bedding constant (K) = 0.1.
15. Fully saturated soil conditions: $hw = h =$ depth of cover above top of pipe.
16. Do not allow diameter (D) over thickness (t) ratio to be greater than 230.

17. Provide minimum inside clear diameter for tunnel liners or casing in accordance with Section 02425LD- Tunnel Excavation and Primary Liner.
18. Exclude structural benefits associated with primary liner in design of pipe in tunnel installations.
 - a. Design pipe and joints to carry loads including overburden and lateral earth pressures, subsurface soil and water loads, grouting, other conditions of service, thrust of jacks, and stresses anticipated during handling and construction loads during installation of pipe.
 - b. Do not use internal removable stiffeners for pipe in tunnel, unless approved by Project Manager.
 - c. External welded steel stiffeners will be permitted in design calculations for steel pipe, provided wall thickness is minimum of 1/2 inch. Minimum clearances specified between exterior pipe wall and tunnel liner applies to distance between outside diameter of external welded stiffener and tunnel liner.
19. Nominal Allowable Steel-wall Thickness for Water Lines: Provide in accordance with following table for HS-20 live loads and depths of cover of up to 16 feet. Net internal diameter (including inside linings) to be no less than net inside diameter listed. Contractor to review design for conditions more extreme than those indicated by this specification and design accordingly. If, in opinion of Project Manager, proposed pipe wall thicknesses appear inadequate for indicated loading conditions, submittal of design calculations will be required for review. Pipe wall not to be less than that defined in following table.

Net Inside Diameter (Inches)	Minimum Wall Thickness (Inches)	
	Flexible Coating	Mortar Coating
96	0.484	0.464
90	0.454	0.430
84	0.423	0.395
78	0.393	0.359
72	0.362	0.320
66	0.333	0.295
60	0.301	0.268
54	0.271	0.250

Net Inside Diameter (Inches)	Minimum Wall Thickness (Inches)	
	Flexible Coating	Mortar Coating
48	0.235	0.215
42	0.207	0.189
36	0.178	0.163
30	0.149	0.136
24	0.149	0.136

I. Fittings for Water Lines: Fabricate in accordance with AWWA M11, Section 13.3-13.7, and AWWA C208.

1. Wall Thickness: Equal to or greater than pipe to which fitting is to be welded.
2. Elbows: 2-piece for 0 degrees to 22-1/2 degrees; 3-piece for 23 degrees to 45 degrees; 4-piece for 46 degrees to 67-1/2 degrees; and 5-piece for 68 degrees to 90 degrees, unless otherwise shown on Drawings.
3. Outlets: Reinforced in accordance with AWWA M11, Sections 13.3-13.7, AWWA C200, and AWWA C208. Provide interior lining and exterior coating in accordance with paragraphs on coating and lining and matching pipe to access inlets, service outlets, test inlets, and air-vacuum valve and other outlets, including riser pipes.
4. Radius: Minimum radius of two and one-half times pipe diameter.
5. Butt Straps for Closure Piece: Minimum 12-inch-wide split butt strap; minimum plate thickness equal to thinnest member being joined; fabricated from material equal in chemical and physical properties to thinnest member being joined. Provide minimum lap of 4 inches between member being joined and edge of butt strap, welded on both inside and outside, unless otherwise approved by Project Manager. Provide minimum 6-inch welded outlet for inspecting each closure section, unless access manway is within 40 feet of closure section.
6. Joints are to be double-welded and butt or lap joints as shown on drawings. Use flanged joints at valves.
7. Provide double-welded lap field joints or full penetration butt-welded joints for tee fitting supported on pier foundation, aboveground piping and field welds for risers including vertical portion of crossover piping.

J. Joints:

1. Standard field joint for steel pipe: AWWA C206. Rubber gasket Carnegie shape joint or rolled-groove rubber gasket and O-ring joint, 66-inch maximum diameter. Joints may be lap-welded slip type in accordance with AWWA C206, except where flanged joints or butt strap joints are required.
2. Provide double-welded butt joints at aerial crossings and where noted on Drawings.
3. Pipe Manufacturer: Refer to Specification Section 02511 - Water Mains for performance history requirements. In lieu of passing Hydrostatic Joint Test, Contractor may opt to provide all welded joints.
4. Capable of withstanding jacking forces.
5. Design restrained joints for test pressure or maximum surge pressure as specified, whichever is greater. Only minimum restrained joint lengths for prestressed concrete cylinder pipe are shown on Drawings.
6. Provide full circumferential welds at joints required to be welded.
7. Use wire and flux from same manufacturer throughout entire project.
8. Rubber Gasketed Bell-and-Spigot Joints.
 - a. Bells: Formed by either expansion of pipe end, or by segmental expander which stretches steel past its elastic limit, or by attaching sized weld-on bell rings. Weld-on bell rings shall comply with AWWA M11 and AWWA C200, attached with full-thickness fillet welds, and welded inside and out (double welded). Minimum thickness of completed bell ring is equal to thickness of pipe wall in barrel of pipe between joint ends.
 - b. Spigots: Sized prior to rolling gasket groove. For Carnegie joints, attach with full thickness fillet welds, welded inside and out (double welded). Minimum thickness of joint ring shall be equal to or greater than thickness of pipe wall in barrel of pipe between joint ends.
 - c. Joints shall be interchangeable and match up during installation, even if used out of sequence.
 - d. Provide bells and spigots with dimensions and tolerances in accordance with AWWA C 200, as modified herein. Difference in circumference between ID of bell and OD of spigot shall be between 0.00 inch to 0.10 inch as measured with steel circumference tape. Measurement shall be taken at point of full joint engagement, and pipe cylinder shall be within allowable

deflection. Clearance between bell and spigots shall be such that, when joint is assembled, water-tightness will be obtained under operating conditions.

- e. Furnish joint suitable for safe working pressure equal to class of pipe. Joint shall operate satisfactorily with pull-out, tangent of which is not to exceed 0.75 inch/D, where D is outside diameter of pipe in inches or with pull-out of 3/4 inch.
- f. Joints shall be self-centered and gasket shall be restrained or confined to annular space in such a manner that movement of pipe or hydrostatic pressure cannot displace it. Compression of gasket when joint is completed shall provide watertight joints under operating conditions when properly installed. Compression of gasket shall not be dependent upon water pressure in pipe and will provide watertight joints under operating conditions when properly installed.

K. Manufacturer must maintain on site or in plant enough fittings to satisfy the following requirements:

Line Diameter	Required Bends*
20 and 24 inches	Four 45-degree bends per 5,000 LF of water line
> 24 inches	Four 22.5-degree bends per 10,000 LF of water line
*Based on total length of contract (minimum of four). Any combination of bends may be substituted at manufacturer's option (i.e. two 22.5-degree bends are equivalent to one 45-degree bend) and will be counted as one fitting.	

- L. Manufacturer must be capable of delivering bends to job site within 12 hours of notification. Use fittings at direction of Project Manager where unforeseen obstacles are encountered during construction. These fittings are in addition to fittings called out on Drawings and must be available at all times. Use same product throughout entire project.
- M. Perform x-ray or ultrasonic testing of manual welds on special pipe and fittings.
- N. Hydrostatic Test of Pipe:
 - 1. AWWA C200 Section 5.2, at point of manufacture. Hold test for minimum 2 minutes and conduct thorough inspection of pipe. Repair or reject pipe revealing leaks or cracks.
 - 2. Calibrate pressure gauges within one year prior to testing as specified in Section 1.04 L.

- O. Provide forged steel threaded outlets of approved design where required for use in passing hose or lead wires into pipe. Tap plugs with standard pipe threads and weld to pipe in approved manner and use solid forged steel plugs for closure.
- P. Flanges:
 - 1. Fabricate flanges with oversize bolt holes, with flanges drilled in pairs, to accommodate insulating sleeves.
 - 2. Test, coat, line and ship each shop-assembled insulated flange assembly to field as fitting. Use no less than two snug-fitting alignment pins to assist in aligning flanges during assembly. Do not remove pins until bolts have been installed in all remaining holes and have been drawn up tight. After insulating joints have been assembled, subject each assembly (fitting) to shop hydrostatic test pressure of 150 psi and electrically test to ensure that insulated sections are effective. After assembly has been tested, coat insulating joint and adjacent steel pipe as specified for below-ground installation. Line assembly as specified for interior surfaces and in accordance with details shown on Drawings.
- Q. Dished Head Plugs: Design dished head plugs (test plugs) to withstand field hydrostatic test pressure from either side of plug. Design stress due to hydrostatic pressure to be no greater than 50 percent of minimum yield. Pipe on opposite side of hydrostatic test may or may not contain water. Manufacturer of the steel pipe to hydrostatically test plug at factory.
- R. Make curves and bends by deflecting joints, or by using beveled joints, or by combination of two methods, unless otherwise indicated on Drawings or permitted by Project Manager. Do not exceed deflection angle at joint as recommended by pipe manufacturer. Make penetration of spigot into bell at all points of circumference at least equal to minimum required penetration shown on Drawings. Beveled pipe sections used in curved alignment to be of standard length except when shorter sections are required to limit radius of curvature, in which case all sections throughout curve are to be of equal length. Do not allow bevel to exceed 5 degrees.

2.02 INTERNAL LINING SYSTEMS FOR STEEL PIPE, ALL INSTALLATIONS

- A. Supply steel pipe with either epoxy lining or cement-mortar lining, capable of conveying water at temperatures not greater than 140 degrees F. Provide linings conforming to American National Standards Institute/National Sanitation Foundation (ANSI/NFS) Standard 61, and certification to be from organization accredited by ANSI. Unless otherwise noted, coat all exposed (wetted) steel parts of flanges, blind flanges, bolts, access manhole covers, with epoxy lining, as specified.
- B. Epoxy Lining:

1. AWWA C210, color White, or approved equal for shop and field joint applied, except as modified in this Section. Provide materials from same manufacturer.
 - a. Protect interior surface with liquid two-part chemically cured epoxy primer specified for interior surfaces.

Surface Preparation	SSPC-SP5 White Blast Clean 2.0 to 3.0 mils surface profile.
Prime Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy - Buff, or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy - Buff, or approved equal
Finish Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy - White, or approved equal

2. Total allowable dry film thickness for system:
 - a. Minimum: 12.0 mils.
 - b. Maximum: 18.0 mils.
3. Provide dry film thicknesses for approved alternate products in accordance with product's manufacturer recommendations.
4. Lining system may consist of three or more coats of same approved alternate epoxy lining without use of separate primer.
5. Perform adhesion test on pipe 48 inches in diameter and larger in accordance with ASTM D 4541. Minimum field adhesion: 700 psi. Perform test on pipe for project at frequency of one for every 1000 square feet of epoxy lining. Perform cure test in accordance with ASTM D 4752 (solvent rub test) and ASTM D 3363 (pencil hardness) for each section of pipe. Repair tested areas with approved procedures.

C. Shop-applied Cement-mortar Lining:

1. AWWA C205; except as specified herein: 1/2-inch minimum thickness for pipe diameters 42 inches and larger; 3/8-inch minimum thickness for pipe diameters 36 inches and smaller. Cut back lining from joint ends no more than 2 inches to facilitate joining and welding of pipe.

2. Apply cement-mortar lining to inside of pipe by centrifugally spinning. For special sections (shape of which precludes application by spinning method) accomplish by mechanical placement or pneumatic placement and finish to produce smooth, dense surface comparable to centrifugally spinning.
 3. Use galvanized wire mesh when shop-applied mortar is not applied by machine. Do not extend wire mesh across welded portion of mitered fittings. Crimp mesh to provide integral “chair” so wire does not fully rest against steel cylinder.
 4. Make repairs of cement-mortar lining for widths exceeding 6 inches by bonding to steel and adjacent faces of lining with bonding agent conforming to ASTM C 881, Type II.
 5. Restrict usage of sprinkler heads during moist curing to prevent over-spraying onto lining. No alternative curing methods are allowed as described in Section 4.4.7.4 of AWWA C205.
 6. Satisfy Project Manager that above requirements can be accomplished by manufacturer prior to shipment of pipe.
- D. Field-applied Cement-mortar Lining (for pipe \geq 48 inches in diameter): Provide field-applied internal cement-mortar linings in accordance with AWWA C602, latest edition, except as modified in this Section.
1. Lining: Applied in one-course application of cement-mortar by machine that centrifugally places mortar against wall of pipe and mechanically trowel lining to smooth finish.
 2. Steel pipe, fittings, receive cement-mortar lining.
 3. Cement-mortar for Lining.
 - a. Cement-mortar: Dense, smooth, and of uniform quality and consistency to assure efficient machine operation and uniform cement-mortar lining on pipe wall.
 - b. Water-cement Ratio: Kept as low as possible; consistent with proper plasticity for application, allowing slight variations dependent upon temperature, length of haul for mortar, and moisture condition in pipe.
 - c. Mortar: Mixture of one part cement with not less than one or more than 1-1/2 parts of dry screened sand, by volume. After determining mixture, control materials to within plus or minus 2-1/2 percent by weight throughout entire work.

- d. Comply with following materials for cement-mortar:
- 1) Provide Type II low-alkali Portland cement conforming to ASTM C 150, or Type IP (MS) Portland-Pozzolan cement conforming to ASTM C 595, unless otherwise specified. Conform to low alkali requirements of Table IA of ASTM C 150. Type IP (MS) cement to contain no more than 20 percent Pozzolan, to be inter-ground with clinker.
 - 2) Use suitable facilities approved by Project Manager when available for handling and weighing bulk cement. Otherwise, deliver cement in original unopened sacks that have been filled by manufacturer. Plainly mark sacks with manufacturer's name or brand, cement type lot number and weight. Discard unused cement. Use unopened bags of cement for each new batch.
 - 3) Material Storage: Store cement to permit ready access for inspection and sampling. Protect cement and sand against contamination or moisture. Do not use and remove from site cement delivered with evidence of contamination or otherwise unsuitable. Store admixtures in accordance with manufacturer's directions.
 - 4) Use Portland cement of same brand and type unless otherwise approved by Project Manager.
 - 5) Pozzolanic Material: AWWA C602, Paragraph 2.2.
 - 6) Sand: AWWA C205, Section 2.3, except gradation of sand to yield fineness modulus of approximately 1.7; having no material coarser than that passing No. 16 sieve. Submit certification for compliance of sand with these specifications at least 10 calendar days before start of lining placement.
 - 7) Water: Clean; free of deleterious amounts of acids, alkalis or organic materials; total dissolved solids less than 1000 mg/l; ASTM D 512 chloride ions less than 100 mg/l for slurry and mortar cure; ASTM D 1293 pH greater than 6.5.

2.03 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVE-GROUND AND IN VAULTS (EXPOSED)

- A. Provide approved 3-coat epoxy/polyurethane coating system as designated below. Provide materials from same manufacturer.

Surface Preparation	SSPC SP 10 Near White Blast Clean 2.0 to 3.0 mils surface profile
Prime Coat 4.0 to 4.0 mils DFT	Inhibitive Epoxy Primer, or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	Chemical Resistant Epoxy, or approved equal
Finish Coat 1.5 to 2.5 mils DFT	Polyurethane, or approved equal

B. Total Allowable Dry Film Thickness for System:

1. Minimum: 9.5 mils.
2. Maximum: 12.5 mils.

C. Perform adhesion test on pipe in accordance with ASTM D 4541. Minimum field adhesion: 1,000 psi. Perform test on pipe for project at frequency of one for every 1000 square feet of polyurethane coating. Perform cure test in accordance with ASTM D 4752 (solvent rub test) and ASTM D 3363 (pencil hardness) for each section of pipe. Repair tested areas with approved procedures.

2.04 EXTERNAL COATING SYSTEMS FOR BURIED STEEL PIPE

A. Supply pipe with one of the following coatings specified.

1. Tape Coating: Provide approved tape for external tape coating. Apply in accordance with AWWA C214 and requirements of this section; 80-mil.
 - a. Components: Primer, one 20-mil layer of inner-layer tape for corrosion protection and two 30-mil layers of outer-layer tape for mechanical protection.
 - b. Where sleeve type or victaulic couplings are required, bond coupling to adjacent pipes with bonding cables as shown on Drawings.
 - c. Use approved filler putty type insulating putty to fill in gap and create smooth sloped transition between top of reinforcing plate and pipe, before tape coating is applied.
 - d. Primer: Compatible with tape coating, supplied by coating-system manufacturer.

- e. Provide pipe with shop coatings cut back approximately 4 to 4-1/2 inches from joint ends to facilitate joining and welding of pipe. Taper successive tape layers by 1-inch staggers to facilitate field wrapping and welding of joints.
 - f. Inner and outer tape width: 12 or 18 inches.
 - g. Do not expose tape coating to direct sunlight for more than 60 days.
2. Cement-mortar Coating: AWWA C205; shop-applied, cement-mortar coating except as modified in this Section; 1-inch minimum thickness; cut back coating from joint ends no more than 2 inches to facilitate joining and welding of pipe.
3. Polyurethane Coating: See Section 02527 - Polyurethane Coatings on Steel or Ductile Iron Pipe for requirements for use of polyurethane coating system. Refer to Paragraph 2.03 C of this Section for field testing requirements. Provide inspections by NACE trained inspectors under supervision of NACE Certified Coatings Inspector having Level III Certification.
- B. Heat Shrink Joint Sleeves for Tape and Polyurethane Coating: Aqua Shield or approved equal. For repairs to heat shrink joint sleeves, use Aqua-Shield repair kit or approved equal. Pipe manufacturer to hold back coatings at joints as per shrink sleeve manufacturer's recommendations.

2.05 EXTERNAL COATING SYSTEM FOR STEEL PIPE IN TUNNEL, CASING

- A. Provide exterior coating system of pipe in tunnel, without annular grout, as specified in Cement Mortar Coating for Buried Steel Pipe, or provide minimum 80 mils of polyurethane coating in accordance with Specification Section 02527 - Polyurethane Coatings for Steel or Ductile Iron Pipe.
- B. For water lines in tunnel where annular grout will be used, shop prime external surfaces of steel pipe with 4.0 to 6.0 mils DFT of approved Inhibited Epoxy Primer unless pipe has cement-mortar coating.
 - 1. Surface Preparation: SSPC-SP 10(64); Near White Blast Clean 2.0 to 3.0 mils surface profile.
 - 2. Prime Coat: Approved Inhibitive Epoxy Primer 4.0 to 6.0 mils DFT.
 - 3. Use coating procedures and dry film thicknesses for approved alternate product in accordance with product manufacturer's recommendations.

2.06 GROUT FOR JOINTS AND SPECIAL APPLICATIONS

- A. Cement Grout Mixture: One part cement to two parts of fine, sharp, clean sand. Mix interior joint mortar with as little water as possible until very stiff but workable. Mix exterior joint mortar with water until it has consistency of thick cream. Mix cement grout to specific gravity of 19 lb/gallon or greater as measured by grout/slurry balance. Use balance manufactured grout/slurry by Baroid or approved equal. Perform test in presence of and at request of Project Manager. Add additional cement grout or water to mixed cement grout to bring mix to proper moisture content or specific gravity. Discard cement grout that has been mixed more than 20 minutes and is not at proper specific gravity or moisture content.
1. Portland Cement: ASTM C 150, Type II. Provide one type of cement for entire project.
 2. Sand:
 - a. Interior Joints: ASTM C 35 fine graded plaster sand.
 - b. Exterior Joints: ASTM C 33; natural sand with 100 percent passing No. 16 sieve.
 3. Water: Potable water with total dissolved solids less than 1000 mg/l; ASTM D 512 chloride ions less than 100 mg/l for slurry and mortar cure; ASTM D 1293 pH greater than 6.5. Use potable water with 250 ppm limit on chlorides and sulfates.
- B. Provide approved Nonshrink Grout for Special Applications, Patches and Repairs.
1. Conform to requirements of ASTM C 1107, Nonshrink Grout.
 2. Pre-blended factory-packaged material manufactured under rigid quality control, suitable for use in joints of prestressed concrete cylinder pipe.
 3. Contain non-metallic natural aggregate and be nonstaining and noncorrosive.
 4. Meeting NSF 61 Standard suitable for use in contact with potable water supply.
 5. Exterior: Highly flowable to fill joint wrapper without leaving voids or trapped air. Interior capable of being placed with plastic consistency.
 6. Compressive Strength: ASTM C 1107 2500 psi minimum 7-day unconfined; 5000 psi minimum 28-day unconfined.
 7. Non-bleeding and non-segregating at fluid consistency.

8. Contain no chlorides or additives which may contribute to corrosion of steel pipe.
9. Free of gas-producing, gas-releasing agents.
10. Resist attack by oil or water.
11. Mix, place, and cure in accordance with manufacturer's instructions and recommendations. Upon 72 hours' notice, provide services of qualified representative of nonshrink grout manufacturer to aid in assuring proper use of product under job conditions. Representative to be on site when product is first used.
12. Mix cement grout to specific gravity of 17.7 lb/gallon or greater as measured by grout/slurry balance. Use balance manufactured grout/slurry by Baroid or approved equal. Perform test in presence of and at request of Project Manager. Add additional cement grout to mixed cement grout or water to bring mix to proper moisture content or specific gravity. Discard cement grout that has been mixed more than 20 minutes and is not at proper specific gravity or moisture content.
13. Compressive Strength: ASTM C 1107 2500 psi minimum 7-day unconfined; 5000 psi minimum 28-day unconfined.

C. Finished surface of lining and interior joint to be comparable to surface rubbed with No. 16 Carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections, and to produce smooth, dense surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.

D. Joint Wrapper: Minimum width of 9 inches for 33-inch diameter and smaller; minimum width of 12 inches for diameters greater than 33-inch hemmed at edge to allow threading with minimum 5/8-inch-wide steel strap. Provide minimum 6-inch-wide Ethafoam strip sized, positioned, and sewn such that two circumferential edges of Ethafoam are 1-1/2-inches from outer edge of wrapper.

2.07 COLD-APPLIED TAPE COATING

A. Shop-applied Tape Wrap Coating:

1. Use primer furnished by tape manufacturer.
2. Wrap, specials and fittings that cannot be machine wrapped due to configuration with primer layer and two layers of prefabricated tape each 35 mils thick.

3. Overlap machine-applied tape with hand-applied tape by minimum of 2 inches and bind to it.
4. Apply Polyken 30-mil filler tape parallel to spiral weld seams if weld height measures greater than or equal to 1/8 inch.

B. Surface Preparation:

1. Clean bare pipe from mud, mill lacquer, oil, grease, or other contaminants. Inspect and clean surfaces according to SSPC-SP-1 to remove oil, grease, and loosely adhering deposits prior to blast cleaning. Remove visible oil and grease spots by solvent wiping. Use approved safety solvents which do not leave residue. Preheating to remove oil, grease, mill scale, water, and ice may be used provided pipe is preheated in uniform manner to avoid distortion.
2. Remove surface imperfections such as slivers, scabs, burrs, weld spatter, and gouges by hand filing or grinding to prevent excessive number of holidays. Presence of metallic defects may be cause for rejection of pipe.

2.08 EXTERNAL TAPE COATING SHOP APPLICATION

- A. Separate tape dispensing equipment far enough apart to visually inspect continuous steps.
- B. Make cutbacks straight and for total thickness of coating.
- C. State of dryness of primer prior to application of weld filler and inner layer of tape to be in accordance with written recommendation of manufacturer.
- D. Apply weld filler tape over primer and extend minimum of one inch on each side of weld seam. Filler tape may contact rollers as long as release liner is in place and adhesion requirements are met. Remove release liner before applying inner layer tape.
- E. Spirally apply inner layer of tape in direction of helix weld. Overlap each spiral of tape 1 inch or greater with next successive spiral of tape applied.
- F. Overlap end of new roll on top of previous roll minimum of 6 inches.
- G. Tape-roll body temperature to be greater than 70 degrees F; pipe surface temperature to be greater than 60 degrees F.
- H. Spirally apply outer layer tapes in direction of helix weld and use overlap width and application tensions as recommended by manufacturer.

2.09 INSPECTION AND TESTING OF COATINGS

- A. Perform electrical inspection on inner layer of tape before intermediate layer of tape is applied.
- B. If holidays are detected, repair holidays immediately before applying outer layer of tape. Clear holiday area of material and reprime if necessary. Recoat area with inner wrap tape. Overlap inner wrap tape onto surrounding inner wrap coating by at least 2 inches. Perform electrical retest at repaired area after repairing holiday, and before outer wrap is continued.
- C. Shrink Wrap: Perform electrical inspection on shrink wrap to check for holidays. Perform peel tests over heat affected zone. Minimum acceptable result: 15 lbs-ft/in.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

- A. Conform to applicable provisions of Section 02511 - Water Lines, except as modified in this Section.
- B. Comply with following:
 - 1. Make available services of manufacturer's representative when deemed necessary by Project Manager. Representative to advise in aspects of installation, including but not limited to handling and storing, cleaning and inspecting, coating and lining repair, and general construction methods as applicable to pipe.
 - 2. Install stulls prior to placement of pipe, bends, and fittings to prevent deflection during installation. Provide stulls consisting of timber struts with end blocks shaped to fit curvature of interior surface of pipe or other appropriate configuration and material. Firmly edge and secure stulls to blocks so that they will remain intact position during handling and installation. Provide stulls adequate to resist loads encountered without structural failure to stull members or damage to pipe. Where applicable, place stulls at such lengths so as to elongate vertical diameter of pipe as required to suit trench conditions encountered.
 - 3. Handling and Storage: Install padded struts or stulls prior to shipping, horizontally and vertically at 10-foot intervals, or as proposed by manufacturer and approved by Project Manager. Spiders: Installed in joint ends of fittings. Stulls to remain in place, horizontally and vertically positioned under following conditions:
 - a. During storage and shipping.

- b. Until welding is complete.
4. Reject and remove immediately from site pipe that arrives at site with defects in lining, including sand pockets, voids, and oversanded areas.
5. Store pipe at job site with securely fastened plastic endcaps to maintain moist pipe interior. Promptly replace damaged endcaps to avoid shrinkage or cracking of cement-mortar lining.
6. Immediately replace damaged plastic end caps. Do not leave uncapped for more than 4 hours.
7. Bedding and Backfilling:
 - a. Conform to requirements of Section 02317 - Excavation and Backfill for Utilities.
 - b. Align pipe at proper grade prior to joint connection and do not shift after jointing operation has been completed.
 - c. Take necessary precautions during bedding and backfilling operations to prevent deformation or deflection of cylindrical shape of pipe by more than allowable pipe deflection. Do not move trench support system (trench safety system) once bedding material is compacted.
 - d. Excavate outside specified trench section for bell holes, and for spaces sufficient to permit removal of slings. Provide bell holes at proper locations for unrestricted access to joint. Form bell holes large enough to facilitate joint wrapping and to permit visual examination of process. Enlargement of bell holes as required or directed by Project Manager. Subsequent backfilling thereof will not be considered as authorized additional excavation and backfill. Backfill bell holes and spaces to satisfaction of Project Manager.
 - e. Blocking may be removed 24 hours after placing backfill to top of pavement or natural ground level.
8. Pipe Deflection: After backfill is complete, test pipe for excessive deflection by measuring actual inside vertical diameter. For maximum deflection allowable, see Section 2.01.
 - a. Deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection are not acceptable.
 - b. If deflection exceeds that specified, do one of the following:

- 1) Remove backfill and side support. Reround the pipe and properly replace compacted backfill and side support. Review cement mortar lining to assure that no harmful damage has occurred.
 - 2) Remove entire portion of deflected pipe section and install new pipe as directed by Project Manager at no additional cost to Owner.
9. Move pipe in such manner not to damage pipe or coating. Do not roll pipe nor drag on ground. Inspect and repair coating abrasions before pipe is lowered into trench.
10. Use of dogs, clips, lugs, or equivalent devices welded to steel pipe for purpose of forcing it into position will not be permitted unless approved by Project Manager. Remove foreign matter and protective material from surfaces that are to be in contact at joints. Leave surfaces of joint areas thoroughly clean for metal-to-metal contact of field joints.

C. Static Electricity:

1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.
2. Electrically test where required after installation of pipeline is complete.

D. Deviation of installed pipe in one pipe section from line and grade shown on approved shop drawing layout will not exceed 2 inches from grade and 3 inches from line. No deviation from line and grade at contact interfaces are allowed.

E. Use adequate surveying methods, procedures and employ competent surveying personnel to ensure pipe sections are laid to line and grade and within stipulated tolerances. Measure and record, in form approved by Project Manager, and submit copy of data to Project Manager at end of that day. Survey data to include unique pipe number, deflection angle at pipe joint and whether beveled ends were used, invert elevation at pipe joint, deviation of joint from project line, deviation of joint from project grade, inside pipe joint lap measured at top, bottom, and at springline (each side).

F. Any time that laying of additional pipe is stopped for more than eight hours, plug ends of installed pipe and take proper precautions against flotation of pipe segments.

3.02 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVE GROUND AND IN VAULTS (EXPOSED) AND EPOXY INTERNAL LINING SYSTEM

- A. Safety: Paints, coatings, and linings specified in this Section are hazardous materials. Vapors may be toxic or explosive. Protective equipment, approved by appropriate regulatory agency, is mandatory for personnel involved in painting, coating, and lining operations.

- B. Workmanship:
 - 1. Application: By qualified and experienced workers who are knowledgeable in surface preparation and application of high-performance industrial coatings.
 - 2. Paint Application Procedures: SSPC Good Painting Practices, Volume 1.

- C. Surface Preparation:
 - 1. Use abrasive blasting to prepare surfaces.
 - 2. Schedule cleaning and painting so that detrimental amounts of dust or other contaminants do not fall on wet, newly-painted surfaces. Protect surfaces not intended to be painted from effects of cleaning and painting operations.
 - 3. Prior to blasting, clean surfaces to be coated or lined of grease, oil and dirt by steaming or detergent cleaning in accordance with SSPC SP 1.
 - 4. Metal and Weld Preparation: Remove surface defects such as gouges, pits, welding and torch-cut slag, welding flux and spatter by grinding to 1/4-inch minimum radius.
 - 5. Abrasive Material:
 - a. Blast only as much steel as can be coated within same day of blasting.
 - b. Use sharp, angular, properly graded abrasive capable of producing depth of profile specified herein. Transport abrasive to jobsite in moisture-proof bags or airtight bulk containers. Copper slag abrasives are not acceptable.
 - c. After abrasive blast cleaning, verify surface profile with replica tape such as Tes-*Tex* Coarse or Extra Coarse Press-O-Film Tape, or approved equal. Furnish tapes to Project Manager.
 - d. Do not blast if metal surface may become wet before priming commences, or when metal surface is less than 5 degrees F above dew point.

6. Evaluate degree of cleanliness for surface preparation with use of SSPC Pictorial Surface Preparation Standards for Painting Steel Surfaces, SSPC-Vis 1.
7. Remove dust and abrasive residue from freshly blasted surfaces by brushing or blowing with clean, dry air. Test cleanliness by placing 3/4-inch by 4-inch piece of clear Scotch-type tape on blasted surface, then removing and placing tape on 3x5 white index card. Reclean areas exhibiting dust or residue.

D. Coating and Lining Application:

1. Environmental Conditions: Do not apply when metal temperature is less than 50 degrees F; when ambient temperature is less than 5 degrees F above dew point; when expected weather conditions are such that ambient temperature will drop below 40 degrees F within 6 hours after application; or when relative humidity is above 85 percent. Measure relative humidity and dew point by use of sling psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. Provide dehumidifiers for field-applied coatings and linings to maintain proper humidity levels.
2. Application Procedures:
 - a. Apply in accordance with manufacturer's recommendations and requirements of this Section. Provide finish free of runs, sags, curtains, pinholes, orange peel, fish eyes, excessive overspray, or delaminations.
 - b. Thin materials only with manufacturer's recommended thinners. Thin only amount required to adjust viscosity for temperature variations, proper atomization and flow-out. Mix material components using mechanical mixers.
 - c. Discard catalyzed materials remaining at end of day.
3. Thoroughly dry pipe before primer is applied. Apply primer immediately after cleaning surface. Apply succeeding coats before contamination of undersurface occurs.
4. Cure minimum of 24 hours at 77 degrees F before successive coats are applied. During curing process, provide forced-air ventilation in volume sufficient to maintain solvent vapor levels below published threshold limit value. Apply successive coats within recoat threshold time as recommended by coating or lining manufacturer on printed technical data sheets or through written communications. Brush blast joints of pipe which have been shop primed and are to receive intermediate and finish

coats in field prior to application of additional coats. After interior coats are applied, provide forced-air ventilation in sufficient volume and for sufficient length of time to ensure proper curing before filling pipe with water.

3.03 EXTERNAL COATING SYSTEM FOR BURIED STEEL PIPE

A. Tape Coating System:

1. Joint Protection:

a. Heat Shrink Sleeve: In accordance with AWWA C216. Provide Aqua-Shield, or approved equal. Apply manufacturer-approved insulating putty at bell step-offs. For welded joints, apply heat-resistant protective sleeve, such as Aqua-Shield AQW-WAB or approved equal, prior to internal welding. Surface preparation: Clean exposed metal with solvent, wire brush, and blast clean in accordance with AWWA C216 and manufacturer's specifications. Apply sleeve in accordance with manufacturer's specifications. Visually inspect sleeve to verify adhesive flows beyond edge, and there are no cracks or holes. Repair as necessary in accordance with AWWA C216 and manufacturer's recommendations. Shrink sleeve manufacturer's technical representative shall be available on site at beginning of pipe laying operations, and advise Contractor and Project Manager regarding installation, repairs, and general construction methods.

b. Heat-Resistant Tape Coating System: In accordance with AWWA C209. Polyken or approved equal. Apply manufacturer-approved insulating putty at bell step-offs. Surface Preparation: Clean exposed metal with solvent, wire brush and blast clean in accordance with AWWA C209 and manufacturer's specifications. Follow with primer, and then tape coating in accordance with manufacturer's specifications. Visually inspect finished coating for damages, flaws, holidays or mislaps. Repair as necessary in accordance with AWWA C209 and manufacturer's recommendations. Tape manufacturer's technical representative shall be available on site at beginning of pipe laying operations, and advise Contractor and Project Manager regarding installation, repairs and general construction methods.

2. Field Application: AWWA C209 around joint cutbacks except as modified:

a. Field-Welded Joints: Clean shop-primed ends of weld splatter, damaged primer, and rust to achieve required surface preparation prior to field repair of coatings.

- b. Extend joint cleaning 4 inches onto existing coating. Completely remove damaged and loose end-coatings.
 - c. Prior to placing pipe in trench, remove shop-applied primer by abrasive blasting, solvent or other method as approved by Project Manager. Avoid damage to adjacent existing coatings.
 - d. Clean surfaces to achieve surface preparation at least equivalent to SSPC SP 6 in accordance with AWWA C209. Provide solvent that is environmentally safe and compatible with coating system primer.
 - e. Apply insulating putty onto bell step-off as shown on Drawings. Remove release liner during application.
 - f. Apply primer immediately prior to application of first layer of tape to achieve maximum bond. Apply tape while primer is still “tacky” with 3-inch minimum overlap over shop-applied coating.
3. Joint Tape:
- a. Extend inner wrap minimum of 2 inches onto existing coating on each side of joint. Extend outer wrap minimum of 4 inches onto existing coating each side of joint. Stagger end laps minimum of 6 inches. Overlap adjacent tape wraps at least 1 inch, and overlap seam of outer wrap. Do not allow to be coincident with overlap seam of inner wrap. Wash with Xylol area that will be overlapped.
 - b. Apply approved joint wrap tape to uncontaminated primer at proper roll body temperature. If necessary, store joint wrap material in heated box up to point of application.
 - c. Apply joint wrap material to pipe in either spiral or cigarette fashion dependent upon specification. Begin wrapping process 2 to 4 inches onto mill-applied pipe wrap and proceed wrinkle-free up over bell and across joint to spigot side pipe wrap.
 - d. Apply joint wrap under machine tension of 5 to 10 pounds per inch width. Joint wrap width should narrow (neck down) as material is applied tightly around pipe.
 - e. Apply first 1/3 and last 1/3 turn of joint material around pipe with less tension to prevent wrap crawlback. Overlap of joint wrap material and system’s total thickness as specified in this specification section.

- f. End joint wrap process such that its final edge is directed downwards when pipe is placed in ditch to prevent backfill from pulling exposed joint wrap edge.
 4. Do not expose tape coatings or heat-shrinkable joint sleeves to harmful ultraviolet light for more than 90 days. Discard (remove) and replace outer layer of tape coating when exposure exceeds 90 days. In case of factory-applied coatings, remove pipe from site for removal and reapplication of outer layer of tape coatings.
 5. At option of Project Manager, coating system and application may be tested and inspected at plant site in accordance with AWWA C214.
- B. Test for Holidays:
1. Inspect pipe for holidays and damage to coating.
 - a. If test indicates no holidays and outer wrap is torn, remove damaged layers of outer wrap by carefully cutting with sharp razor-type knife. Wash with Xylol area to be patched and at least 4 inches of undamaged tape where hand-applied tape wrap will overlap. AWWA C209 cold-applied tape compatible with tape-wrapping system applied for each layer of outer-wrap tape that has been removed.
 - b. If test indicates holiday, remove outer layers and expose inner wrap. Prime exposed area and overlaps with light coat of primer. Firmly press into place patch of two 35-mil inner wrap tape extending 4 inches from affected area in all directions. Second patch to overlap first patch by 2 inches. Perform holiday test of patch to verify satisfactory installation. Wash exposed outer wrap tape with Xylol and prime.
 - c. For severe outer wrap tape tears or damage, and holiday is not detected, remove outer wrap to boundaries of damaged area, taking care not to damage inner wrap coating. Before replacing outer wrap, apply holiday detector to exposed area to determine that no damage has been made to primary coating. After verification that no holidays exist in underlying tape, clean damaged area and use patch of 35-mil outer wrap tape. Apply as specified herein for repair of areas where bare pipe is exposed.
 2. Do not allow bubbles in tape coating system regardless of holiday test results, cut out bubbles and patch as described above as directed by Project Manager.

3. Perform test procedure in accordance with NACE Standard RP-02-74. Perform electrical holiday test with 60-cycle current audio detector. Use test voltage below:

<u>Total Coating Thickness</u> (Mils)	<u>Test Voltage</u> (Volts)
20	6,000
30/35	7,500
50	9,000
70	11,500
80	12,000

- C. Remove areas having physical damage and recoat. After repairing area, apply holiday detector as stated above to verify area is adequately repaired.
- D. Cement mortar coating. AWWA C 2051 1-inch minimum thickness; Cut back from joint ends no more than 2 inches to facilitate joining and welding of pipe.
- E. Polyurethane Coating. Comply with requirements of Paragraph 3.02.

3.04 JOINTS AND JOINTING

- A. Rubber Gasketed Bell-and-Spigot Joints:
 1. Use O-ring gasket with sufficient volume to approximately fill area of groove and gasket material in accordance with AWWA C200. Check each splice in gasket by stretching gasket to at least twice original length of gasket. Visually check stretched splice by rotating 360 degrees. Reject splices showing visible separation or cracks.
 2. Equalize rubber gasket cross section after rubber gasket is placed in spigot groove of pipe by inserting tool or bar such as large screwdriver under rubber gasket and moving it around periphery of pipe spigot. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined. Fit pipes together in manner to avoid twisting or otherwise displacing or damaging rubber gasket. Check gaskets after pipe sections are joined with feeler gauge to ensure that no displacement of gasket has occurred at point around circumference after joining. If displacement has occurred, remove pipe section and remake joint as if for new pipe. Remove old gasket and replace before remaking joint.
- B. Welded Joints:
 1. Conform to requirements of Section 02511 - Water Lines.

2. Field weld to be double-welded lap field joints or full penetration butt welded joints for steel pipe and encasement sleeves for entire circumference.
 3. Employ independent certified testing laboratory, approved by Project Manager, to perform weld acceptance tests on welded joints. Include cost of such testing in contract unit price bid for water line. Furnish copies of all test reports to Project Manager for review. Test by magnetic particle test method for lap welds and fillet welds or by X-ray methods for butt welds, for 100 percent of all joint welds. Project Manager has final decision as to suitability of welds tested.
- C. Flanged Joints: Conform to requirements of Section 02511 - Water Lines.
- D. Joint Grouting and Testing: Conform to requirements of Section 02511 - Water Lines.
- E. Do not allow steel plugs for threaded outlets to project beyond inner surface of pipe shell and seal weld by at least two passes. Apply weld around outside of plug after it has been inserted in final position. Coat outlets and plugs inside and outside as required at field joints on pipe.
- 3.05 FIELD-APPLIED CEMENT-MORTAR LINING
- A. Entrances Into Pipeline:
1. Establish means to permit entry and exit of labor, materials and equipment necessary for progress of work, as approved by Project Manager.
 2. Provide dikes and channeling for diversion of flood and drainage waters away from these openings in pipeline. Use temporary airtight covers over openings to provide proper curing conditions in completed sections of lined pipe. Where operation of equipment requires that end of pipe be left open, install temporary bulkhead inside pipe to eliminate direct draft through pipe over completed sections.
 3. Brace closure sections of pipeline left out to facilitate field lining above ground to conform as nearly as possible to shape of pipe in ground and then place cement-mortar lining by machine or hand trowel to same thickness as in adjoining machine-lined sections. Bulkhead sections immediately after being lined to maintain proper curing conditions for period of not less than 48 hours before sections are installed in pipeline. Install these sections of steel pipe.
 4. Coat exterior surface of buttstraps and uncoated exterior surface area of steel pipe within excavations in accordance with specifications. Place

cement-mortar lining inside areas of joints in accordance with specifications.

- B. Mixing of Cement-mortar: Mix ingredients for cement-mortar for not less than 1-1/2 and not more than 6 minutes; use mortar promptly after mixing for lining pipe. Do not use mortar that has attained its initial for lining. Do not retemper mortar. Add water to mix last.
- C. Placing Cement-mortar Lining:
1. Complete joint work, backfill and welding before cement-mortar lining begins. After cement-mortar lining has cured, hydrostatic testing of pipe can begin.
 2. Provide provisions necessary for Project Manager to conduct inspections of work in safe and thorough manner during and after initial application of mortar and after necessary repairs made. Include, as minimum, space on application machine, and adequate lighting to inspect gross surface areas.
 3. Comply with ASTM C 494 and with manufacturer's recommendations when using chemical admixtures, bonding agents, accelerators, and other additives.
 4. Remove dirt, debris, oil, grease and loose mill scale and rust from interior surfaces of pipe, and scrape or brush surface with stiff bristle brush and/or water blast as may be necessary, and approved by Project Manager, to ensure clean surfaces for successful application of cement-mortar lining. Interior surfaces to be approved by Project Manager prior to placing lining.
 5. Provide cement-mortar lining uniform in thickness along entire length of pipe. Provide cement-mortar no less than 1/2 inch over all surfaces with tolerance of plus 1/8 inch, and no allowance for minus tolerance.
 6. Mechanically control travel of machine and rates of discharge of mortar to produce uniform thickness of lining without segregation around perimeter and along length of pipe.
 7. Check finished surface by placing 12-inch straightedge parallel to axis of pipe along surface of straight section of lining. At no point will space between lined surface and straightedge be greater than 1/16 inch.
 8. Provide smooth finished surface, within tolerances specified. Repair or replace surface irregularities including corrugations, ripples, or pits in any direction, to satisfaction of Project Manager. Remove defective lining material, including sand pockets, voids, oversanded areas, blisters, delaminations, or unbounded areas, cracked areas, irregular surfaces, and

- unsatisfactory thin spots. Remove to pipe wall and area repaired to full thickness of mortar lining.
9. Repair cracks 1/16 inch and larger to satisfaction of Project Manager.
 10. Place cement-mortar lining by machine having following features:
 - a. An applicator head which can be centered within pipe and which will centrifugally project mortar against wall of pipe at high velocity producing dense, uniformly distributed mortar on wall of pipe.
 - b. Equipped with mechanically driven, rotating steel trowels that immediately follow applicator, providing smooth, hard surface without spiral shoulders. Compensate for torque so that machine will sit true in pipe and trowel faces will not vary in angle with mortar face during complete 360-degree cycle. Clean trowels at frequent intervals to prevent accumulated mortar from obtaining initial set resulting in sanded or unglazed finish. Continuously operate trowels during application of cement-mortar and forward progress of lining machine.
 - c. Design applicator so that nothing will come in contact with troweled surface until it has attained final set, and so that forward progress of machine and mechanical placing of mortar can be controlled to assure uniform thickness of lining.
 11. Cement-mortar Lining: Adhere to steel at all points; provide consistent thickness except that lining of bell end of pipe where lining is to be thicker in order to fill depression and make smooth surface.
 12. Immediately prior to application of cement-mortar lining, sweep and clean off slime, dirt, loose rust, loose mill scale, and other foreign materials. Free interior surface of pipe after cleaning of accumulated water on pipe wall or at joints.
 13. After receiving its finish troweling, do not roughen lining by rebound material or by mortar direct from machine.
 14. Temporarily close outlets in pipeline with easily removable stoppers to prevent spun mortar from being thrown into such openings. After lining is applied, remove stoppers from outlets and repair lining damaged by removal of stoppers. Point outlet openings up to provide smooth flow.
- D. Hand Finishing:

1. Repair defective areas in machine-applied lining and unlined joints by hand patching to yield lining equal to that required for machine-applied troweled lining.
2. Provide nonshrink grout for patching or lining joints as specified in this Section.
3. Clean defective areas of loose foreign material and moisten with water just prior to application of hand-applied mortar.
4. Use steel finishing trowels for hand application of cement-mortar.
5. Complete hand finishing required in given pipe section not later than day following machine application of mortar lining to that particular pipe section, whether normal working day or otherwise. Slow down or stop machine application of mortar lining to allow time for hand patching.

E. Curing of Lining: Begin curing operations immediately after completing any portion of mortar lining. Close pipe by airtight bulkheads, and maintain moist atmosphere in completed section of pipe to keep lining damp and to prevent evaporation of entrained water from mortar lining. Humidify air introduced into pipe for ventilating or curing purposes and maintain moist atmosphere inside pipe until Project Manager accepts Work.

3.06 INSPECTION (EXCEPT MORTAR COATED PIPE)

- A. Include cost of inspection described in Paragraph 3.08, Inspection, in contract unit price for water line. Furnish copies of certified inspection reports to Project Manager for review.
- B. Holiday Test and Adhesion Test: Provide services of independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Provide inspections by NACE trained inspectors under supervision of NACE Certified Coatings Inspector having Level III Certification.

3.07 COATINGS AND LININGS INSPECTION RESPONSIBILITIES

- A. Contractor is responsible for quality control of coatings and linings applications and testing and inspection stipulated in this Section. Project Manager is responsible for quality assurance and reserves right to inspect or acquire services of independent third-party inspector who is fully knowledgeable and qualified to inspect surface preparation and application of high-performance coatings at phases of coatings and linings, field- or shop-applied. Contractor is responsible for proper application and performance of coatings and linings whether or not Project Manager provides such inspection.

- B. Cement Mortar Lining and Joint Finish: Finished surface of lining and joint to be comparable to surface rubbed with No. 16 Carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections, and to produce smooth, dense surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.

3.08 FIELD REPAIR PROCEDURES AND SPECIAL FITTINGS APPLICATION FOR CEMENT MORTAR LINING

- A. Areas less than or equal to 6 inches in diameter: Patch honeycomb and minor defects in concrete surfaces with nonshrink grout. Repair defects by cutting out unsatisfactory material and replacing with nonshrink grout, securely bonded to existing concrete. Finish to make junctures between patches and existing concrete as inconspicuous as possible. After each patch has stiffened sufficiently to allow for greatest portion of shrinkage, strike off grout flush with surrounding surface.
- B. Areas greater than 6 inches in diameter:
1. Remove defective lining down to bare steel by chipping, making sure care is taken to prevent further lining damage. Ends of lining where defective lining is removed are to be left square and uniform, not feathered.
 2. Clean bare steel with wire brush to remove loose or other foreign matter.
 3. Remove existing wire reinforcement and replace. Overlap new reinforcement to existing reinforcement by 1/2 inch. Secure reinforcement, against wall of pipe, at frequent intervals, by tack welding to pipe.
 4. Prepare cement mortar mixture. Mixture to compose of Portland Type II cement, sand, and water. Proportions of sand to cement not to exceed 3 parts sand to 1 part cement, by weight. Use only enough water to obtain proper placement characteristics. Set-up time before mixture is to be discarded is to be no longer than 1/2 hour. Nonshrink grout may also be used. Do not use combination of cement mortar and nonshrink grout within same repair.
 5. Apply WELD-CRETE, or approved equal, concrete bonding agent to bare steel and interface of existing lining. After bonding agent is applied to steel and lining, new mix must be applied within 10 minutes.
 6. Apply cement mortar to repair area 1/2 inch thick, then hand trowel to achieve smooth dense finish, making sure wire is not left exposed. To ensure proper thickness while placing new mortar, check thickness with 1/2-inch-long wire gauge.

7. Curing: Place plastic sheeting over repair area; use tape to adhere plastic to area surrounding repair area. Let cure for 4 days, then remove plastic sheeting.

END OF SECTION

Section 02520

FLUSHING HYDRANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flushing hydrants.
- B. Adjustment of flushing hydrants and gate valves.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. Payment is on a unit price basis for each flushing hydrant assembly, including; TEE, 6-inch gate valve and box, hydrant installed regardless of barrel depth, branch, and appurtenances completely restrained.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 502 - Standard for Dry Barrel Fire Hydrants (Latest Edition)
- B. AWWA C 550 - Standard for Protective Epoxy Interior Coatings for Valves and Hydrants
- C. SSPC SP2 - Hand Tool Cleaning
- D. SSPC SP3 - Power Tool Cleaning
- E. SSPC SP10 - Near-White Blast Cleaning
- F. SSPC SP11 - Power Tool Cleaning to Bare Metal
- G. SSPC Paint Spec No. 21
- H. SSPC-Paint 21 - White or Colored Silicone Alkyd Paint
- I. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II

- J. SSPC-Paint 104 - White or Tinted Alkyd Paint
- K. Federal Standard A-A-2962A - Enamel, Alkyd, Solvent Based Low VOC

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit name of hydrant manufacturer, type of bonnet paint, and engineering control drawing number for hydrant proposed for use.

PART 2 PRODUCTS

2.01 HYDRANTS

- A. Provide hydrants in conformance with AWWA C 502, Standard for Dry Barrel Fire Hydrants (Latest Edition). The following hydrants are currently approved. Alternate hydrants will not be considered.

HYDRANT	ENGINEERING CONTROL DRAWING
Mueller Company Super Centurion 250 5-1/4" A423	FH-70 Rev. B dated 02/06/02
U.S. Pipe and Foundry Co. M-94 Metropolitan 5-1/4" A495	960324 Rev. dated 02/06/02
Clow - 5 1/4" Medallion	D-20454 Rev. J dated 02/97 D-20455 Rev. H dated 02/97
American Darling B84B	94-20052 Rev. B dated 06/20/00 and 91-20051 dated 10/26/94
Kennedy - Guardian K81 A	81257 Rev. 3 dated 12/97

- B. Hydrants shall have two 2.5-inch hose connection nozzles with 7.5 threads per inch, and one 4.5-inch pumper connection nozzle with 4 threads per inch.
- C. The Owner's Representative may, at any time prior to or during installation of hydrants, randomly select furnished hydrant for disassembly and laboratory inspection, at Owner's expense, to verify compliance with Specifications. When hydrant is found to be non-compliant, replace, at Contractor's expense, hydrants, with hydrants that comply with Specifications.

- D. Provide lower hydrant barrel fabricated from Ductile Iron Pipe as single piece, connected to upper hydrant barrel by means of joint coupling that will provide three hundred sixty degree (360) rotation of upper barrel.

2.02 LEADS

- A. Branches (Leads): Conform to requirements of Section 02501 - Ductile Iron Pipe and Fittings, Section 02502 - Steel Pipe and Fittings, and Section 02506 - Polyvinyl Chloride Pipe.

2.03 HYDRANT PAINTING

- A. New hydrants and refurbished hydrants shall be shop coated as specified herein.
- B. Exterior Above Traffic Flange (Including Bolts & Nuts).
 - 1. Surface preparation to be in accordance with SSPC-SP 10 (NACE 2) near white blast cleaned surface.
 - 2. Coat with three coat alkyd/silicone alkyd system with total dry film thickness (DFT) of 6 -9 mils as follows:
 - a. Prime Coat - Oil modified alkyd primer, to be in general conformance with SSPC Paint Specification No. 25. Total dry film thickness (DFT) 2 -3 mils.
 - b. Intermediate Coat - Heavy Duty Industrial Alkyd Enamel to be in general conformance with SSPC Paint Specification No. 104, and Federal Standard A-A-2962A. Total dry film thickness (DFT) of 2 -3 mils.
 - c. Finish Coat - Silicone Alkyd Resin Enamel to be in general conformance with SSPC Paint Specification No. 21. Total dry film thickness (DFT) to be 2 -3 mils. Exception -hydrant bonnet shall not be finished shop coated, only intermediate coated. Install color coded finish coating of bonnet in field.
 - d. Bonnet Paint - Field apply finish coat of Silicone Alkyd Resin Enamel to be in general conformance with SSPC Paint Specification No. 21. Dry film thickness of 2 -3 mils. Bonnet colors are to be as specified in Paragraph 3.01 to designate the appropriate size of water supply line.
 - 3. Colors - Primer: Manufacturer's standard color. Finish coat of hydrant body: ACRO 555 Crystal Blue or equivalent. Connection caps: Finished coated white. Paint white band of finish coat two (2) inches in width on hydrant body approximately six inches (6") above and parallel to traffic flange. Intermediate coat: Contrasting color to blue finish, such as white.

- C. Field Maintenance Painting (Exterior above Traffic Flange)

1. Surface Preparation to be in accordance with SSPC -SP2, Hand Tool Cleaning, or SSPC -SP3, Power Tool Cleaning, depending on condition of existing paint and extent of corrosion. It is not necessary to remove tightly adhered mill scale, rust, and paint. Mill scale, rust and paint are considered tightly adherent when they cannot be removed with dull putty knife. In some severe cases where it is necessary to remove majority of existing paint, surface should be cleaned in accordance with SSPC -SP11, Power Tool Cleaning to Bare Metal.
 2. When surface is cleaned to bare metal (SSPC -SP11), coat hydrant with three coat Alkyd/Silicone Alkyd system in accordance with Paragraph 2.03.B.2 as for new hydrants. When surface is cleaned to SSPC -SP2 or SSPC -SP3, coat hydrant with Silicone Alkyd Resin Enamel in general conformance with SSPC Paint Specification No. 21. Total dry film thickness of 3-6 mils.
- D. Exterior Below Traffic Flange (including lower barrel extensions)
1. Surface preparation in accordance with SSPC-SP10 (NACE 2) Near White Blast Cleaned Surface.
 2. Primer and intermediate coat: coal tar epoxy in general conformance with SSPC Paint Specification No. 16. Apply two (2) coats with dry film thickness (DFT) of 8 -10 mils each for total DFT of 16 -20 mils.
 3. Finish coat: Water based vinyl acrylic mastic. Apply one coat with dry film thickness of 6 -8 mils. Color of finish coat to be same as finish coat for exterior above traffic flange, i.e., blue. (Acro 555 Crystal Blue, or equivalent.)
- E. Interior Surfaces Above and Below Water Line Valve (including lower barrel extensions)
1. Material used for internal coating of hydrant interior ferrous surfaces must be NSF certified as suitable for contact with potable water as required by Chapter 290, Rules and Regulations for Public Water Systems, Texas Commission on Environmental Quality
 2. Coating shall be liquid or powder epoxy system in accordance with AWWA Standard C - 550 (latest revision). Coating may be applied in two or three coats, according to manufacturer's recommendations, for total dry film thickness of 12-18 mils.

PART3 EXECUTION

3.01 INSTALLATION

- A. Set flushing hydrant plumb and brace at locations and grades as shown on Drawings. When barrel of hydrant passes through concrete slab, place 1-inch-

thick piece of standard sidewalk expansion joint material around section of barrel passing through concrete.

- B. Locate nozzle center line minimum 18 inches above finish grade.
- C. Place 12-inch by 12-inch yellow indicators (plastic, sheet metal, plywood, or other material approved by Owner's Representative) on pumper nozzles of new or relocated fire hydrants installed on new water lines not in service. Remove indicators after new water line is tested and approved by Owner's Representative.
- D. Do not cover drain ports when placing concrete thrust block.
- E. Obtain Owner's Representative's approval in writing prior to installation of hydrants which require changes in bury depth due to obstructions not shown on Drawings. Unit price adjustments will not be allowed for changes in water line flow line or fire hydrant barrel length caused by obstructions.
- F. Plug branch lines to valves and fire hydrants shown on Drawings to be removed. Deliver fire hydrants designated for salvage to nearest Utility Maintenance Quadrant Facility.
- G. Install branches (leads) in accordance with Section 02511 - Water Lines.
- H. Coating Requirements:
 - 1. Apply coatings in strict accordance with manufacturer's recommendations. No requirements of this specification shall cancel or supersede written directions and recommendations of specific manufacturer so as to jeopardize integrity of applied system.
 - 2. Furnish affidavit of compliance that coatings furnished complies with requirements of this specification and referenced standards, as applicable.
- I. Use following color code for field coating of hydrant bonnet to indicate size of water line supplying hydrant:

Supply Water Line Diameter (inched)	Bonnet Color
6	Yellow
8	White
12-20	Green
24 and larger	Orange

- J. Remove and dispose of unsuitable materials and debris in accordance with requirements of Section 01576 -Waste Material Disposal.

END OF SECTION

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Section 02521

GATE VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gate valves.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for gate valves 20 inches in diameter and smaller under this Section. Include payment in unit price for water lines.
2. Payment for gate valves 24 inches to 36 inches in diameter is on a unit price basis. Unit price includes cost of required box for gate valves.
3. Payment for 2-inch blow-off valve with box is on a unit price basis for each installation.
4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
- B. ASTM B 62 - Standard Specification for Composition Bronze or Ounce Metal Casting.
- C. ASTM D 429 - Standard Test Methods for Rubber Property-Adhesion to Rigid Substrates.
- D. ASTM B 763 - Standard Specification for Copper Alloy Sand Casting for Valve Application.
- E. AWWA C 500 - Standard for Metal-Seated Gate Valves for Water Supply Service.

- F. AWWA C 509 - Standard for Resilient-Seated Gate Valves for Water Supply Service.
- G. AWWA C 515- Standard for Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.
- H. AWWA C 550 - Standard for Protective Epoxy Interior Coatings for Valves and Hydrants.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's product data for proposed valves for approval.
- C. Provide detailed drawings of gearing mechanism for 20-inch and larger gate valves.

1.05 QUALITY CONTROL

- A. Submit manufacturer's affidavit that gate valves are manufactured in the United States and conform to stated requirements of AWWA C 500, AWWA C 509, AWWA C 515, and this Section, and that they have been satisfactorily tested in the United States in accordance with AWWA C 500, AWWA C 509, and AWWA C 515.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Gate Valves: AWWA C 500, AWWA C 509, AWWA C 515 and additional requirements of this Section. Direct bury valves and those in subsurface vaults open clockwise; aboveground and plant valves open counterclockwise.
- B. If type of valve is not indicated on Drawings, use gate valves as line valves for sizes 20 inches and smaller. When type of valve is indicated, no substitute is allowed.
- C. Gate Valves 1-1/2 Inches in Diameter and Smaller: 125 psig; bronze; rising-stem; single-wedge; disc type; screwed ends.
- D. Coatings for Gate Valves 2 Inches and Larger: AWWA C 550, non-toxic, imparts no taste to water, functions as physical, chemical, and electrical barrier between base metal and surroundings, minimum 8-mil-thick, fusion-bonded epoxy. Prior to assembly of valve, apply protective coating to interior and exterior surfaces of body.

- E. Gate Valves 2 Inches in Diameter: Iron body, double disc or resilient-seated, non-rising stem, 150-pound test, 2-inch square nut operating clockwise to open.

- F. Gate Valves 3 Inches to 12 Inches in Diameter: Non-directional, standard-wall resilient seated (AWWA C 509), parallel seat double disc (AWWA C 500), or reduced-wall resilient seated gate valves (AWWA C 515), 200 psig pressure rating, bronze mounting, push-on bell ends with rubber joint rings, and nut-operated unless otherwise specified. Provide approved standard-wall resilient seated valves. Provide approved reduced-wall resilient seated valves. Provide approved double disc valves. Comply with following requirements unless otherwise specified in Drawings:
 - 1. Design: Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless-steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.
 - 2. Body: Cast or ductile iron, flange bonnet and stuffing box together with ASTM A 307 Grade B bolts. Manufacturer's initials, pressure rating, and year manufactured shall be cast in body.
 - 3. Bronze: Valve components in waterway to contain not more than 15 percent zinc and not more than 2 percent aluminum.
 - 4. Stems: ASTM B 763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2 inches of 12 percent, non-rising.
 - 5. O-rings: For AWWA C 500, Section 3.12.2. For AWWA C 509, Sections 2.2.6 and 4.8.2. For AWWA C 515, Section 4.2.2.5.
 - 6. Stem Seals: Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar for operating torque.
 - 7. Stem Nut: Independent or integrally cast of ASTM B 62 bronze.
 - 8. Resilient Wedge: Molded, synthetic rubber, vulcanized and bonded to cast or ductile iron wedge or attached with 304 stainless steel screws tested to meet or exceed ASTM D 429 Method B; seat against epoxy-coated surface in valve body.
 - 9. Bolts: AWWA C 500 Section 3.4, AWWA C 509 Section 4.4 or AWWA C 515 Section 4.4.4; stainless steel.

- G. Gate Valves 14 Inches and Larger in Diameter: AWWA C 500; parallel seat double disc gate valves; push-on bell ends with rubber rings and nut-operated unless otherwise specified. Provide approved double disc valves with 150 psig

pressure rating. Comply with following requirements unless otherwise specified on Drawings:

1. Body: Cast iron or ductile iron; flange together bonnet and stuffing box with ASTM A 307 Grade B bolts. Cast following into valve body manufacturer=s initials, pressure rating, and year manufactured. When horizontally mounted, equip valves greater in diameter than 12 inches with rollers, tracks, and scrapers.
 2. O-rings: For AWWA C 500, Section 3.12.2. For AWWA C 515, Section 4.2.2.5.
 3. Stems: ASTM B 763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2 inches of 12 percent, non-rising.
 4. Stem Nut: Machined from ASTM B 62 bronze rod with integral forged thrust collar machined to size; non-rising.
 5. Stem Seals: Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar for operating torque.
 6. Bolts: AWWA C 500 Section 3.4 or AWWA C 515 Section 4.4.4; stainless steel.
 7. Discs: Cast iron with bronze disc rings securely peened into machined dovetailed grooves.
 8. Wedging Device: Solid bronze or cast-iron, bronze-mounted wedges. Thin plates or shapes integrally cast into cast-iron surfaces are acceptable. Other moving surfaces integral to wedging action shall be bronze monel or nickel alloy-to-iron.
 9. Provide bypass for valves 24 inches and larger.
 10. Bronze Mounting: Built as integral unit mounted over, or supported on, cast-iron base and of sufficient dimensions to be structurally sound and adequate for imposed forces.
 11. Gear Cases: Cast iron; furnished on 18-inch and larger valves and of extended type with steel side plates, lubricated, gear case enclosed with oil seal or O-rings at shaft openings.
 12. Stuffing Boxes: Located on top of bonnet and outside gear case.
- H. Gate Valves 14 Inches to 24 Inches: Provide AWWA C 515; reduced-wall, resilient seated gate valves with 250 psig pressure rating. Furnish with spur or bevel gearing.

1. Mount valves horizontally if proper ground clearance cannot be achieved by normal vertical installation. For horizontally mounted gate valves, provide bevel operation gear mounted vertically for above ground operation.
 2. Use valve body, bonnet, wedge, and operator nut constructed of ductile iron. Fully encapsulate exterior of ductile iron wedge with rubber.
 3. Ensure wedge is symmetrical and seals equally well with flow in either direction.
 4. Provide ductile iron operator nut with four flats at stem connection to apply even input torque to the stem.
 5. Bolts: AWWA C515, Section 4.4.4, stainless Steel.
 6. Provide high-strength bronze stem and nut.
 7. O-rings: AWWA C515, Section 4.2.2.5, pressure O-rings as gaskets.
 8. Provide stem sealed by three O-rings. Top two O-rings are to be replaceable with valve fully open at full rated working pressure.
 9. Provide thrust washers to the thrust collar for easy valve operation.
- I. Gate Valves Extension Stem: When shown on Drawings, provide non-rising, extension stem having coupling sufficient to attach securely to operating nut of valve. Upper end of extension stem shall terminate in square wrench nut no deeper than 4 feet from finished grade or as shown on Drawings. Support extension stem with an arm attached to wall of manhole or structure that loosely holds extension stem and allows rotation in the axial direction only.
- J. Gate Valves in Factory Mutual (Fire Service) Type Meter Installations: Conform to provisions of this specification; outside screw and yoke valves; carry label of Underwriters' Laboratories, Inc.; flanged, Class 125; clockwise to close.
- K. Gate Valves for Tapping Steel Pipe: Provide double disc gate valve. Resilient wedge gate valve shall only be installed in a vertical position.
- L. Provide flanged joints when valve is connected to steel or PCCP.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Earthwork. Conform to applicable provisions of Section 02317 - Excavation and Backfilling for Utilities.

- B. Operation. Do not use valves for throttling without prior approval of manufacturer.

3.02 SETTING VALVES AND VALVE BOXES

- A. Remove foreign matter from within valves prior to installation. Inspect valves in open and closed positions to verify that parts are in satisfactory working condition.
- B. Install valves and valve boxes where shown on Drawings. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of 4 feet, or to undisturbed trench face when less than 4 feet. Install valves completely closed when placed in water line.
- C. For pipe section of each riser, use only 6-inch, ductile iron Class 51, or DR18 PVC pipe cut to proper length. Riser must be installed to allow complete access for operation of valve. Assemble and brace box in vertical position as indicated on Drawings.

3.03 DISINFECTION AND TESTING

- A. Assist Project Manager with disinfection of valves and appurtenances as required by Section 02514 - Disinfection of Water Lines, and test as required by Section 02515 - Hydrostatic Testing of Pipelines.
- B. Double-Disc Gate Valves: Apply hydrostatic test pressure equal to twice rated working pressure of valve between discs. Valve shall show no leakage through metal, flanged joints, or stem seals. Test at rated working pressure, applied between discs. Valve shall show no leakage through metal, flanged joints, or stem seals. Do not exceed leakage rate of 1 oz/hr/inch of nominal valve size.
- C. Solid-Wedge Gate Valves: Apply hydrostatic pressure equal to twice rated working pressure of valve with both ends bulkheaded and gate open. Valve shall show no leakage through metal, flanged joints, or stem seals. Test at rated working pressure, applied through bulkheads alternately to each side of closed gate with opposite side open for inspection. Valve shall show no leakage through metal, flanged joints, or stem-seals. Do not exceed leakage rate of 1 oz/hr/inch of nominal valve size.
- D. Repair or replace valves which exceed leakage rate.

3.04 PAINTING OF VALVES

- A. Paint valves in vaults, stations, and above ground with approved paint.

END OF SECTION

Section 02522

BUTTERFLY VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Butterfly valves.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. Payment for butterfly valves is on a unit price basis for each. Payment include box (when required), actuator and appurtenances necessary for complete installation of the valve.
2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- C. AWWA C 504 - Standard for Rubber-Seated Butterfly Valves.
- D. AWWA C 550 - Standard for Protective Interior Coatings for Valves and Hydrants.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's product data for proposed valves and actuators for approval.
- C. Submit manufacturer's affidavit for proposed valves and actuators certifying compliance with specifications.
- D. Submit manufacturer's affidavit that butterfly valves were manufactured in the United States, and conform to applicable requirements of AWWA C 504 and that

they have been satisfactorily tested in the United States in accordance with AWWA C 504 using test pressure of 150 psi in both directions. Submit Proof-of-Design and hydrostatic testing procedure in accordance with AWWA C 504.

- E. Submit manufacturer's affidavit that coating for interior surfaces of valves conform to applicable requirements of AWWA C 550. Submit results of holiday test and thickness measurements of coatings.
- F. Furnish, at time of delivery, affidavit of compliance, as specified in Section 6.3 of AWWA C 504 certifying compliance with applicable portion of AWWA C 504 and modification or supplements herein. Furnish certified drawings and material test records by manufacturer covering items included in Section 4.3 of AWWA C 504, for review. Furnish certified copies of test reports covering items in Sections 4.5.8.5.5, 4.5.8.5.8 and 5.2.1 through 5.2.4.3 of AWWA C 504 for review.
- G. Submit data indicating maximum torque required to open valve, maximum torsional strength of shaft and torque output of actuator.
- H. Provide submittal information on CD-ROM in Adobe portable document format (*.PDF).
- I. Include number of turns to operate valves to fully open/closed.

1.05 QUALITY CONTROL

- A. Perform valve leakage tests in both directions at 150 psi in factory and field. Hydrostatic field tests of 150 psi shall be made against dished head plug or similar arrangement.
- B. For purposes of interpreting referenced AWWA tests, the following shall apply: Shutoff pressure is 150 psi; cycle consists of rotating disc from fully opened to fully closed position, for valves larger than 72 inches, proof of design shall require 1000 cycles and shall be performed on valve greater than 72 inches of like design and construction. When proof of design tests are performed on valve delivered to job site, replace disc, bushing, shaft and seals with new and unused items, and test and certify as described above.
- C. Hydrostatic Testing by Manufacturer:
 - 1. Hydrostatic testing to be witnessed by Project Manager prior to shipment of valves. Provide minimum 4 weeks notice to Project Manager to schedule witness testing. When possible, maximize number of valves to be tested during a plant visit; no more than two visits will be allowed per project to witness test valves, unless otherwise approved by Project Manager. Owner will pay expenses for each visit up to total of two visits incurred by Project Manager to witness testing of each grouping of valve(s) per project. Expenses for subsequent or extended visits by Project

Manager for defective valves, improper scheduling or valve failures are to be paid by Contractor. Witness of hydrostatic testing by Project Manager will only be in regards to compliance with this specification and will not constitute approval by Project Manager nor relieve Contractor of obligations to comply with contract documents.

2. Document serial number on valve at time of testing and reflect in certified test records furnished to Project Manager. Identification plate must be permanently affixed to valve and actuator prior to hydrostatic testing.
3. Hydrostatic testing to conform to AWWA C504 except as modified below:
 - a. Install actuator prior to hydrostatic testing. Test actuator to verify actual number of turns match manufacturer's published number of turns. Verify valve stops are in correct positions.
 - b. Fully open and close valve prior to performing shell test and prior to each leakage test.
 - c. Perform shell test first.
 - d. When tested with water, adequately dry seat and disc.
 - e. When tested with air, fill top of valve with water to aid in viewing possible leakage.
 - f. Pressure Gauges: Calibrated within past 12 months; 0-500 psi range in increments of 5 psi; present calibration certificates prior to hydrostatic testing.
 - g. If seat adjustment is required during hydrostatic testing, perform valve leakage test again in both directions. Once seat adjustment is made, fully open and fully close valve three (3) times, and repeat leakage test.
4. Field Testing:
 - a. When valve arrives at the job site, Contractor is to operate valve fully open and closed twice in presence of Project Manager. Document number of turns to open and close each time.
 - b. Install operator nut plum.
 - c. After valve is installed, repeat the operation test and document number of turns in presence of Project Manager.

- d. Manufacturer=s representative must be present to witness the operation test again at the substantial walk thru. Verify valve operate fully open/closed twice at the appropriate number of turns.

PART 2 PRODUCTS

2.01 VALVES AND ACTUATORS

- A. Butterfly Valves and Actuators: Provide approved butterfly valves and actuators. Conform to AWWA C 504, except as modified or supplemented herein.
- B. If type of valve is not indicated on Drawings, use butterfly valves for line valve sizes 24-inch and larger. When type of valve is specified on Drawings, no substitute will be allowed, unless otherwise approved by Project Manager.
- C. Butterfly valves shall be short-body, flanged design and installed at locations as shown on Drawings.
- D. Direct-bury valves and valves in subsurface vaults shall open clockwise. Above-ground and plant valves shall open counterclockwise.
- E. Provide flanged joints when valve is connected to steel or PCCP.
- F. Butterfly Valves and Actuators (Additional Requirements for Large Diameter Water Lines):
 1. Provide valves from approved manufacturer⁽¹⁾. Provide all valves for single project, from same manufacturer. ⁽¹⁾as modified for seat replacement in field for Owner.
 2. Valves larger than 72 inches in diameter design: allowable stresses at rated pressure not to exceed one-third of yield strength or one-fifth of ultimate strength of material used.
 3. Provide manual actuators for single project from same manufacturer.
 4. Shaft connecting actuator to valve body must be fully enclosed. Bonnet and extension to be fully enclosed and watertight.

2.02 VALVE CONSTRUCTION

- A. Valves: AWWA C 504, Class 150B. Body: Cast iron, ASTM A 126, Class B. Flanges: ASME B 16.1, Class 125 lb.
- B. Discs for Butterfly Valves: Either cast iron or ductile iron. Valves greater than 54 inches in diameter must utilize flow-through disc.

- C. Seats: Buna-N or neoprene, and may be applied to disc or body. Seats shall be mechanically secured and may not rely solely on adhesive properties of epoxy or similar bonding agent to attach seat to body. Seats on disc shall be mechanically retained by stainless steel (18-8) retaining ring held in place by stainless steel (18-8) cap screws that pass through rubber seat for added retention. When seat is on disc, seat shall be retained in position by shoulders located on both disc and stainless-steel retaining ring. Mating surfaces for seats: Type 304 or 316, stainless steel and secured to disc by mechanical means. Sprayed-on or plated mating surfaces will not be allowed. Seat must be replaceable in field for valves greater than 30 inches in diameter. Valves with segmented retaining rings will not be accepted.
- D. Coat interior wetted ferrous surfaces of valve, including disc, with epoxy suitable for potable water conditions. Epoxy, surface preparation, and epoxy application: In accordance with AWWA C 550 and coating manufacturer's recommendations. Provide three coats of two-component, high-build epoxy with minimum dry film thickness of 12 mils. Provide approved epoxy coating. Coatings shall be holiday tested and measured for thickness.
- E. Valve Shaft and Keys: 24 inches in diameter and greater valves require a minimum of two (2) taper pins used for attaching valve shaft to valve disc, use of torque plug for purpose of attaching valve shaft to valve disc is not permitted: Type 316 stainless steel. Shaft Bearings: Stainless steel, bronze, nylon, or Teflon (supported by fiberglass mat or backing material with proven record of preventing Teflon flow under load) in accordance with AWWA C 504. Sinter stainless steel bearing material. Design valve shaft to withstand 3 times amount of torque necessary to open valve.
- F. Packing: Self adjusting and wear compensating, full or split ring V-type, and replaceable without removing actuator assembly.
- G. Retaining Hardware for Seats: Type 304 or 316 stainless steel. Nuts and screws used with clamps and discs for rubber seats shall be held securely with locktight, or other approved method, to prevent loosening by vibration or cavitation effects.
- H. Valve disc shall seat in position at 90 degrees to pipe axis and shall rotate 90 degrees between full-open and tight-closed position. Install valves with valve shafts horizontal and convex side of disc facing anticipated direction of flow, except where shown otherwise on Drawings. The valve stops shall be capable of withstanding a 450 ft lb. torque against the stop without damage to either the stop or the gear teeth.
- I. For valves utilizing retaining rings, tighten bolts to a uniform torque. Measure torque prior to testing valve.

2.03 VALVE ACTUATOR CONSTRUCTION

- A. Provide actuators for valves with size based on line velocity of 12 feet per second and uni-directional service, and, unless otherwise shown on Drawings, equip with geared manual actuators. Provide fully enclosed and traveling-nut type, rack-and-pinion type, or worm-gear type for valves 20 inches and smaller. Provide worm-gear type for valves 24 inches and larger.
- B. Provide actuator designed for installation with valve shaft horizontal unless otherwise indicated on Drawings.
- C. Provide bonnet extensions, as required, between valve body and actuator. Space between actuator housing and valve body shall be completely enclosed so that no moving parts are exposed to soil or elements.
- D. Provide oil-tight and watertight actuator housings for valves, specifically designed for buried service or submerged service when located in valve vaults, and factory packed with suitable grease.
- E. Install valve position indicator on each actuator housing located above ground or in valve vaults. Valves shall be equipped with 2-inch actuator nut only.
- F. Indicate direction of opening of valve on exposed visible part of assembly and cast direction of open on 2-inch nut on top of valve operator extension. Paint 2-inch actuator nut and extension shaft black when counterclockwise open and red when clockwise to open.
- G. Design worm-gear or traveling-nut actuators to be self-locking and designed to transmit twice the required actuator torque without damage to faces of gear teeth or contact faces of screw or nut.

2.04 VALVE BOXES

- A. Provide Standard Type "A" valve boxes conforming to requirements of Section 02085 - Valve Boxes, Meter Boxes, and Meter Vaults.

2.05 VALVE SERVICE MANHOLES

- A. For large diameter water lines, provide manholes to dimensions shown on Drawings conforming to requirements of Section 02082 - Precast Concrete Manholes.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Conform to applicable provisions of Section 02317 - Excavation and Backfill for Utilities.

3.02 SETTING VALVES AND VALVE BOXES

- A. Prior to hydrostatic testing of water line and valve:
 - 1. Test valve by opening and closing valve a minimum of two times to verify valve seats properly.
 - 2. Verify number of turns from fully open to fully closed position is same as identified in manufacturer=s submittal.
 - 3. Adjust valve as required if number of turns do not match.
 - 4. Remove foreign matter from within valves.
- B. Install valves where shown on Drawings or as located by Project Manager. Use valve boxes for 16-inch and 24-inch valves. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of 4 feet, or to undisturbed trench face when less than 4 feet.
- C. Avoid disturbing or overstressing valve body when installing valves. Perform field adjustment of valves under pressure to ensure shutoff occurs in number of rotations as described in valves operation and maintenance manual.
- D. Attach two 4-foot lengths of pipe to each side of valve prior to installation in line.
- E. Submit certification that large diameter valve was installed, adjusted, and exercised in accordance with manufacturer's instructions. Manufacturer's certification shall state that all performance characteristics of large diameter valves, as installed, have been met. Adjustments made to valve, for any reason, must be made by manufacturer's representative.

3.03 DISINFECTION AND TESTING

- A. Assist Owner with disinfection of valves and appurtenances as required by Section 02514 - Disinfection of Water Lines and test as required by Section 02515 - Hydrostatic Testing of Pipelines. Do not use valves for throttling without prior approval of manufacturer.

3.04 COATING OF PIPING

- A. Coat valves located in vaults, stations, and above ground using approved paint. Minimum of two (2) coats shall be applied with minimum of three (3) mil thickness. Apply coating in accordance with manufacturer=s recommendations.

END OF SECTION

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Section 02523

PRESSURE REDUCING/FLOW CONTROL VALVE

PART 1 GENERAL

1.01 SECTION INCLUDES

The Contractor shall furnish and install control valves, and appurtenances completely as specified herein.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for pressure reducing/flow control valves is on unit price basis for each valve installed.
2. Payment includes vault, piping, manhole, fittings, and appurtenances necessary for complete installation of valve.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- C. AWWA C 504 - Standard for Rubber-Seated Butterfly Valves.
- D. AWWA C 550 - Standard for Protective Interior Coatings for Valves and Hydrants.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit one drawing or illustration showing unit construction for each type and size valve used.
- C. Submit the following information for each valve:

1. Description including type of valve, type of operator and accessories included.
2. Size and end connections.
3. Maximum non-shock working pressure for which valve is designed.
4. Materials of construction and coatings for valves, operators and accessories.
5. K or Cv value.
6. Manufacturer's make and model.

D. Location of nearest stocking distributor.

E. Affidavits:

1. Submit affidavits of compliance with the reference standards.

1.05 QUALITY CONTROL

Submit manufacturer's affidavit that pressure reducing valves purchased for Work, were manufactured and tested in the United States, and conform to requirements of this Section.

PART 2 PRODUCTS

2.01 FUNCTION

A. The Electronic Control Valve shall control the valve flow rate via a solenoid controlled pilot system. The valve shall also be equipped with an integral independent hydraulic pressure sustaining, reducing, and relief override features, with a low flow bypass and a model

1. X-143HP Hydo Turbine.

B. The valve shall be hydraulically operated, single diaphragm actuated, globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons or rolling diaphragms operating the main valve or pilot controls. Valve body and cover shall be of cast material. Ductile Iron is standard, other materials shall be available. No fabrication or welding shall be used in the manufacturing process.

- C. Solenoid pilot alternately applies pressure to or exhausts pressure from the diaphragm chamber of the main valve which in turn causes the main valve to open or close.

2.02 DESCRIPTION

- A. No separate chambers shall be allowed between the main valve cover and body. Valve body and cover shall be of cast material. Ductile Iron is standard and other materials shall be available. No fabrication or welding shall be used in the manufacturing process. The valve shall contain a resilient, synthetic rubber disc, with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. No O-ring type discs (circular, square, or quad type) shall be permitted as the seating surface. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the disc firmly in place.

The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. It must have straight edge sides and a radius at the top edge to prevent excessive diaphragm wear as the diaphragm flexes across this surface. No hourglass-shaped disc retainers shall be permitted and no V-type or slotted type disc guides shall be used.

- B. The diaphragm assembly containing a non-magnetic 303 stainless steel stem of sufficient diameter to withstand high hydraulic pressures shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. The seat shall be a solid, one-piece design and shall have a minimum of a five-degree taper on the seating surface for a positive, drip-tight shut off. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.
- C. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The center hole for the main valve stem must be sealed by the vulcanized process or a rubber grommet sealing the center stem hole from the operating pressure. The diaphragm shall not be used as the seating surface. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully opened or fully closed position.
- D. The main valve seat and the stem bearing in the valve cover shall be removable. Valve seat in 8" and larger size valves shall be retained by flat head machine screws for ease of maintenance. The lower bearing of the valve stem shall be contained concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No "pinned" covers to the

valve body shall be permitted. Cover bearing, disc retainer, and seat shall be made of the same material. The valve shall be designed in a way that enables disassembly of the Cover and diaphragm assembly vertically up from the top of a narrow valve pit. Diagonally shaped ("Y" pattern) valve body is not accepted. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline.

- E. The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment, provided the valve is installed and used in accordance with all applicable instructions. Electrical components shall have a one-year warranty.
- F. The valve manufacturer shall be able to supply a complete line of equipment from 2" through 48" sizes and a complete selection of complementary equipment. The valve manufacturer shall also provide a computerized cavitation chart which shows flow rate, differential pressure, percentage of valve opening, Cv factor, system velocity, and if there will be cavitation damage. The valve manufacturer shall be able to provide cavitation analysis substantiated by independent third party testing.

G. Material Specification

Valve Size:	Two - 16" (Globe) and One - 12" (Angle)
Main Valve Body and Cover:	Ductile Iron ASTM
A-536 Main Valve Trim:	Stainless Steel
End Detail:	150 LB Flange ANSI B16.42
Pressure Rating:	250 psi max. working pressure
Rubber Material:	-40 to +180 Degrees F
Temperature Range:	Buna N
Coating:	FDA approved heat fusion bonded epoxy coating to internal and external surfaces of valve body including disc retainer and diaphragm washer

2.03 PILOT CONTROL SYSTEM

- A. The 131 control valve pilot system shall consist of dual solenoids which alternately apply or relieve pressure to the diaphragm chamber to position the main valve. One shall be normally closed (energized to open), with Nema type 4 enclosure and one shall be normally open (energized to close) with Nema type 4 enclosure. Solenoids shall be arranged to provide Main valve closure upon power failure. A manual system to by-pass the solenoids shall also be provided.

- B. The valve shall also be equipped with an integral independent hydraulic pressure Sustaining and pressure Relief override features. The valve uses a CRA pilot control for hydraulic pressure sustaining control, and a CRL pilot for pressure relief override.
- C. Material Specification for Pilot Control Pressure Rating: 300 psi
- | | |
|----------------------------|----------------------------|
| Rubber Material: | Buna N |
| Tubing and Fittings: | Bronze and Copper |
| Operating Fluid: | Water |
| Solenoid Voltage: | 120 Volts |
| Enclosure Type: | NEMA 4 |
| Desired Options: | X105LCW limit switch, X141 |
| Guages on inlet and outlet | |
| CRA Adjustment Range: | 20-105 psi |
| CRL Adjustment Range: | 20-200 psi |

2.04 MANUFACTURER

- A. This valve shall be a Cla-Val Co. Model No. 131-CE BCPSYKCX Electronic Flow Control Valve with Pressure Sustaining and pressure Relief override Features, as manufactured by Cla-Val Co., Newport Beach, CA 92659-0325.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Conform to applicable provisions of Section 02317 – Excavation and Backfill for Utilities.

3.02 INSTALLATION

- A. The Contractor shall install the valves in accordance with the following requirements:
1. Installation shall be in accordance with the plans, approved shop drawings and the manufacturer's instructions.
 2. Install valves and valve operators to provide for ease of access and operation.
 3. Install buried valve by carefully lowering into position in such a manner to prevent damage to any part of the valves. The valve shall be placed in proper position and shall be securely held until all connections have been made. All buried pipe and appurtenances shall be wrapped in polyethylene encasement in accordance with AWWA C105/A21.5.

4. All buried valves 8 inches and larger shall rest on a concrete pad. Pad shall extend for the full width of the trench and from back-to-back of hub (or flange). Care shall be taken to not interfere with the jointing.

B. The Equipment Manufacturer shall furnish all accessories and hardware necessary for installation.

3.03 SETTING VALVES

A. Provide services of technical representative of valve manufacturer on site during installation of valves and to serve as adviser on aspects of installation. Take necessary precautions to protect pilot system during PRV installation.

B. Prior to installing valves, remove foreign matter from within valves. Inspect valves in open and closed position to verify that parts are in satisfactory working condition.

3.04 FIELD QUALITY CONTROL

A. The Equipment Manufacturer shall perform the following services:

1. Inspect the completed installation and note deficiencies.

2. Assist the Contractor during start-up, adjusting, and site testing of completed installation as required. A direct factory representative shall be made available for start-up service, inspection and necessary adjustments.

3. Instruct Owner personnel in the operations and maintenance of the equipment.

B. Testing: Field startup testing will be in accordance with Section 01755. All valves shall be tested by manufacturer in accordance with AWWA C500.

C. Valve shall not hang and shall seat and unseat to/from fully closed position. Verify valve tag is installed and correct. Verify valve position indicator correctly reflects valve positions and limit switches (if used) are set correctly.

3.05 DISINFECTION AND TESTING

Disinfect valves and appurtenances as required by Section 02514 - Disinfection of Water Lines and test as required by Section 02515 - Hydrostatic Testing of Pipelines.

3.06 PAINTING OF PIPING AND VALVES

Paint piping and valves located in vaults, stations, and above ground using ACRO Paint No. 2215, or approved equal.

3.07 WARRANTY

The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of startup, provided the valve is installed and used in accordance with all applicable instructions.

Electrical components shall have a one-year warranty.

END OF SECTION

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Section 02524

AIR RELEASE AND VACUUM RELIEF VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air release and vacuum relief valves.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. Payment for air release and vacuum relief valves is on unit price basis for each valve installed.
2. Payment includes manhole or vault (when required), fittings, vent piping and bollard(s) and appurtenances necessary for complete installation of valve.
3. Payment for valve assembly on aerial crossing includes fittings, anti-vandalism protection, freeze protection, vent piping and appurtenances necessary for complete installation of valve.
4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM A 48 - Standard Specification for Gray Iron Castings.
- B. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- C. ASTM A 240 - Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
- D. ASTM A 276 - Standard Specification for Stainless Steel Bars and Shapes.
- E. ASTM A 313 - Standard Specification for Stainless Steel Spring Wire.
- F. ASTM B 584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's product data for proposed valves for approval.

1.05 QUALITY CONTROL

- A. Provide manufacturer's affidavit that air release and vacuum relief valves purchased for Work were manufactured and tested in the United States and conform to requirements of this Section.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. Provide combination air valves designed to fulfill functions of air release (permit escape of air accumulated in line at high point of elevation while line is under pressure) and vacuum relief.
- B. Provide inlet and outlet connections, and orifice as shown on Drawings.
- C. Valve Exterior: Painted with shop-applied primer suitable for contact with potable water.

2.02 MATERIALS

- A. Air Release Valves: Provide approved air release valves, ASTM A 48, Class 30, cast iron; float and leverage mechanism with body and cover, ASTM A 240 or ASTM A 276 stainless steel; orifice and seat, stainless steel against Buna-N or Viton mechanically retained with hex head nut and bolt. Other valve internals shall be stainless steel or bronze.
- B. Air Release and Vacuum Relief Valves: Provide single-body, standard combination valves or duplex-body custom combination valves as indicated on Drawings.
 - 1. For 2-inch and 3-inch, single-body valves, provide inlet and outlet size as shown on Drawings and orifice sized for 100 psi working pressure.
 - a. Valve Materials: Body, cover, and baffle, ASTM A 48, Class 35, or ASTM A 126, Grade B cast iron; plug or poppet, ASTM A 276 stainless steel; float, ASTM A 240 stainless steel; seat, Buna-N; other valve internals, stainless steel.
 - 2. For 3-inch and larger duplex body valves as shown on Drawings, provide approved air release valve.

- a. Air and Vacuum Valve Materials: Body and cover, ASTM A 48, Class 35, cast iron; float, ASTM A 240 stainless steel; seat, Type 304, stainless steel and Buna-N; other valve internals, stainless steel or bronze.
 - b. Air Release Valve: Constructed as specified in paragraph above on Air Release Valves.
- C. Vacuum Relief Valves: Provide approved air inlet vacuum relief valves with flanged inlet and outlet connections as shown on Drawings. Provide air release valves in combination with inlet and outlet, and orifice as shown on Drawings. Valve shall open under pressure differential not to exceed 0.25 psi.
1. Materials for Vacuum Relief Valves: Valve body, ASTM A 48, Class 35, cast iron; seat and plug, ASTM B 584 bronze, copper alloy 836; spring, ASTM A 313, Type 304, stainless steel; bushing, ASTM B 584 bronze, copper alloy 932; retaining screws, ASTM A 276, Type 304, stainless steel.
- D. Manholes: As shown on Drawings conforming to requirements of Section 02082 - Precast Concrete Manholes.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Conform to applicable provisions of Section 02317 - Excavation and Backfill for Utilities.

3.02 SETTING VALVES IN MANHOLES AND VAULTS

- A. If required by Project Manager, provide services of technical representative of valve manufacturer available on site during installation of valves.
- B. Prior to installing valves, remove foreign matter from within valves. Inspect valves in open and closed position to verify that parts are in satisfactory working condition.
- C. Install valves and valve manholes where indicated on Drawings or as located by Project Manager. Set manholes and valves plumb and as detailed. Center manholes on valves. Compact cement-stabilized sand around each manhole and vault for minimum radius of 4 feet, or to undisturbed trench face when less than 4 feet. Provide above-ground vents for manholes and vaults as indicated on Drawings.

3.03 DISINFECTION AND TESTING

- A. Assist Owner with disinfection of valves and appurtenances as required by Section 02514 - Disinfection of Waterlines, and test as required by Section 02515 - Hydrostatic Testing of Pipelines.

3.04 PAINTING OF PIPING AND VALVES

- A. Paint piping and valves located in manholes, stations, and above ground using approved paint.

END OF SECTION

Section 02526

WATER METERS

PART 1 GENERAL

1.01 SECTION INCLUDES

Water meters and flow transmitters.

1.02 MEASUREMENT AND PAYMENT

Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price. Cost included in lump sum for meter station.

1.03 REFERENCES

- A. ANSI B 16.5 – Carbon Steel Pipe Flanges and Flanged Fittings.
- B. AWWA C-207 – Steel Pipe Flanges and Flanged Fittings.
- C. AWWA Manual M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

1.04 SUBMITTALS

- A. Conform to other sections of the specifications for submittal procedures.
- B. Submit written certification of calibration and test results.
- C. Submit manufacturer's certification that meters meet applicable requirements of this Specification Section.
- D. Submit accuracy registration test certification from manufacturer for each 8 inch through 16-inch diameter meter.
- E. Shop Drawings
 - 1. Manufacturers written and illustrated instructions for the construction and dimensions.
 - 2. Manufacturers written and illustrated instructions for the approved installation method.
 - 3. Use elementary diagram with numbered terminals for interconnection with other units in accordance with ISA loop diagram standards.
- F. Operations and Maintenance Data: Include, as a minimum, the following:

1. Equipment operational instructions.
2. Preventive maintenance instructions.
3. Troubleshooting instructions.
4. Complete listing of repair parts and model numbers.
5. Calibration method and procedure.
6. Manufacturer's installation statement that the meters are properly installed and adjusted or description of any deficiency and recommended corrective action.
7. Corrected shop drawings as called for above.

1.05 QUALITY CONTROL

A. Submit manufacturer's warranty against defects in materials and workmanship for one year from date of Substantial Completion.

B. Provide vendor's unconditional guarantee that performance of each meter meets applicable AWWA standards and AWWA Manual M6 as follows:

Turbine type: 1 year from date of installation

Operations of hermetically sealed register, 5/8-inch to 2-inch diameter, shall be unconditionally guaranteed for 15 years.

C. Provide manufacturer's unconditional guarantee for each sealed register against leakage, fogging, discoloration, and stoppage for 15 years from date of installation.

D. Vendor may replace meters that become defective within guarantee period with meters that comply with this Specification. The Authority will return defective meters to vendor at expense of vendor. Meters repaired or replaced under this guarantee must meet accuracy limits for new meters upon receipt and accuracy limits for remaining period of initial guarantee.

PART 2 PRODUCTS

2.01 MATERIAL AND/OR EQUIPMENT

A Flowmeter

1. Manufacturer:
 - a. Siemens SITRANS FM - MAG5100W Magnetic Flow Meter
2. Flowmeter Materials

- a. Flow Tube: 150# Cast steel with 304 stainless steel flow tube, ebonite hard rubber liner and hastelloy C measuring and grounding electrodes. Flow tube to be painted with corrosion resistant epoxy paint.
 - b. Grounding shall be accomplished by way of built-in grounding electrodes. Grounding rings shall not be required.
 - c. The sensor termination box shall be sealed with a non-hardening, two-part epoxy compound poured in place in the field as soon as proper operation of the flowmeter/transmitter is confirmed. The sensor shall be rated for submergence for up to 30 ft. of water for indefinite periods with the compound installed and cured.
3. Flanged end connections in accordance with ANSI B 16.5 Class 150.
 4. Maximum operating pressure 150 PSIG.
 5. Accuracy: 100% +/- 0.25% of actual throughput NIST.
 6. Range: 250 to 10,000 gpm with a maximum intermittent flow of 12,500 pgm.
 7. Designation: Refer to drawings.

B. Accessories

1. Transmitter
 - a. Manufacturer.
 - i) Siemens transmitter and accessories: MAG 6000 with MODBUS Communications.
 - b. Output: Electric pulse proportional to flow.
 - c. NEMA 4X enclosed for remote mounting, with appropriate length factory cable kit and submersible kit.
 - c. Required features:
 - i) Back illuminated 3 line 200 character display.
 - ii) Shall indicate flowrate, totalized values – Forward and Reverse, settings and faults.
 - iii) Capable of rotating 360 degrees and shall be protected by a hinged cover.
 - iv) Programmed via integral password protected keypad.

- v) Plug in ModBUS Communications module.
- 2. Signal Transmitter
 - a. Manufacturer
 - i) Sensus Metering Systems -Model 1107D
 - ii) Approved equal
 - b. Performance Requirements
 - i) Input signal: From transmitters specified in paragraph 2.01, A.
 - ii) Output signal: 4-20mA DC into 500 ohm load at 24 volt DC. Signal to be directly proportional to flow.
 - c. Features
 - i) Solid-state electronics
 - ii) Integral regulated power supply for driving transmitter, 120-volt AC single phase 60 hertz.
 - iii) Plug-in circuit cards coated for maximum environmental protection

2.02 LAYING LENGTHS

Minimum laying lengths for meter and standard strainer shall be as shown on Drawings.

PART 3 EXECUTION

3.01 TAPPING AND METER SERVICE INSTALLATION

- A. Refer to other sections of the specifications for tapping requirements.
- B. Meter Service Line:
 - 1. Use pipe and fittings conforming to requirements of Section 02501 - Ductile Iron Pipe and Fittings, or Section 02506 - Polyvinyl Chloride Pipe.
 - 2. Limit pulling and deflecting of joints to limits recommended by manufacturer.
 - 3. Make vertical adjustments with offset bends where room will permit. Minimize number of bends.
- C. Follow manufacturer's recommendation for the minimum upstream and downstream

installation requirements for the flow sensor.

3.02 METER FITTING HOOKUP

- A. Support meter piping and meter, level and plumb, during installation. Support meters 8 inches and larger with concrete at minimum of two locations.
- B. Use round flanged fittings inside meter station or vault except for mechanical joint to flange adapter. Provide full-face 1/8-inch black neoprene or red rubber gasket material on flanged joints. Provide bolts and nuts made from approved corrosion-resistant material.
- C. Tighten bolts in proper sequence and to correct torque.
- D. Visually check for leaks under normal operating pressure following installation. Repair or replace leaking components.

3.03 METER BOX AND VAULT INSTALLATION

Conform to other sections of the specifications for requirements of meter vaults.

3.04 CALIBRATION

- A. Each flow sensor shall be wet calibrated and furnished with a factory calibration certificate.
- B. The calibration information and factory settings matching the sensor shall be stored in an integrally mounted SENSORPROM® memory unit. The SENSORPROM® shall store sensor calibration data and signal converter settings for the lifetime of the product. At initial commissioning, the flowmeter commences measurement without any initial programming. The transmitter shall be of the plug-N-play type. All customer specified settings are downloaded to the SENSORPROM®. Should the signal converter need to be replaced, the new signal converter will upload all previous settings and resume measurement without any need for reprogramming or rewiring. A certificate of calibration shall accompany each flow sensor.

3.05 CALIBRATION

- A. Each flow sensor shall be wet calibrated and furnished with a factory calibration certificate.

3.05 TESTING

- A. Accuracy registration tests will be conducted in accordance with latest revision of AWWA standard for type and size of meter.
 - 1. Tests will be run by manufacturer on all 8 inch and larger meters prior to installation. Manufacturer shall submit certified test results.

2. Accuracy of displacement meters during guarantee period shall be as follows:
 - a. Initial period: of 18 months from date of shipment or 12 months from date of installation: 98.5% to 101.5% at standard and minimum flow rates; 98% to 101% at low flow rates.

END OF SECTION

Section 02527

POLYURETHANE COATINGS ON STEEL OR DUCTILE IRON PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Two-component polyurethane coating system for use as external coating for steel or ductile iron pipe.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for work performed under this Section. Include cost of polyurethane coatings in contract unit prices for steel pipe or ductile iron pipe.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 210 - Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
- B. ASTM D 522 - Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.
- C. SSPC-PA 2 - Measurement of Dry Paint Thickness with Magnetic Gauges.
- D. SSPC-PA Guide 3 - A Guide to Safety in Paint Application.
- E. SSPC-PS Guide 17.00 - Guide for Selecting Urethane Painting Systems.
- F. SSPC-PS10 - Near-White Blast Cleaning.

1.04 SAFETY

- A. Secure, from manufacturer, Material Safety Data Sheet (MSDS) for polyurethane coatings and repair materials listed in this Section.

- B. Safety requirements stated in this specification and in related sections apply in addition to applicable federal, state and local rules and regulations. Comply with instructions of coating manufacturer and requirements of insurance underwriters.
- C. Follow handling and application practices of SSPC-PA Guide 3; SSPC-PS Guide 17.00; Coating Manufacturer's Material Safety Data Sheet.

1.05 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit coating manufacturer's catalog sheets and technical information for approval, prior to delivery of pipe.
- C. Obtain from coating manufacturer and submit coating "affidavit of compliance" to requirements of this Section stating that coatings were applied in factory and in accordance with manufacturer's minimum requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Use standard containers to prevent gelling, thickening deleteriously or forming of gas in closed containers within period of one year from date of manufacture.
- B. Label each container of separately packaged component clearly and durably to indicate date of manufacture, manufacturer's batch number, quantity, color, component identification and designated name or formula specification, number of coatings together with special instructions. Do not use coating components older than one year.
- C. Deliver coating materials to pipe manufacturer in sealed containers showing designated name, batch number, color, date of manufacture and name of coating manufacturer.
- D. Store material onsite in enclosures, out of direct sunlight in warm, ventilated and dry area.
- E. Prevent puncture, inappropriate opening or other action which may lead to product contamination.

PART 2 PRODUCTS

2.01 COATING MATERIAL

- A. CORROPIPE II PW - TOUCHUP (two-component) or approved equal; mix in accordance with coating manufacturer's recommendations.
 - 1. For areas less than or equal to 6 inches in diameter, brush apply.

2. For areas greater than 6 inches in diameter, spray apply.
- B. Coating System: Use Type V system which is 2-package polyisocyanate, polyol-cured urethane coating, mixed in 1:1 ratio at time of application. Components shall be balanced viscosities in their liquid state and not require agitation during use.
- C. Exterior Coating Material: CORROPIPE II-TX and Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc.
- D. Internal Coating Material: Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc.
- E. Cured Coating Properties:
 1. Conversion to Solids by Volume: 97 percent plus or minus 3 percent.
 2. Temperature Resistance: Minus 40 degrees F and plus 130 degrees F.
 3. Minimum Adhesion: 500 psi, when applied without primer to ductile iron pipe which has been blasted to comply with SSPC-SP 10.
 4. Cure Time: For handling in 1 minute at 120 degrees F, and full cure within 7 days at 70 degrees F.
 5. Maximum Specific Gravities: Polyisocyanate resin, 1.20. Polyol resin, 1.15.
 6. Minimum Impact Resistance: 80 inch-pounds using 1-inch diameter steel ball where coating is applied at 30 mils to ductile iron pipe surface which has been blasted to SSPC No. 10 finish.
 7. Minimum Tensile Strength: 2,000 psi.
 8. Hardness: 55 plus or minus 5 Shore D at 70 degrees F.
 9. Flexibility Resistance: ASTM D 522 using 1-inch mandrel. Allow coating to cure for 7 days. Perform testing on test coupons held for 15 minutes at temperature extremes specified in this Paragraph.

2.02 REPAIR AND TOUCHUP MATERIAL

- A. CORROPIPE II-PW (two-component, brush applied, or approved equal). Mix in accordance with coating manufacturer's recommendations.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Remove deposits of oil, grease or other organic contaminants before blast cleaning by using solvent wash as specified in SSPC-PA Guide 3. Clean and dry surfaces making them completely dry, free of moisture, dust, grit, oil, grease or other deleterious substances prior to application of coating.
- B. Exterior and Interior Surfaces: SSPC-SP10, near-white metal blast cleaning. Blast with clean, hard, sharp cutting abrasives with no steel or cast iron shot in mix.
- C. Ductile Iron Pipe: Prior to start of production blasting, prepare specimens for white metal blast and near-white metal blast using equipment and abrasives proposed for work. During preparation of specimens, change blasting intensity and abrasive as necessary to provide degree of cleaning required by SSPC-SP10, except that color of blasted substrate is not expected to match color of blasted steel. After examination and concurrence by Project Manager, production blasting may begin. Monitor and control production blasting so that production pipe surfaces match surface of approved blasting specimens.

3.02 THICKNESS

- A. External Coatings: Minimum DFT of 25 mils (0.025 inch).
- B. Internal Coatings: Minimum DFT of 35 mils.
- C. Thickness Determinations: Use Type 1 magnetic thickness gauge as described in SSPC-PA2 specification. Individual readings below 90 percent of specified minimum are not acceptable. Average individual spot readings (consisting of three point measurements within 3 inches of each other) less than 95 percent of minimum are not acceptable. Average of all spot readings less than minimum thickness specified are not acceptable.

3.03 FACTORY APPLICATION OF POLYURETHANE COATING

- A. Equipment: Two-component, 1:1 mix ratio, heated airless spray unit.
- B. Temperature: Minimum 5 degrees F above dew point temperature. Temperature of surface shall not be less than 60 degrees F during application.
- C. Humidity: Heating of pipe surfaces may be required to meet requirements of Paragraph 2.01E, Cured Coating Properties, when relative humidity exceeds 80 percent.
- D. Do not thin or mix resins; use as received. Store resins at temperature above 55 degrees F at all times.

- E. Application: Conform to coating manufacturer's recommendations. Apply directly to substrate to achieve specified thickness. Multiple-pass, one-coat application process is permitted provided maximum allowable recoat time specified by coating manufacturer is not exceeded.
- F. Recoat only when coating has cured less than maximum time specified by coating manufacturer. When coating has cured for more than recoat time, brush-blast or thoroughly sand coating surface. Blow-off cleaning using clean, dry, high pressure compressed air.
- G. Cure at ambient temperature above 0 degrees F. Do not handle pipe until coating has been allowed to cure as follows:

Ambient Temperature	Minimum Full Cure Time
Over 70 degrees F	7 days
50 to 70 degrees F	9 days
0 to 50 degrees F	12 days

3.04 JOINTS

- A. Apply coating to unlined pipe surfaces including inside of bell socket and outside of spigot.
- B. Coating thickness on sealing areas of spigot end of pipe exterior: minimum 8 mils (0.008 inch), maximum of 10 mils (0.010 inch). Maximum 10 mils may be exceeded in spigot end provided maximum spigot diameter as specified by pipe manufacturer is not exceeded.

3.05 INSPECTION

- A. Project Manager may inspect coatings at coating applicator's facilities.
- B. Secure approval of surface preparation by coating manufacturer's representative prior to coating application.
- C. Holiday Inspection: Conform to AWWA C 210, Section 5.3.3.1. Follow coating manufacturer's recommendation. Conduct inspection any time after coating has reached initial cure. Repair in accordance with Paragraph 3.07, Repair and Field Touchup.

3.06 PIPE INSTALLATION

- A. When required by Project Manager, provide services of manufacturer's representative for period of not less than 2 weeks at beginning of actual pipe laying operations to advise Contractor regarding installation including but not

limited to handling and storing, cleaning and inspecting, coatings repairs, and general construction methods as to how they may affect pipe coatings.

- B. Use nylon straps, padded lifts and padded storage skids. Field cuts should be kept to minimum. Repair damage to coating due to handling or construction practices. See Section 02501 - Ductile-Iron Pipe and Fittings and Section 02502 - Steel Pipe and Fittings for additional requirements.
- C. Just before each section of pipe is to be placed into trench, conduct visual and holiday inspection. Repair defects in coating system before pipe is installed.

3.07 REPAIR AND FIELD TOUCHUP

- A. Apply repair and touchup materials in conformance with factory application of polyurethane coating requirements specified in this Section, excluding equipment requirements.
- B. Repair Procedure - Holidays:
 - 1. Remove traces of oil, grease, dust, dirt, and other deleterious materials
 - 2. Roughen area to be patched by sanding with rough-grade sandpaper (40 grit).
 - 3. Apply one coat of repair material described above. Work repair material into scratched surface by brushing.
- C. Repair Procedure - Field Cuts or Large Damage:
 - 1. Remove burrs from field cut ends or handling damage and smooth out edge of polyurethane coating.
 - 2. Remove traces of oil, grease, dust, dirt, and other deleterious materials.
 - 3. Roughen area to be patched with rough-grade sandpaper (40 grit). Feather edges and include overlap of 1 inch to 2 inches of roughened polyurethane in area to be patched.
 - 4. Apply thick coat of repair material described above. Work repair material into scratched surface by brushing. Feather edges of repair material into prepared surface. Cover at least 1 inch of roughened area surrounding damage, or adjacent to field cut.
- D. Repair Procedure - Thermite Brazed Connection Bonds:
 - 1. Remove polyurethane coating with power wire brush from area on metal surface which is to receive thermite brazed connection.

2. Grind metal surface to shiny metal with power grinder and coarse grit grinding wheel.
3. Apply thermite-brazed connection using equipment, charge and procedure recommended by manufacturer of thermite equipment.
4. After welded surface has cooled to temperature below 130 degrees F, apply protective coating repair material to weld, exposed pipe surface and damaged areas of polyurethane coating.
5. Do not cover or backfill freshly repaired areas of coating at thermite-brazed connection until repair material has completely cured. Allow material to cure in conformance with manufacturer's recommendations.

END OF SECTION

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Section 02528

POLYETHYLENE WRAP

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Polyethylene wrap to be used in open-cut construction for cast iron and ductile iron pipe when cathodic protection system is not required by Drawings.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for polyethylene wrap. Include cost of polyethylene wrap in unit price for pipes and fittings to be wrapped.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCE

- A. ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials for a Wire and Cable.
- B. AWWA C 105 - Standard for Polyethylene Encasement for Ductile-Iron Pipe System.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit product data for proposed film and tape for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Polyethylene Film: Tubular or sheet form without tears, breaks, holidays, or defects; conforming with requirements of AWWA C 105, 2.5 to 3 percent carbon black content, either low- or high-density:

1. Low-Density Polyethylene Film: Low-density polyethylene film shall be manufactured of virgin polyethylene material conforming to following requirements of ASTM D 1248.
 - a. Raw Material:
 - 1) Type : I.
 - 2) Class: C (black).
 - 3) Grade: E-5.
 - 4) Flow rate (formerly melt index): 0.4 g/10 minute, maximum.
 - 5) Dielectric strength: volume resistivity, 10^{15} ohm-cm, minimum.
 - b. Physical Properties:
 - 1) Tensile strength: 1,00 psi, minimum.
 - 2) Elongation: 300 percent, minimum.
 - 3) Dielectric strength: 800 V/mil thickness, minimum.
 - c. Thickness: Low-density polyethylene film shall have normal thickness of 0.008 inch. Minus tolerance on thickness is 10 percent of nominal thickness.
2. High-Density, Cross-Laminated Polyethylene Film: High-density, cross-laminated polyethylene film shall be manufactured of virgin polyethylene material conforming to following requirements of ASTM D 1248.
 - a. Raw Material:
 - 1) Type: III.
 - 2) Class: C (black).
 - 3) Grade: P33.
 - 4) Flow rate (formerly melt index): 0.4 to 0.5g/10 minute, maximum.
 - 5) Dielectric strength: volume resistivity, 10^{15} ohm-cm, minimum.

- b. Physical Properties:
 - 1) Tensile strength: 5000 psi, minimum.
 - 2) Elongation: 100 percent, minimum.
 - 3) Dielectric strength: 800 V/mil thickness, minimum.
 - c. Thickness: Film shall have nominal thickness of 0.004 inch. Minus tolerance of thickness is 10 percent of nominal thickness.
- B. Polyethylene Tape: Provide 3-inch-wide, plastic-backed, adhesive tape; Paleocene No. 900, Scotchwrap No. 50, or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove lumps of clay, mud, and cinders from pipe surface prior to installation of polyethylene encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.
- B. Fit polyethylene film to contour of pipe to effect snug, but not tight fit; encase with minimum space between polyethylene and pipe. Allow sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.
- C. For installations below water table or in areas subject to tidal actions, seal both ends of polyethylene tube with adhesive tape at joint overlap.

3.02 INSTALLATION

- A. Tubular Type (Method A):
 - 1. Cut polyethylene tube to length approximately 2 feet longer than pipe section. Slip tube around pipe, centering tube to provide 1-foot overlap on each adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears pipe ends.
 - 2. Lower pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene tube.

3. After assembling pipe joint, make overlap of polyethylene tube. Pull bunched polyethylene from preceding length of pipe, slip it over end of adjoining length of pipe, and secure in place. Then slip end of polyethylene from adjoining pipe section over end of first wrap until it overlaps joint at end of preceding length of pipe. Secure overlap in place. Take up slack width at top of pipe to make snug, but not tight, fit along barrel of pipe, securing fold at quarter points.
 4. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.
- B. Tubular Type (Method B):
1. Cut polyethylene tube to length approximately 1 foot shorter than pipe section. Slip tube around pipe, centering it to provide 6 inches of bare pipe at each end. Take up slack width at top of pipe to make snug, but not tight, fit along barrel of pipe, securing fold at quarter points; secure ends.
 2. Before making up joint, slip 3-foot length of polyethylene tube over end of preceding pipe section, bunching in accordion-fashion lengthwise. After completing joint, pull 3-foot length of polyethylene over joint, overlapping polyethylene previously placed on each adjacent section of pipe by at least 1 foot; make each end snug and secure.
 3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.
- C. Sheet Type:
1. Cut polyethylene sheet to length approximately 2 feet longer than pipe section. Center length to provide 1-foot overlap on each adjacent pipe section, bunching sheet until it clears pipe ends. Wrap polyethylene around pipe so that sheet circumferentially overlaps top quadrant of pipe. Secure cut edge of polyethylene sheet at intervals of approximately 3 feet.
 2. Lower wrapped pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene. After completing joint, make overlap and secure ends.
 3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.
- D. Pipe-shaped Appurtenances: Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in same manner as pipe.
- E. Odd-shaped Appurtenances: When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in tube, wrap with flat sheet or split length of

polyethylene tube by passing sheet around appurtenance and encasing it. Make seams by bringing edges together, folding over twice, and taping down. Tape polyethylene securely in place at valve stem and other penetrations.

- F. Openings in Encasement: Create openings for branches, service taps, blow-offs, air valves, and similar appurtenances by making X-shaped cut in polyethylene and temporarily folding back film. After appurtenance is installed, tape slack securely to appurtenance and repair cut, as well as other damaged area in polyethylene, with tape. Service taps may also be made directly through polyethylene, with resulting damaged areas being repaired as specified.
- G. Junctions between Wrapped and Unwrapped Pipe: Where polyethylene-wrapped pipe joins adjacent pipe that is not wrapped, extend polyethylene wrap to cover adjacent pipe for distance of at least 3 feet. Secure end with circumferential turns of tape. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for minimum clear distance of 3 feet away from cast or ductile iron pipe.

3.03 REPAIRS

- A. Repair cuts, tears, punctures, or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrapped around pipe to cover damaged area, and secured in place.

END OF SECTION

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Section 02613

BAR WRAPPED STEEL CYLINDER PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

Furnishing and installing new bar wrapped steel cylinder pipe and fittings for buried water lines for sizes 20 inches to 60 inches.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for bar wrapped steel cylinder pipe under this Section. Include cost in price for water lines.
2. Maintain, on site, minimum of two 3-degree and two 5-degree grade angle adapters. Adapters are considered "extra unit price." When used during construction, adapter will be paid at unit price.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO - Standard Specifications for Highway Bridges.
- B. AREMA - Manual of Railway Engineering, Volume II, Chapter 15.
- C. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- D. ASTM C 33 - Standard Specification for Concrete Aggregates.
- E. ASTM C 35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.
- F. ASTM C 150 - Standard Specification for Portland Cement.
- G. ASTM C 497 - Standard Test Method for Concrete Pipe, Manhole Sections, or Tile, Testing.

- H. ASTM D 512 - Standard Test Methods for Chloride Ion in Water.
- I. ASTM C 1107 (CRD C-621) - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- J. ASTM D 1293 - Standard Test Methods for pH of Water.
- K. ASTM E 165 - Standard Test Methods for Dye Penetration.
- L. ASTM E 340 - Standard Test Method for Macroetching Metals and Alloys.
- M. ASTM E 709 - Standard Test Methods for Magnetic Particle Testing.
- N. ASTM E 1032 - Standard Test Methods for Radiographic Examination of Weldments.
- O. ANSI/AWS A3.0 - Standard Welding Terms and Definitions.
- P. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
- Q. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 in. through 144 in.
- R. AWWA C 301 - Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and Other Liquids.
- S. AWWA C 303 - Standard for Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
- T. AWWA C 304 - Standard for Design of Prestressed Concrete Cylinder Pipe.
- U. AWWA M 9 - Concrete Pressure Pipe.
- V. NSF 61 - Drinking Water System Components - Health Effects.
- W. SSPC SP 7 - Surface Preparation Specification No. 7 Brush Off Blast Cleaning.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit shop drawings and certification signed and sealed by Professional Engineer registered in State of Texas showing following:
 - 1. Manufacturer's pipe design calculations.
 - 2. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, welding procedures, fabrication, fitting, flange, and special details, with plan view of each pipe segment sketched, detailing

- pipe invert elevations, horizontal bends, welded joints, and other critical features. Indicate station numbers for pipe and fittings corresponding to Drawings. Do not start production of pipe and fittings prior to review and approval by Project Manager. Provide final approved lay schedule on CD-ROM in Adobe portable document format (*PDF).
3. Include hot tapping procedure.
 4. Submit certification from manufacturer that design was performed for project in accordance with requirements of this section.
- C. Submit inspection procedures to be used by manufacturer and for quality control and assurance for materials and welding. Submit standard repair procedures that describe in detail shop and field work to be performed. Repair defects such as substandard welds, excessive radial offsets (misalignment), pitting, gouges, cracks, etc.
- D. Submit following within 45 days after manufacturing of pipe and fittings:
1. Steel:
 - a. Steel reports as required in AWWA C303, Section 5.2.5.
 - b. Results of other tests of steel reinforcement required in AWWA C303, Section 5.2.
 2. Test Results.
 - a. Hydrostatic testing, acid etching, magnetic particle and x-ray weld test reports as required.
 - b. Compressive strength (7 and 28 day) test results for each type of coating and lining mix design.
 3. Submit pipe manufacturer's certification that Bar Wrapped Steel Cylinder Pipe:
 - a. Cylinder assembly has been hydrostatically tested at factory.
 - b. Mortar coatings and linings were applied or allowed to cure at temperature above 32 degrees Fahrenheit.
- E. Submit following for nonshrink grout for special applications:
1. Manufacturer's technical literature including specifications for mixing, placing, and curing grout.

2. Results of tests performed by certified independent testing laboratory showing conformance to ASTM C 1107, Nonshrink Grout and requirements of this specification.
 3. Certification product is suitable for use in contact with potable water.
- F. Submit certification for welder and welding operator demonstrating their certification within past 6 months in accordance with AWWA C 206. Indicate certified procedures and position each welder is qualified to perform.
- G. Calibrate within last 12 months for equipment such as scales, measuring devices, and calibration tools used in manufacture of pipe. Each device used in manufacture of pipe is required to have tag recording date of last calibration. Devices are subject to inspection by Project Manager.

1.05 QUALITY CONTROL

- A. Manufacturer to have permanent quality control department and laboratory facility capable of performing inspection and testing required. Inspection procedures and manufacturing process are subject to inspection by Project Manager. Perform manufacturer tests and inspections required by AWWA C 303 as modified by these Specifications. Correct nonconforming conditions.

1. Cylinder and Joint Ring Assembly:
 - a. Review mill certifications for conformance to requirements of Specifications.
 - b. Perform physical testing of each heat of steel for conformance to applicable ASTM standards.
 - c. Inspect physical dimensions and overall condition of joint rings and cylinder/joint ring assembly to verify compliance with requirements of AWWA C 303. Maximum allowable thickness variation of cylinder shall not be less than determined thickness.
 - d. Test cylinder/joint ring weld for tensile strength. Test one specimen for each 500 cylinder/joint ring assemblies in addition to those tests required by AWWA C 301.
 - e. Reject pipe with dented steel cylinders.
2. Bar Rod
 - a. Review mill certifications for conformance to requirements of Specifications.
 - b. Inspect rod spacing during placement on cylinder.

- c. Test rod splices for each production run or minimum of once a week, whichever is less, for conformance with minimum strength criteria.
3. Pipe Lining Coating:
 - a. Review mill certificates for each load of cement for conformance to ASTM C 150.
 - b. Perform sieve analyses weekly for each source of coarse and fine aggregate for conformance to ASTM C 33.
 - c. Inspect kiln recorder charts daily to confirm proper curing environment.
 - d. Verify mortar thickness on each size of pipe to a tolerance of 1/16th of an inch of required thickness.
 - e. Perform absorption tests in accordance with ASTM C 497, Method A, on cured mortar samples taken from pipes.
 - f. Check mortar batch proportions, moisture content and slurry application rate. Check coating thickness over wire on each pipe.
 - g. Check physical integrity of cured mortar coating. Check cured mortar coating for soundness on every pipe in field in addition to manufacturing plant.
 - h. Reject pipe with cracks in mortar coating exceeding 0.01 inches wide.
 4. Protective Coatings: Check daily application rate and resulting dry film thickness.
- B. Gaskets:
1. Randomly test rubber cord for diameter, tensile strength, elongation, compression set, hardness, and specific gravity after oven aging on one out of 100 gaskets.
 2. Stretch test each gasket splice to twice its unstretched length and inspect for defects.
- C. Weld Testing
1. Perform macroetching tests for complete penetration production welds on normal production weld tests. Complete joint penetration welds are defined in ANSI/AWS A3.0. Verify complete joint penetration by means

- of macroetch of joint weld cross section. Macroetch technique in accordance with ASTM E 340.
2. Perform ultrasonic or x-ray testing of manual welds for fittings and special pipes. Perform dye penetration testing of manual lap welds for fittings and special pipes and for joint ring weld onto cylinder.
 3. Perform minimum of one set of weld test specimens in accordance with ANSI/AWS A3.0 on each size, grade and wall thickness at minimum of every 3,000 feet of pipe manufactured; but perform no less than one test per project by each welding machine and each operator.
- D. Cast four standard test cylinders each day for each 50 cubic yards of concrete mortar coating or portion thereof for each coating and lining mix design placed in day. Perform compressive strength test at 28 days. No cylinder test result shall be less than 80 percent of specified strength. Reject pipe that does not meet minimum strength requirements.
- E. Make available copy of Physical and Chemical testing reports for steel cylinders and provide reports at request of Project Manager.
- F. Check physical dimensions of pipe and fittings: Physical dimensions to include at least pipe lengths, pipe I.D., pipe O.D. and bend angles.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Furnish pipe by same manufacturer.
- B. Provide bar wrapped steel cylinder pipe in conformance with AWWA C 303 and AWWA M 9, except as modified herein. Produce pipe cylinder to conform to AWWA C 303 except modify Section 4.5 to require that total cross-sectional area of bell ring plus cross-sectional area of bar reinforcement over bell ring exceed circumferential steel area in like length of barrel area by one-third.
- C. Use of pipe from inventory is permitted only if specifications and certifications are met. Provide testing records for such pipe.
- D. Do not use bar wrapped steel cylinder pipe in aerial crossings, exposed or other unburied areas.
- E. Pipe Manufacturer.
 1. Must have minimum of 5 years of manufacturer's pipe installations that have been in successful and continuous service.

2. Must maintain on site or in plant minimum of four 22.5 bends per 10,000 linear feet of water line. Any combination of bends may be substituted at manufacturer's option (i.e. two 11.25 bends are equivalent to one 22.5 bend and shall be counted as one fitting). Must be capable of delivering bends to job site within 12 hours of notification. These fittings are in addition to any fittings called out on Drawing and must be available at all times.

F. Pipe Design Conditions:

1. Working pressure: 100 psi.
2. Hydrostatic field test pressure: 150 psi.
3. Maximum pressure due to surge: 150 psi.
4. Minimum pressure due to surge: -5 psi.
5. Unit weight of soil: 120 pcf minimum, unless otherwise specified.
6. Minimum trench width: O.D. of pipe + 4 feet.
7. Pipe and Fittings: Designed to withstand most critical simultaneous application of external loads including construction loads and internal pressures.
8. Design: Design pipe and fittings to withstand most critical simultaneous application of external loads and internal pressures. Base design on minimum of AASHTO HS-20 loading, AREA E-80 loads and depths of bury as indicated on Drawings. Design pipes with Marston's earth loads for transition width trench for all heights of cover.

Calculate moments and thrusts in wall based on earth load.

9. Increase longitudinal steel area (cylinder thickness) to prevent cylinder stress from exceeding 40 percent of minimum yield point at rated working pressure and 67 percent of minimum yield point at rated maximum surge pressure where pipe and fittings are subjected to longitudinal stresses induced by restrained joints or thrust blocks.
10. Groundwater Level: Design for most critical ground water level condition.
11. Modulus of elasticity (E) = 30,000,000 psi.
12. Design stress due to working pressure to be no greater than 50 percent of minimum yield, and stress not to exceed 16,500 psi for mortar coated pipe.

13. Design stress due to maximum hydraulic surge pressure to be no greater than 75 percent of minimum yield, and stress not to exceed 24,750 psi for mortar coated pipe.
14. Modulus of soil reaction (E_s) < 1500 psi. If $E_s > 1000$ psi, do not use silty sand (SM) for embedment.
15. Deflection lag factor (DI) = 1.2.
16. Bedding constant (K) = 0.1.
17. Fully saturated soil conditions: $h_w = h$ = depth of cover above top of pipe.
18. Provide minimum inside clear diameter for tunnel liners or casing in accordance with Section 02425 - Tunnel Excavation and Primary Liner.
19. Exclude structural benefits associated with primary liner in design of pipe in tunnel installations.
 - a. Design pipe and joints to carry loads including overburden and lateral earth pressures, subsurface soil and water loads, grouting, other conditions of service, thrust of jacks, and stresses anticipated during handling and construction loads during installation of pipe.
 - b. Do not use internal removable stiffeners for pipe in tunnel, unless approved by Project Manager.
 - c. External welded stiffeners shall be permitted in design calculations for pipe, provided wall thickness is minimum of 1/2 inch. Minimum clearances specified between exterior pipe wall and tunnel liner applies to distance between outside diameter of external welded stiffener and tunnel liner.
20. Design pipe for transmitting potable water, unless otherwise shown on Drawings.
21. Tunnel and Augered Sections: Provide constant outside diameter from bell to spigot end for pipe. Exclude structural benefits associated with primary liner. Design pipe and pipe joints to carry loads including but not limited to: overburden and lateral earth pressures, subsurface soil, grouting, other conditions of service, thrust of jacks, and any stress anticipated during handling and installation.

G. Coatings and Linings:

1. Provide Portland cement; ASTM C 150, Type I or II. Provide one type of cement for entire project.

2. Water Absorption Test: ASTM C 497, Method A; perform on samples of cured mortar coating taken from each working shift. Cure mortar coating samples in same manner as pipe.
 - a. Test Value: Average minimum of 3 samples taken from same working shift, no greater than 9 percent for average value, 11 percent for individual value.
 - b. Test Frequency: Perform tests each working shift until conformance to absorption requirements has been established by 10 consecutive passing test results, at which time testing may be performed weekly. Resume testing for each working shift if absorption test results fail until conformance to absorption requirements is reestablished by 10 consecutive passing test results.
3. Apply one coat of primer to exposed steel parts of steel bell and spigot rings. Prior to coating, blast clean in accordance with SSPC-SP7 (Brush Off Blast Cleaning). Apply primer in accordance with manufacturer's recommendations.
4. Coat and line access inlets, service outlets, test inlets and air release/vacuum relief riser pipe with same coating and lining of water line pipe in accordance with AWWA C 303, Section 4, unless otherwise indicated on Drawings.
5. Do not defer placing of coating of any portion of pipe length. Verify cement mortar coating thickness on each size of pipe by nondestructive method before removing pipe from coating machine.
6. Remove and replace disbonded lining or coating. Reject pipe requiring patches larger than 100 square inches or 12 inches in greatest dimension. Allow no more than one patch on either lining or coating of pipe. Provide WELD-CRETE Probond Epoxy Bonding Agent ET-150, parts A and B; Sikadur 32 Hi-Mod, or approved equal bonding agent for pipe patching.

H. Fittings and Specials:

1. Design fittings to same internal and external loads as straight pipe.
2. Manufacture in accordance with Section 02518 - Steel Pipe and Fittings for Large Diameter Water Lines.
3. Provide fabricated bends or fittings with minimum radius of 2½ times pipe diameter.
4. Design test plugs to withstand forces generated by hydrostatic test and test pressure from either side. Do not exceed 50% of minimum yield for

design stresses due to hydrostatic pressure. Assume opposite side of plug does not contain water.

5. Provide no specials less than 4 feet in length unless indicated on Drawings or approved by Project Manager.
6. Butt Straps for Closure Piece: Provide at locations indicated on Drawings or authorized by Project Manager. Minimum 12-inch-wide split butt strap; minimum plate thickness equal to thinnest member being joined; fabricated from material equal in chemical and physical properties to thinnest member being joined. Permit no angular deflection at butt-strap joints.
7. Provide minimum 6-inch welded outlet for inspecting each closure section, unless access manway is within 40 feet of closure section.
8. Provide Densco petroleum based tape or approved equal for exposed portions of nuts and bolts.

I. Joints:

1. AWWA C 303 rubber-gasketed or welded bell-and-spigot type except where flanged joints are required for valves and fittings as shown on Drawings. Refer to Section 02511 - Water Lines for details on joints and jointing.
2. Rubber-Gasketed Joints: Single weld bell and spigot ring onto steel cylinder. In thrust areas, double weld bell and spigot onto steel cylinder.
3. Restrained Joints: Restrain joints by welding or harnessing joints.
 - a. Design Pressure: 1.5 times working pressure.
 - b. Harnessed Joints: AWWA M 9, clamp or snap ring type, except where prohibited.
 - c. Groundwater Level: Assumed to be equal to natural ground surface.
 - d. Provide restrained joint pipe with adequate cylinder thickness to transmit full thrust generated by internal pressure across joints.
 - (1) Calculate distance of restrained joints based on resistance along each leg of bend with thrust based on bend angle.
 - (2) Cylinder thickness not to be less than that defined in AWWA C303, Table 2, minimum nominal cylinder thickness.

- (3) Allow cylinder thickness to reduce linearly from maximum calculated thickness to minimum thickness required by design over required length (as determined in Paragraph 2.01 J.3.d.1) of restrained joints.
 - (4) Provide full circumferential welds at joints required to be welded.
- J. Use only fully circumferentially welded joints in areas considered potentially petroleum contaminated, within tunnels and under foreign pipelines. Perform welding in accordance with Section 02502 - Steel Pipe and Fittings and Section 02518 - Steel Pipe and Fittings for Large Diameter Water Lines.
- K. Pipe Flanges: AWWA C 207 for standard steel flanges of pressure class corresponding to pipe class.
- L. Pipe lengths: Provide pipe sections in standard lengths with minimum length of 16 feet and maximum length of 25 feet, and as indicated on approved shop Drawings or approved by Project Manager. Gasketed joints are allowed on standard lengths of pipe. Non-standard pipe lengths must be approved by Project Manager and joints must be welded as specified herein to achieve equal to or greater than standard pipe length before gasketed joints can be used. Internally and externally mark pipe section with durable marking to show location and pipe pressure.
- M. Hydrostatic Test of Cylinder: In accordance with AWWA C 303, at point of manufacture. Hold test for minimum 2 minutes for thorough inspection of cylinder. Repair or reject cylinders revealing leaks or cracks.
- N. Transport fittings with end caps. Remove end caps just prior to installation.
- O. Transport fittings 36 inches in diameter and larger with stulls. Remove stulls after completion of backfill.
- P. Provide radius of curve as indicated on Drawings unless approved by Project Manager. Make curves and bends by deflecting joints, by use of beveled joints, or by combination of two methods, unless otherwise indicated on Drawings. Do not exceed deflection angle recommended by pipe manufacturer. Provide beveled pipe sections of standard length used in curved alignment, except when shorter sections are required to limit radius of curvature. In such case, provide sections throughout curve of substantially equal length.
- Q. When manufacturing straight pipe sections, manual welding is allowed for following:
 1. Tack welding of coils and plates during continuous pipe making process.

2. Rewelding and repairing structural defects in plate and automatic machine welds.
3. Attaching new coil of steel to previous coil.

2.02 BAR ROD

- A. Conform to requirements of ASTM A 615, AWWA C 303 and this specification.
- B. Test foreign manufactured rod by local independent laboratory.
- C. Rod manufacturer is responsible for performing mechanical tests required in ASTM A 615.
- D. Pipe manufacturer is responsible for requiring rod manufacturer to submit certified results of chemical and mechanical tests, performed by rod manufacturer. Pipe manufacturer is responsible for performing mechanical tests, and is required to attest to such in affidavit of compliance.
- E. Do not use rod with visible pitting.

2.03 GROUT FOR JOINTS AND SPECIAL APPLICATION

A. Joint Grout:

1. Cement Grout Mixture: One part cement to two parts of fine, sharp clean sand. Mix interior joint mortar with as little water as possible until very stiff but workable. Mix exterior joint mortar with water until it has consistency of thick cream.
2. Water: Potable water with total dissolved solids less than 1000 mg/l; ASTM D 512 chloride ions less than 100 mg/l for slurry and mortar cure; ASTM D 1293 pH greater than 6.5. Use potable water with 250ppm limit on chlorides and sulfates.
3. Portland Cement: ASTM C 150, Type I or II. Provide one type of cement for entire project.
4. Sand:
 - a. Interior joints: ASTM C 35 fine graded plaster sand.
 - b. Exterior joints: ASTM C 33 natural sand with 100 percent passing No. 16 sieve.
5. Mix cement grout to specific gravity of 19 lb/gallon or greater as measured by grout/slurry balance. Use grout/slurry balance manufactured by Baroid or approved equal. Perform test in presence of and as requested

by Project Manager. Add additional cement grout or water to mixed cement grout to bring mix to proper moisture content or specific gravity. Discard cement grout mixed more than 20 minutes that is not at proper moisture content or specific gravity.

- B. Nonshrink Grout for Special Applications, Patches and Repairs.
1. Conform to requirements of ASTM C 1107, Nonshrink Grout.
 2. Pre-blended factory-packaged material manufactured under rigid quality control.
 3. Contain non-metallic natural aggregate, be nonstaining and noncorrosive.
 4. Meeting NSF 61 Standard suitable for use in contact with potable water supply.
 5. Exterior: Highly flowable to fill joint wrapper without leaving voids or trapped air. Interior capable of being placed with plastic consistency.
 6. Non-bleeding and non-segregating at fluid consistency.
 7. Contain no chlorides or additives which may contribute to corrosion of bar wrapped steel cylinder pipe.
 8. Free of gas-producing, gas-releasing agents.
 9. Resist attack by oil or water.
 10. Mix, place, and cure in accordance with manufacturer's recommendations. Upon 72 hours' notice, provide services of qualified representative of nonshrink grout manufacturer to aid in use of product under job conditions.
 11. Mix nonshrink grout to specific gravity of 17.7 lb/gallon or greater as measured by grout/slurry balance. Use grout/slurry balance manufactured by Baroid or approved equal. Perform test in presence of and as requested by Project Manager. Add additional non-shrink grout to mixed non-shrink grout to bring to proper moisture content or specific gravity. Discard grout mixed more than 20 minutes that is not at proper moisture content or specific gravity.
 12. Compressive strength: ASTM C 1107 2500 psi minimum 7-day unconfined; 5000 psi minimum 28-day unconfined.
- C. Finished surface of lining and interior joint to be comparable to surface rubbed with No. 16 Carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections, and to produce smooth, dense

surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.

- D. Joint Wrapper: Minimum width of 9 inches for 33-inch diameter and smaller; minimum width of 12 inches for diameters greater than 33-inch hemmed at edge to allow threading with minimum 5/8-inch wide steel strap. Provide minimum 6-inch wide Ethafoam strip sized, positioned, and sewn such that two circumferential edges of Ethafoam are 1½-inches from outer edge of wrapper.

2.04 CATHODIC PROTECTION

- A. Connect each joint of pipe with bonding straps or approved devices to maintain continuity of current. Provide bonding straps free of foreign material.
- B. Electrically isolate water line from other connections. Use insulating type joints or nonmetallic pipe unless otherwise indicated on Drawings.
- C. Provide flange adapter with insulating kit as required when connecting new piping to existing piping.

2.05 INSPECTION AND SHIPPING

- A. Permit Project Manager to inspect pipes or witness pipe manufacturing. Inspection shall not relieve manufacturer of responsibilities to provide products that comply with applicable standards and these Specifications. Should Project Manager elect not to inspect manufacturing, testing, or finished pipes, it in no way implies approval of products or tests.
- B. Manufacturer's Notification to Customer: Should Project Manager wish to see specific pipes during manufacturing process, manufacturer shall provide Project Manager with minimum of three (3) weeks advance notice of when and where production of those pipes will take place.
- C. Repair damage to pipe or protective lining per manufacture specifications before final acceptance.
- D. Shipping: Where required, provide pipe and fittings with sufficient interior strutting or cross bracing to prevent deflection under their own weight.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Conform to requirements of Section 02511 - Water Lines. Do not install pipe without approved lay schedule.
- B. Install pipe within six months of pipe being manufactured.

- C. Manufacturer shall make available services of representative, throughout project duration when deemed necessary by Project Manager, to advise aspects of installation including but not limited to handling, storing, cleaning and inspecting, coatings and linings repairs, and general construction methods affecting pipe.
- D. Bedding and Backfilling
1. Conform to requirements of Section 02317 - Excavation and Backfill for Utilities.
 2. Take necessary precautions during bedding and backfilling operations to prevent deformation or deflection of cylindrical shape of pipe by more than allowable pipe deflection.
 3. Do not move trench support system (trench safety system) once bedding material is compacted.
 4. Align pipe at proper grade prior to joint connection and do not shift after jointing operation has been completed.
 5. Excavate outside specified trench section for bell holes, and for spaces sufficient to permit removal of slings. Provide bell holes at proper locations for unrestricted access to joint. Form bell holes large enough to facilitate joint wrapping and to permit visual examination of process. Enlargement of bell holes as required or directed by Project Manager. Subsequent backfilling thereof shall not be considered as authorized additional excavation and backfill. Backfill bell holes and spaces to satisfaction of Project Manager.
 6. Remove blocking after placing sufficient backfill to hold pipe in position.
- E. Follow nonshrink grout manufacturer's specifications for nonshrink grouting.
- F. Store pipe at job-site with securely-fastened plastic end caps to maintain moist pipe interior. Promptly replace damaged end caps to avoid shrinkage or cracking of cement-mortar lining. Immediately replace damaged plastic end caps. Do not leave uncapped for more than 4 hours.
- G. Deviation of installed pipe in any one pipe section from line and grade shown on approved shop drawing layout shall not exceed 2 inches from grade and 3 inches from line. No deviation from line and grade at contact interfaces are allowed.
- H. Use adequate surveying methods, procedures and employ competent surveying personnel to ensure pipe sections are laid to line and grade and within stipulated tolerances. Measure and record, in form approved by Project Manager, in-place survey data for pipe laid each day and submit copy of data to Project Manager at end of that day. Survey data to include unique pipe number, deflection angle at pipe joint and whether beveled ends were used, invert elevation at pipe joint,

deviation of joint from project line, deviation of joint from project grade, inside pipe joint lap measured at top, bottom, and at springline (each side).

I. Static Electricity:

1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.
2. Electrically test where required after installation of pipeline is complete.

3.02 DEFLECTION

A. Allowable deflection from specified diameter determined as follows:

Allowable Deflection = $(D)^2/4000$, (D= Nominal inside pipe diameter in inches).

- B. Deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection are not acceptable.
- C. If deflection exceeds that specified, remove entire portion of deflected pipe section and install new pipe as directed by Project Manager at no additional cost.

3.03 CLOSURES AND APPROVED PIPE MODIFICATIONS.

- A. No modifications of standard pipe for closures shall be permitted in field. No field cutting of pipe or exposure of bar wire is permitted without written approval from Project Manager.
- B. Pipe manufacturer's representative and Project Manager to entirely witness closures and approved pipe modification efforts.
- C. Provide minimum lap of 4 inches between member being joined and edge of butt strap. Weld on both interior and exterior, unless otherwise approved by Project Manager.
- D. Provide full circumferential welds on joints required to be welded. Employ independent certified testing laboratory, approved by Project Manager, to perform weld tests on field welds. Include cost of such testing in contract unit price for water line. Use magnetic particle test method for lap welds or X-ray methods for butt welds, for 100 percent of joint welds. Maintain records of tests. If defective weld is revealed, repair defective weld, and retest. Use wire and flux from same manufacturer throughout entire project.
- E. Fill wrapper in field and allowing excess grout water to seep out. Refill wrapper as necessary. When joint mortar level has stabilized and begun to mechanically stiffen, lap Ethafoam wrapper over top of joint, and secure in place.

- F. Stretch test each gasket splice to twice its unstretched length and inspect for defects.
- 3.04 VISIBLE CRACKS
- A. No visible cracks longer than 6 inches, measured to be within 15 degrees of line parallel to pipe longitudinal axis, are permitted except:
1. In surface laitance of centrifugally cast concrete,
 2. In sections of pipe with steel reinforcing collars or wrappers, or
 3. Within 12 inches of pipe ends.
- B. Repair interior lining cracks that exceed 1/16-inch (0.0625 inches) wide.
- C. Reject pipe with exterior coating cracks that exceed 0.01 inches wide.
- D. Immediately remove pipe from site if pipe has cracks exceeding limitations and cracks are not repairable.
- 3.05 FIELD REPAIR PROCEDURES FOR COATING/LINING
- A. Areas less than or equal to 6 inches in diameter: Patch honeycomb and minor defects in concrete surfaces with nonshrink grout conforming to section 2.03 B. Use only manual or small (low pressure) air chisels to chip away mortar coating or lining. Cut out unsatisfactory material and replace with nonshrink grout, securely bonded to existing coating or lining. Finish junctures between patches and existing concrete as inconspicuous as possible. Strike off nonshrink grout flush with surrounding surface after patch has stiffened sufficiently to allow for greatest portion of shrinkage. Finish surface in accordance with lining requirements.
- B. Pipe with defective coating areas greater than 6 inches in diameter cannot be used. Immediately remove pipe from project.
- C. Reject pipe if steel cylinder is dented while making field repair. Immediately remove pipe from project.

END OF SECTION

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Section 02621

GEOTEXTILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Geotextile, also called filter fabric, in applications including pipe embedment wrap, around exterior of tunnel liner, around foundations of pipeline structures, and slope stabilization.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for Work performed under this Section. Include cost of Work in unit prices for Work requiring geotextile.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. AASHTO M 288 - Standard Specification for Geotextile Specification for Highway Applications.
- B. ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- C. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- D. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles (Grab Method).
- E. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of Geotextiles.
- F. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit standard manufacturer's catalog sheets and other pertinent information, for approval, prior to installation.
- C. Submit installation methods, as part of Work plan for tunneling or for excavation and backfill for utilities. Obtain approval from Project Manager for filter fabric material and proposed installation method prior to use of filter fabric.

PART 2 PRODUCTS

2.01 GEOTEXTILE

- A. Provide geotextile (filter fabric) designed for use in geotechnical applications. Filter fabric shall provide permeable layer or media while retaining soil matrix.
- B. Use fabric which meets physical requirements for Class A subsurface drainage installation conditions as defined in AASHTO M 288 and as specified in Paragraph 2.02, Properties.

2.02 PROPERTIES

- A. Material: Nonwoven, nonbiodegradable, fabric consisting of continuous chain polymer filaments or yarns, at least 85 percent by weight polyolefins, polyesters or polyamide, formed intodimensionally stable network.
- B. Chemical Resistance: Inert to commonly encountered chemicals and hydrocarbons over pH range of 3 to 12.
- C. Physical Resistance: Resistant to mildew and rot, ultraviolet light exposure, insects and rodents.
- D. Minimum Test Values:

Property	Value (Min.)	Test Method
Grab Strength	180 lbs.	ASTM D 4632
Trapezoidal Tear Strength	50 lbs.	ASTM D 4533
Puncture Strength	80 lbs.	ASTM D 4833
Mullen Burst Strength	290 psi.	ASTM D 3786
Apparent Opening Size ⁽¹⁾	0.25 mm	ASTM D 4751
Permittivity (sec ⁻¹)	0.2	ASTM D 4491
⁽¹⁾ Maximum average roll value.		

PART 3 EXECUTION

3.01 LINE WORK

- A. Conform use of geotextile to backfill for utilities to Section 02317 - Excavation and Backfill for Utilities.

3.02 TUNNEL WORK

- A. Use geotextile outside of tunnel primary liner to prevent migration of soil fines into excavated tunnel resulting in voids or settlement. Select geotextile, subject to minimum requirements of Paragraph 2.02, meeting tunnel liner design requirements and installation conditions.
 - 1. Sewers: Conform to Section 02426 - Sanitary Sewer Line in Tunnel.
 - 2. Waterlines: Conform to Section 02517 - Waterline in Tunnels.

END OF SECTION

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Section 02712

CEMENT STABILIZED BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foundation course of cement stabilized crushed stone.
- B. Foundation course of cement stabilized bank run gravel.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

- 1. Payment for cement stabilized base course is on square yard basis. Separate pay items are used for each different required thickness of base course.
- 2. Payment for asphaltic seal cure is by gallon.
- 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- 4. Refer to Paragraph 3.09, Unit Price Adjustment.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in Los Angeles Machine.
- B. ASTM C 150 - Standard Specification for Portland Cement.
- C. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft³ (600kN kN-m/m³)).
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- E. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

- F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- H. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
- I. TxDOT Tex-110-E - Particle Size Analysis of Soils.
- J. TxDOT Tex-120-E - Soil-Cement Testing.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit samples of crushed stone, gravel, and soil binder for testing.
- C. Submit manufacturer's description and characteristics for pug mill and associated equipment, spreading machine, and compaction equipment for approval.

1.05 TESTS

- A. Perform testing under provisions of Section 01454 - Testing Laboratory Services.
- B. Perform tests and analysis of aggregate and binder materials in accordance with ASTM D 1557 and ASTM D 4318.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Make stockpiles from layers of processed aggregate to eliminate segregation of materials. Load material by making successive vertical cuts through entire depth of stockpile.
- B. Store cement in weatherproof enclosures. Protect from ground dampness.

PART 2 PRODUCTS

2.01 CEMENT

ASTM C 150 Type I; bulk or sacked.

2.02 WATER

Clean, clear; and free from oil, acids, alkali, or vegetable matter.

2.03 AGGREGATE

- A. Crushed Stone: Material retained on No. 40 Sieve meeting following requirements:
 - 1. Durable particles of crusher-run broken limestone, sandstone, or granite obtained from approved source.
 - 2. Los Angeles abrasion test percent of wear not to exceed 40 when tested in accordance with ASTM C 131.
- B. Gravel: Durable particles of bank run gravel or processed material.
- C. Soil Binder: Material passing No. 40 Sieve meeting following requirements when tested in accordance with ASTM D 4318:
 - 1. Maximum Liquid limit: 35.
 - 2. Maximum Plasticity index: 10.
- D. Mixed aggregate and soil binder shall meet the following requirements:
 - 1. Grading in accordance with TxDOT Tex-101-E and Tex-110-E within the following limits:

Sieve	Percent Retained			
	Crushed Stone	Processed G. 1	Gravel G. 2	Bank Run Gravel
1¾ inch	0 to 10	0 to 5	-	0 to 5
½ inch	-	-	0	-
No. 4	45 to 75	30 to 75	15 to 35	30 to 75
No. 40	55 to 80	60 to 85	55 to 85	65 to 85

- 2. Obtain prior permission from Owner’s Engineer for use of additives to meet above requirements.

2.04 ASPHALT SEAL CURE

- A. Cutback Asphalt: MC30 conforming to requirements of Section 02742 - Prime Coat.
- B. Emulsified Petroleum Resin: EPR-1 Prime conforming to requirements of Section 02742 - Prime Coat.

2.05 MATERIAL MIX

- A. Design mix for minimum average compressive strength of 200 psi at 48 hours using TxDOT Tex-120-E unconfined compressive strength testing procedures. Provide minimum cement content of 1½ sacks, weighing 94 pounds each, per ton of mix.
- B. Increase cement content when average compressive strength of tests on field samples fall below 200 psi. Refer to Part 3 concerning field samples and tests.
- C. Mix in stationary pug mill equipped with feeding and metering devices for adding specified quantities of base material, cement, and water into mixer. Dry mix base material and cement sufficiently to prevent cement balls from forming when water is added.
- D. Resulting mixture shall be homogeneous and uniform in appearance.

2.06 SOURCE QUALITY CONTROL

- A. Perform testing under provisions of Section 01454 - Testing Laboratory Services.
- B. Perform testing for unconfined compressive strength by TxDOT Test Method Tex-120-E as follows:
 - 1. Mold three samples each day or for each 300 tons of production.
 - 2. Compressive strength shall be average of three tests for each production lot.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is ready to support imposed loads.
- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Complete backfill of new utilities below future grade.
- B. Prepare subgrade in accordance with requirements of Section 02330 - Embankment and Section 02315 - Roadway Excavation.

- C. Correct subgrade deviations in excess of plus or minus $\frac{1}{4}$ inch in cross section or in 16 foot length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.
- D. Prepare sufficient subgrade in advance of base course for efficient operations.

3.03 PLACEMENT

- A. Do not mix and place cement stabilized base when temperature is below 40 degrees F and falling. Place base when temperature taken in shade and away from artificial heat is above 35 degrees F and rising.
- B. Place material on prepared subgrade in uniform layers to produce thickness indicated on Drawings. Depth of layers shall not exceed 6 inches.
- C. Spread with approved spreading machine. Conduct spreading so as to eliminate planes of weakness or pockets of non-uniformly graded material resulting from hauling and dumping operations.
- D. Provide construction joints between new material and stabilized base that has been in place 4 hours or longer. Joints shall be approximately vertical. Form joint with temporary header or make vertical cut of previous base immediately before placing subsequent base.
- E. Use only one longitudinal joint at center line under main lanes and shoulder unless shown otherwise on Drawings. Do not use longitudinal joints under frontage roads and ramps unless indicated on Drawings.
- F. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Secure firm bond between reinforcement and base.

3.04 COMPACTION

- A. Start compaction as soon as possible but not more than 60 minutes from start of moist mixing. Compact loose mixture with approved tamping rollers until entire depth is uniformly compacted. Do not allow stabilized base to mix with underlying material.
- B. Correct irregularities or weak spots immediately by replacing material and recompacting.
- C. Apply water to maintain moisture between optimum and 2 percent above optimum moisture as determined by ASTM D 1557. Mix in with spiked tooth harrow or equal. Reshape surface and lightly scarify to loosen imprints made by equipment.

- D. Remove and reconstruct sections where average moisture content exceeds ranges specified at time of final compaction.
- E. Finish by blading surface to final grade after compacting final course. Seal with approved pneumatic tired rollers which are sufficiently light to prevent surface hair line cracking. Rework and recompact at areas where hair line cracking develops.
- F. Compact to minimum density of 95 percent of maximum dry density at moisture content of treated material between optimum and 2 percent above optimum as determined by ASTM D 1557, unless otherwise indicated on Drawings.
- G. Maintain surface to required lines and grades throughout operation.

3.05 CURING

- A. Moist cure for minimum of 7 days before adding pavement courses. Restrict traffic on base to local property access. Keep subgrade surface damp by sprinkling.
- B. If indicated on Drawings, cover base surface with curing membrane as soon as finishing operation is complete. Apply with approved self-propelled pressure distributor at following rates, or as indicated on Drawings:
 - 1. MC30: 0.1 gallon per square yard.
 - 2. EPR-1 Prime: 0.15 gallon per square yard.
- C. Do not use cutback asphalt during period of April 16 to September 15.

3.06 TOLERANCES

- A. Smooth and conform completed surface to typical section and established lines and grades.
- B. Top surface of base course: Plus or minus 1¼ inch in cross section, or in 16 foot length.

3.07 FIELD QUALITY CONTROL

- A. Perform testing under provisions of Section 01454 - Testing Laboratory Services.
- B. Take minimum of one core at random locations per 1,000 linear feet per lane of roadway or 500 square yards of base to determine in-place depth.

- C. Request additional cores in vicinity of cores indicating nonconforming in-place depths at no extra cost. When average of tests falls below required depth, place and compact additional material at no additional cost to Owner.
- D. Perform compaction testing in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017 at randomly selected locations. Remove and replace areas that do not conform to compaction requirements at no additional cost to Owner.
- E. Fill cores and density test sections with new compacted cement stabilized base.

3.08 NONCONFORMING BASE COURSE

- A. Remove and replace areas of base course found deficient in thickness by more than 10 percent, or that fail compressive strength tests, with cement-stabilized base of thickness shown on Drawings.
- B. Replace nonconforming base course sections at no additional cost to Owner.

3.09 UNIT PRICE ADJUSTMENT

Make unit price adjustments for in-place depth determined by cores as follows:

1. Adjusted unit price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price.
2. Apply adjustment to lower limit of 90 percent and upper limit of 100 percent of unit price.

3.10 PROTECTION

- A. Maintain stabilized base in good condition until completion of Work. Repair defects immediately by replacing base to full depth.
- B. Protect asphalt membrane, when used, from being picked up by traffic. Membrane may remain in place when proposed surface courses or other base courses are to be applied.

END OF SECTION

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Section 02713

RECYCLED CRUSHED CONCRETE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

Recycled crushed concrete base (RCCB) course.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for RCCB is on a per square yard basis, furnished and compacted in place.
2. Payment for RCCB for transitions and base repairs is on a per square yard basis.
3. Payment for RCCB for temporary driveway, roadway shoulders, and elsewhere shown on Drawings is on a per square yard basis.
4. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 150 - Standard Specification for Portland Cement.
- B. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
- C. TxDOT Tex-106-E - Calculating the Plasticity Index of Soils.
- D. TxDOT Tex-110-E - Determining Particle Size Analysis of Soils.
- E. TxDOT Tex-113-E - Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials.
- F. TxDOT Tex-115-E - Field Method for Determining In-place Density of Soils and Base Materials.
- G. TxDOT Tex-120-E - Soil-Cement Testing.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit representative samples of crushed concrete for testing.
- C. Submit weight tickets, certified by supplier, for each delivery of recycled crushed concrete, gravel, and soil binder.
- D. Submit manufacturer's description and characteristics for pug mill and associated equipment, mixer trucks, spreading and compaction equipment for approval.

1.05 TESTS

- A. Follow Section 01454 - Testing Laboratory Services.
- B. Test and analyze aggregate and binder products following TxDOT Tex-110-E.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide materials from stockpiles that are protected during storage from contaminants detrimental to concrete base.
- B. Load material from same area of stockpile to maintain uniformity of each successive delivery to Project site.
- C. Store cement in weatherproof enclosures. Protect from ground dampness.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Provide RCCB with following performance:
 - 1. Minimum 5 percent cement.
 - 2. Minimum compressive strength: 650 psi at 14 days following TxDOT Tex-120-E.
 - 3. Prepare concrete product in on-site or off-site pug mill, or in on-site or off-site portable concrete mixer.

- B. Preliminary Design: Prepare preliminary mix with minimum cement to crushed concrete ratios of 5 percent by dry mass of materials.
 - 1. Designate source of concrete for crushing. Follow Section 01454 - Testing Laboratory Services for tests of concrete from source.
 - 2. Results of laboratory and compression tests will be used by the Engineer to select final mix design.

2.02 PORTLAND CEMENT

ASTM C 150 Type I, II, or III; bulk or sacked.

2.03 WATER

Potable.

2.04 AGGREGATE

- A. Recycled Crushed Concrete: Material retained on No. 40 Sieve, and durable coarse particles of crusher-run reclaimed cured Portland cement concrete, obtained from approved source. Organic material is prohibited.
 - 1. The crushed concrete shall be substantially free of foreign matter including but not limited to asphalt, base, and dirt.
 - 2. Obtain Owner's Engineer's written approval, prior to crushing salvaged concrete.
- B. Soil Binder (classified below): Meeting following requirements when tested following TxDOT Tex-106-E:
 - 1. Maximum liquid limit: 35
 - 2. Maximum plasticity index: 10
- C. Mixed Aggregate and Soil Binder: Grading following TxDOT Tex-101-E and Tex-110-E within following limits:

Sieve	Percent Crushed Concrete Retained
1 ³ / ₄ inch	0 to 10
No. 4	45 to 75
No. 40	55 to 80; classified as Soil Binder

1. Obtain prior permission from Owner's Engineer for use of additives to meet above requirements.
2. Bank sand may be added to mix at pug mill with prior written permission of Owner's Engineer.

2.05 ASPHALTIC SEAL CURE

- A. Acquire written approval from Owner's Engineer before curing and before proceeding with curing.
- B. Use following as option to curing by sprinkling:
 1. Cut-back asphalt: MC30 following Section 02742 - Prime Coat.
 2. Emulsified petroleum resin: EPR-1 Prime following Section 02742 - Prime Coat.

2.06 MATERIAL MIX

- A. Design mix for minimum compressive strength of 650 psi at 14 days following TxDOT Tex-120-E unconfined compressive strength.
- B. Cement Ratio: Follow Paragraph 2.01A. Increase cement content in two percent steps up to 9 percent maximum when compressive strength of design mix samples fail TxDOT Tex-120-E test.

2.07 MIXING EQUIPMENT

Mix following Paragraph 2.01A, with metering devices adding specified quantities of crushed concrete, cement, and water into mixer. Dry mix crushed concrete and cement prior to adding water. Produce homogeneous and uniformly mixed product.

2.08 SOURCE QUALITY CONTROL

- A. Test following Section 01454 -Testing Laboratory Services.
- B. When directed by Owner's Engineer, test for unconfined compressive strength following Test Method TxDOT Tex-120-E as follows:
 1. Mold minimum of three samples each day or for each 500 tons of production or one for each day.
 2. Compressive strength: average of 3 specimens for each sample lot.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Follow Section 01452 - Inspection Services.
- B. Verify buried utility work is complete.
- C. Verify lime treatment of base is complete.
- D. Verify subgrade is ready to support imposed loads.
- E. Verify flatwork, foundations, projecting reinforcement and similar Work interfacing with base is in place.
- F. Verify lines and grades are correct.

3.02 PREPARATION

- A. Complete backfill of new utilities below future grade.
- B. Prepare subgrade in accordance with requirements of Section 02330 - Embankment and Section 02315 - Roadway Excavation, or Section 02336 - Lime Stabilized Subgrade and Section 02337 - Lime-Fly Ash Stabilized Subgrade and Section 02338 - Portland Cement Stabilized Subgrade.
- C. Correct subgrade deviations in excess of plus or minus $\frac{1}{4}$ inch in cross section, or in 16 foot length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.
- D. Prepare sufficient subgrade in advance of base course for efficient operations.
- E. Have sufficient products and equipment on hand to expeditiously apply base.

3.03 MIXING

Maintain moisture content of between optimum and 5 percent above optimum.

3.04 PLACEMENT

- A. Place mixture with approved spreading equipment. Spread to eliminate planes of weakness or pockets of nonuniformly graded material resulting from hauling and dumping operations.

- B. Provide approximately vertical construction joints between fresh base and base-in-place 4 hours or longer. Form joint with temporary header or make vertical cut of in-place base immediately before placing fresh base.
- C. Make cold joints at center line of head-to-head parking stalls.
- D. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Provide proper bond between reinforcement and base.
- E. Transverse and longitudinal joints shall be vertical.
- F. Unless noted otherwise, place recycled crushed concrete base in courses not to exceed 8 inches in depth. All courses shall be placed on same working day unless approved by Owner's Engineer. Construction joints between new base and base previously placed shall be wetted and coated with dry cement prior to addition of new base.
- G. Complete finishing operations within period of 6 hours after cement is added to base materials.

3.05 COMPACTION

- A. Start compaction maximum 3 hours after start of mixing. Compact loose mixture with approved tamping rollers until entire depth is uniformly compacted. Do not allow base to mix with underlying material.
 - 1. Do not rework uncompacted material that has set up for more than 30 minutes.
 - 2. Complete placement and compaction work within 6 hours from start of moist mixing.
- B. Correct irregularities or weak spots immediately by replacing material and recompacting.
- C. Apply water to maintain moisture between optimum and 5 percent above optimum moisture.
- D. Remove and reconstruct sections where average moisture content exceeds ranges specified at time of final compaction.
- E. Finish by blading surface to final grade after compacting final course. Seal with approved pneumatic tired rollers or flat wheel rollers which are sufficiently light to prevent surface hair line cracking.
- F. Compact to minimum density of 95 percent of dry density, following TxDOT Tex-113-E, at moisture content of treated material between optimum and 5 percent above optimum.

- G. Test roadway base course compaction in accordance with TxDOT Tex-115-E.
- H. Maintain surface to required lines and grades throughout operation.

3.06 CURING

- A. Moist cure for minimum of 72 hours before adding pavement courses.
- B. Use sprinkling or, at option, apply following curing membrane as soon as initial set begins, using approved light-weight self-propelled pressure distributor:
 - 1. MC30: 0.1 gallon per square yard.
 - 2. EPR-1 Prime: 0.15 gallon of asphalt residual per square yard.
- C. Do not use cut-back asphalt during period of April 16 through September 15.

3.07 TOLERANCES

- A. Completed Surface: Smooth and conform to typical section and established lines and grades.
- B. Top Surface of Base Course: Plus or minus ¼ inch in cross section or in 16 foot length.

3.08 FIELD QUALITY CONTROL

- A. Test following Section 01454 - Testing Laboratory Services.
- B. Perform compaction tests following TxDOT Tex-113-E at randomly selected locations. Remove and replace areas failing compaction requirements at no additional cost to Owner.

3.09 PROTECTION

- A. Maintain base in proper condition until surface is placed. Surface must be placed within 14 days after final mixing and compaction unless otherwise approved by Owner's Engineer. Repair unacceptable base course immediately by replacing base to full depth.
- B. Curing membrane may remain in place at areas where surface courses or other base courses are applied.
- C. Prevent construction traffic on base for minimum 3 days. Light vehicles, used to maintain proper cure, are permitted on base after initial set or as permitted by Owner's Engineer.

END OF SECTION

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Section 02716 (Large Diameter)

CEMENT STABILIZED SAND BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cement stabilized sand base material.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. Payment for work under this section will be on a square yard basis for the thickness shown on Drawings. Limits of measurement will match actual pavement replaced, but no greater than the maximum pavement replacement limits shown on Drawings. Limits for measurement will be extended to include installed cement stabilized sand base course material that extends 1 foot beyond outside edge of pavement to be replaced, except where proposed pavement section shares a common longitudinal or transverse edge with existing pavement section. No pavement will be made for cement stabilized sand base in areas beyond these limits.
2. A price reduction for deficient thickness or strength will be applied in accordance with paragraph 3.08.

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM D558 - Standard Test Methods for Moisture-Density Relations of Soil-Cement Mixtures.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

- B. Submit material qualification and mix design tests to include:

1. Three series of tests of sand or fine aggregate material from proposed source. Test procedures are defined in Paragraph 2.01.
2. Three moisture-density relationship tests prepared using the material qualified by the tests of Paragraph 1.04 B.1. Test blends of fine aggregate

from crushed concrete and bank run sand at ratio to be used for mix design testing.

3. Mix design report to meet design requirements of Paragraph 2.01. Include compressive strength tests after 48-hours and 7 days curing.

- C. Submit source of cement-sand material.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Conform to requirements of Section 02321 - Cement Stabilized Sand.

2.02 MIXING MATERIALS

- A. Conform to requirements of Section 02321 - Cement Stabilized Sand.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Conform to requirements of Section 02321 -Cement Stabilized Sand for performance, testing and adjustment for deficient strength.
- B. Material not placed, compacted and finished within 4 hours after mixing shall be rejected.

3.02 PREPARATION OF SUBGRADE

- A. After excavation and/or fill is made to subgrade lines, remove soft or undesirable material and replace with material as specified under Section 02317 - Excavation and Backfill for Utilities. Grade and shape subgrade required to construct cement-stabilized sand base in conformance with lines, grades, thickness and typical cross section shown on Drawings.
- B. Compact subgrade material as specified in Section 02317 - Excavation and Backfill for Utilities.

3.03 PLACING

- A. Do not exceed percentage of moisture in soil subgrade at time of cement-stabilized sand base placement that permits uniform and intimate cement sand curing during placement operations. Do not exceed specified optimum moisture content for surrounding soil.

- B. Place cement-stabilized base in uniform layers to produce depth indicated on Drawings. Place material in a single layer for depth of 6 inches or less. Place no single layer thicker than 6 inches or less than 3 inches for depth greater than 6 inches.
- C. Provide material on dry side of optimum moisture content during compaction but sufficient for hydration.
- D. Make vertical construction joints between new material and material placed for more than 4 hours. Form plane of joint by a header removed immediately prior to placing new base, or cut base placed first to a vertical edge immediately prior to placing new base.
- E. Do not place base when air temperature is below 40EF and falling. Place when temperature is above 35EF and rising. Take temperature in shade and away from artificial heat.

3.04 **COMPACTION**

- A. Roll loose mixture with tamping rollers in addition to plate compactors or tandem rollers. Compact with mechanical hand tampers in places inaccessible to roller
- B. Compact to 95 percent ASTM D558, unless otherwise specified.
- C. Reconstruct sections when moisture content of uncompacted material exceeds amount required for proper hydration of cement.

3.05 **FINISHING**

- A. Finish surface to grade by blading and seal with pneumatic or flat wheel rollers after final course is compacted. Other means providing a dense, uniform surface and avoiding compaction planes are permitted.
- B. Correct any deviation from plan surface in excess of 1/4 inch in cross section and in length of 16 feet measured longitudinally prior to paving. Correct irregularities or weak spots by removing full depth of affected areas. Replace with suitable material as required. Reshape and compact.
- C. Maintain moisture content of surface material at $\nabla 2$ percent of optimum moisture. Proceed with surface compaction and finishing to produce a smooth, closely knit surface, free of cracks, ridges or loose material. Conform to crown, grade and line shown on Drawings, or as required to ensure proper drainage of pavement.

3.06 **CURING**

- A. Protect finished surface against rapid drying by maintaining a moist condition. Sprinkle for not less than 3 days or until surface or pavement is placed.

3.07 TRAFFIC AND MAINTENANCE

- A. Completed section of cement-stabilized sand base may be opened to local traffic and construction equipment after curing period, provided base material has hardened sufficiently to prevent marring or distorting surface by equipment or traffic.
- B. Maintain cement-stabilized base in good condition until pavement replacement has been completed and accepted. Immediately repair defects, as often as needed to keep area intact. Repair cement-stabilized base to full depth by replacement. Do not repair by adding a thin surface layer to damaged part.

3.08 ADJUSTMENT FOR DEFICIENT BASE THICKNESS AND STRENGTH

- A. Construct base to thickness and typical section shown on Drawings. Where base does not conform:
 - 1. Owner may core drill base prior to final acceptance. Cores will be drilled full thickness of section. At least three core thicknesses will be averaged to determine base thickness.
 - 2. A base within 1/2 inch of required thickness will be considered as satisfactory.
 - 3. A base thickness between 1/2 inch less and 1-1/2 inches less than required thickness will be considered deficient. Adjusted unit price will be used in payment.
 - a. Adjusted unit price will bear same ratio to unit price as square of actual average thickness of base bears to square of thickness shown.
 - b. Length of area of such deficient thickness will be determined by additional cores taken at 10-foot intervals in both directions until cores are obtained which are at least that required thickness less 2 inch.
 - c. Width of deficiency will be entire width of base as placed in one operation within length as determined above.
 - 4. No payment will be made for base found more than 1-1/2 inches deficient. Length of unsatisfactory area will be determined by additional cores at 10-foot intervals in both directions until cores are obtained which are required thickness less 1/2 inch. Width will be entire base as placed in one operation within length determined as above. Remove and replace such base with base of specified thickness.

5. No additional payment over unit price will be made for thickness exceeding that required.
 6. Contractor responsible for cost of cores taken to define limits of deficient base thickness.
- B. Refer to Section 02321 - Cement Stabilized Sand, paragraph 3.03 for payment adjustment for deficient strength.

END OF SECTION

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Section 02741

ASPHALTIC CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

Surface courses of compacted mixture of coarse and fine aggregates and asphaltic material.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Measurement for asphaltic concrete pavement is on a square yard basis.
2. Payment for asphaltic concrete pavement for transitions and repairs is on a per square yard basis.
3. Payment for asphaltic concrete pavement for temporary driveways, roadway shoulders, and elsewhere shown on Drawings is on a per square yard basis.
4. Payment for hot-mix asphalt concrete pavement includes payment for associated work performed in accordance with Section 02742 - Prime Coat.
5. Measurement for utility projects: Match actual pavement replaced but no greater than maximum pavement replacement limits shown on Drawings.
6. Payment for temporary detour pavement is on a square yard basis and includes surface and base materials, associated grading, maintenance and removal as well as restoration of ditches.
7. Payment for speed humps is on linear foot basis, and includes milling of existing pavement, prime coat, and placement and compaction of asphalt. Measurement of speed hump is along length of 12-foot wide speed hump, measured transverse to centerline of road. Separate payment is made for thermoplastic markings applied to speed hump.
8. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 33 - Standard Specification for Concrete Aggregates.
- B. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- C. TxDOT Tex-106-E - Calculating the Plasticity Index of Soils
- D. TxDOT Tex-126-E - Molding, Testing, and Evaluation of Bituminous Black Base Material
- E. TxDOT Tex-200-F – Sieve Analysis of Fine and Course Aggregates
- F. TxDOT Tex-203-F - Sand Equivalent Test
- G. TxDOT Tex-204-F - Design of Bituminous Mixtures
- H. TxDOT Tex-206-F – Compacting Test Specimens of Bituminous Mixtures
- I. TxDOT Tex-207-F - Determining Density of Compacted Bituminous Mixtures
- J. TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures
- K. TxDOT Tex-217-F - Determination Deleterious Material and Decantation Test for Coarse Aggregates
- L. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures
- M. TxDOT Tex-530-C – Effect of Water on Bituminous Paving Mixtures
- N. TxDOT Tex-531-C – Prediction of Moisture Induced Damage to Bituminous Paving Materials Using Molded Specimens

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit certificates that asphalt materials and aggregates meet requirements of Paragraph 2.01, Materials.
- C. Submit proposed design mix and test data for surface course.
- D. Submit manufacturer’s description and characteristics of spreading and finishing machine for approval.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate:

1. Use gravel, crushed stone, or combination thereof, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Use aggregate conforming to ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.
2. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay-like particles, or silt when tested in accordance with Tex-217-F, Part II.

B. Fine Aggregate: Sand, stone screenings, or combination of both passing No. 10 sieve. Use aggregate conforming to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by TxDOT Tex-106-E. Sand equivalent shall have minimum value of 45 when tested by TxDOT Tex-203-F.

C. Composite Aggregate: Conform to following limits when graded in accordance with TxDOT Tex-200-F.

Gradation of Composite Aggregate		
Sieve Size	Percent Passing	
	Course Surface (TxDOT Type C)	Fine Surface (TxDOT Type C)
7/8"	100	---
5/8"	95 to 100	---
1/2"	---	100
3/8"	70 to 85	85 to 100
#4	43 to 63	50 to 70
#10	30 to 40	32 to 42
#40	10 to 25	11 to 26
#80	3 to 13	4 to 14
#200	1 to 6*	1 to 6*
VMA % minimum	13	14

* 2 to 8 when Test Method Tex-200-F, Part II (Washed Sieve Analysis) is used.

- D. Asphaltic Binder: Moisture-free homogeneous material which will not foam when heated to 347°F, meeting following requirements:

Performance Graded Binder	
CRITERIA/TEST	PERFORMANCE GRADE (PG64-22)
Average 7-day Maximum Pavement Design Temperature, C	< 64
Minimum Pavement Design Temperature, C	> -22
ORIGINAL BINDER	
Flash Point Temperature, T48; Minimum C	230
Viscosity, ASTM D 4402; Maximum, 3Pa*s (3000 cP) Test Temperature, C	135
Dynamic Shear, TP5; $G^*/\sin[\]$, Minimum, 1.00 kPa Test Temperature @ 10 rad/sec., C	64
PRESSURE AGING VESSEL RESIDUE (PPI)	
PAV Aging Temperature, C	100
Dynamic Shear, TP5; $G^*/\sin[\]$, Minimum, 5000 kPa Test Temperature @ 10 rad/sec., C	25
Physical Hardening	Report
Creep Stiffness, TP1; S, Maximum, 300 Mpa-Value, Minimum, 0.300 Test Temperature @ 60 sec., C	-12
Direct Tension, TP3; Failure Strain, Minimum, 1.0% Test Temperature @ 1.0 mm/min, C	-12

- E. Anti-stripping Agent:

1. Evaluate mixture of aggregate, asphalt, and additives proposed for use for moisture susceptibility and requirement for anti-stripping agents. To substantiate mix design, produce, and test trial mixtures using proposed project materials and equipment prior to placement. Test for susceptibility to moisture and trial mixture may be waived by Owner’s Representative when similar designs using same material have previously proven satisfactory.
2. Liquid Anti-stripping Agent. Use anti-stripping agent with uniform liquid with no evidence of crystallization, settling, or separation of components. Submit sample of anti-stripping agent proposed for use and manufacturer’s product data, including recommended dosage range, handling and storage, and application instructions.

2.02 EQUIPMENT

- A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum-mix plant, shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors.
- B. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:
 - 1. Cold aggregate bins and proportioning device
 - 2. Dryer
 - 3. Screens
 - 4. Aggregate weight box and batching scales
 - 5. Mixer
 - 6. Asphalt storage and heating devices
 - 7. Asphalt measuring devices
 - 8. Truck scales
- C. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix. Provide one cold feed bin per stockpile.

2.03 MIXES

- A. Employ a certified testing laboratory to prepare design mixes. Test in accordance with TxDOT Tex-126-E or Tex-204-F, Tex-206-F, Tex-208-F, Tex-530-C, and Tex-531-C.
- B. Density, Stability, and Air Void Requirements:

Percent Density		Percent Optimum	HVEEM Stability Percent Not Less Than
Min.	Max.		
94.5	97.5	96	35

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted base course is ready to support imposed loads.
- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Prime Coat: Conform to requirements of Section 02742 - Prime Coat. Where the mixture will adhere to the surface on which it is to be placed without use of a prime coat, prime coat may be eliminated if approved by Owner's Representative.
- B. Prepare subgrade in accordance with requirements of Section 02321 - Cement Stabilized Sand, or Section 02713 - Recycled Crushed Concrete Base Course.
- C. Prepare subgrade in advance of asphaltic concrete paving operation.
- D. Perform pavement repair and resurfacing as indicated in Section 02951 - Pavement Repair and Resurfacing.
- E. Do not use cutback asphalt.
- F. Milling of pavement for speed humps: Mill pavement (concrete or asphalt) to depth of 1 inch and width between 18 and 24 inches around entire perimeter of proposed hump, as shown in detail for speed hump design.

3.03 PLACEMENT

- A. Do not place asphalt pavement less than 2 inches thick when surface temperature taken in shade and away from artificial heat is below 50°F and falling. Asphalt may be placed when temperature is above 40°F and rising.
- B. Haul prepared and heated asphaltic concrete mixture to the project in tight vehicles previously cleaned of foreign material. Mixture temperature shall be between 250°F and 325°F when laid.
- C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.
- D. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Spread lifts in such manner that, when compacted, finished course will be smooth, of uniform density, and will be to section, line, and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by Owner's Representative.
- E. Joints: Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce

slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.

- F. When new asphalt is laid against existing or old asphalt, saw cut existing or old asphalt to full depth to provide straight smooth joint.
- G. In small restricted areas where use of paver is impractical, spread material by hand. Compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove lumps that do not break down readily.

3.04 COMPACTION

- A. Construct test strip to identify correct type, number, and sequence of rollers necessary to obtain specified in-place density or air-voids when directed by the Owner's Representative. Prepare test strip at least 1,000 feet in length, comparable to placement and compaction conditions for Project.
- B. Begin rolling while pavement is still hot and as soon as it will bear roller without shoving, displacement, or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water or petroleum by-products.
- C. Compact surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing a minimum of 8 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below 185°F.
- D. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.
- E. Along walls, curbs, headers, and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.
- F. Compact binder course and surface course to a minimum density of 91 percent of maximum possible density of voidless mixture composed of same materials in like proportions.

3.05 TOLERANCES

- A. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed $\frac{1}{8}$ inch.

- B. Completed surface, when tested with 10-foot straightedge laid parallel to center line of pavement, shall show no deviation in excess of $\frac{1}{8}$ inch in 10 feet. Correct surface not meeting this requirement.
- C. Dimensions of speed humps shall conform to details for speed hump design and speed hump height tolerances.

3.06 QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.
- B. For in-place depth and density, take minimum of one core at random locations for each 1,000 feet of single lane pavement. On a two-lane pavement, take samples at random every 500 feet from alternating lanes. Take cores for parking lots every 500 square yards of base to determine in-place depth and density. If cul-de-sac or streets are less than 500 feet, minimum of two cores (one per lane) will be procured. On small projects, take a minimum of two cores for each day's placement. For first days placement and prior to coring, minimum of five nuclear gauge reading will be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process will continue for each day's placement until engineer determines that a good bias has been established for that nuclear gauge.
- C. Determine in-place density will be determined in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by Owner's Representative. Average densities for each street placed in a single day to determine compliance.
- D. Contractor may request three additional cores in vicinity of cores indicating nonconforming in-place depths or density at no additional cost to the Owner. In-place depth at these locations shall be average depth of four cores.
- E. Fill cores and density test sections with new compacted asphaltic concrete.

3.07 NONCONFORMING PAVEMENT

- A. Recompact and retest nonconforming street sections not meeting surface test requirements or having unacceptable surface texture. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute. Retesting is at no cost to the Owner.
- B. Remove and replace areas of asphalt found deficient in thickness by more than 10 percent. Use new asphaltic surface of thickness shown on Drawings. Remove and replace areas of asphalt surface found deficient in average density.

- C. Replace speed humps which do not conform to requirements of details, or which are rejected by Owner's Representative.

3.08 PROTECTION

- A. Do not open pavement to traffic until completion of rolling and temperature has cooled to set asphaltic concrete surface, or as shown on Drawings.
- B. Maintain asphaltic concrete pavement in good condition until completion of Work.
- C. Repair defects immediately by replacing asphaltic concrete pavement to full depth.

END OF SECTION

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Section 02821

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases and concrete foundation for posts.
Gates and related hardware.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices
 - 1. Payment for fencing is on a lump sum basis including personnel gate.
 - 2. Payment for sliding gate is on a lump sum basis including gate operators, loop detectors, and key pad/card access pedestal.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

1.03 REFERENCES

- A. ANSI/ASTM A 123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- B. ANSI/ASTM F 567 - Installation of Chain-Link Fence.
- C. ASTM A 116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- D. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated Welded and Seamless.
- E. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- F. ASTM A 392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- G. ASTM A 428 - Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- H. ASTM C 94 - Ready-mixed Concrete.
- I. ASTM F 573 - Residential Zinc-Coated Steel Chain Link Fence Fabric.

- J. ASTM F 668 - Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
- K. ASTM A 121 - Zinc Coated (Galvanized) Steel Barbed Wire.
- L. ASTM A 501 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- M. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.
- N. FS RR-F-191 - Fencing, Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories).

1.04 SYSTEM DESCRIPTION

- A. Fence height shall be as indicated on Drawings or as noted to match height of existing.
- B. Extension arms for barbed wire shall match existing.
- C. Line post spacing shall not exceed 10 feet, or as shown on Drawings.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01330 - Submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- C. Product Data: Provide data on fabric, posts, accessories, fittings, and hardware that indicates that items match or exceed the quality of existing items.

1.06 QUALIFICATIONS

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

1.07 FIELD MEASUREMENTS

Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 MATERIALS AND/OR EQUIPMENT

- A. Fence and Gates
 - 1. Vinyl Coating: Coat fence components, except barbs, with thermally fused and bonded plasticized polyvinyl chloride (PVC). Color vinyl

- coating black. Coat wire fabric with 7 mil. Vinyl. Coat other fence components with 10 mil. Vinyl.
2. Fabric to conform to ASTM A392, 6 feet high, No. 9 W&M gauge core wire woven in 2-inch mesh. Unless otherwise shown on Plans, use Class 2 zinc coating. Top and bottom selvages to be twisted and barbed.
 3. Barbed wire to be 3 lines of wire mounted on extension arms and conforming to ASTM A121, No. 12-1/2 W&M gauge wire, with 4 point barbs, and Class 3 zinc coating. Space barbs 3 inches apart.
 4. Line Posts shall be 2.375" diameter Schedule 40 Hot-Dip galvanized steel pipe color coated conforming to ASTM A120.
 5. End, corner, and pull posts shall be 2.875" diameter Schedule 40 Hot-Dip galvanized steel pipe color coated weighing not less than 4.64 pounds per linear foot.
 6. Gate posts to be in accordance with ASTM A53, Schedule 40 for steel pipe, ASTM A501 for steel tubing.
 7. Barbed wire extension arms to be standard, one-piece, three wire capacity, with steel conforming to ASTM A36/A36M.
 8. Swing gates to be standard heavy type, welded, watertight, rigid frame, 1.90" diameter. Schedule 40 steel pipe, minimum weight 2.72 pounds per foot, conforming to ASTM A53.
 9. Hot-Dip galvanized component metal parts not covered by ASTM specifications above with minimum standard zinc coating in accordance with ASTM A153 before application of vinyl coating.

B. Gate

1. Framework
 - a. All horizontal and vertical frame members shall be minimum 12-gauge tubing, hot-dip galvanized inside and out after assembly. Gate frame to be prepped and painted with black gloss enamel paint prior to being fitted with vinyl coated chain link fencing material and barbed wire. If welding is required after assembly, all welds shall be air driven wire brush cleaned and covered with two (2) coats of galvanized-weld. Vertical members shall be spaced on maximum 48-inch centers. Size of frame to be determined by manufacturer to allow 22' opening between posts.
 - b. Gate section shall have diagonal braces made from minimum 3/8-inch galvanized rods. Each rod shall be threaded at both ends and

attached to four (4) inch truss rod tighteners. Truss rod tighteners shall be fastened to frame by 7/16" by 3" galvanized eye bolts. All diagonal truss rods shall have two (2) nuts to prevent slippage.

2. Gate Posts

- a. Gate post shall be 4" diameter Schedule 40, steel pipe hot-dip galvanized inside and out, color coated or such other strength as manufacturer can demonstrate to ENGINEER/OWNER that bending will not occur under wind loads, attempted forced entry or normal use. Gate posts to be fabricated with a minimum of six (6), ½" thick x 2" wide x 4" long galvanized steel tabs, seal welded at right angles to the post at intervals on the bottom 36" of the post. Clean welds with air driven brush and coat with two layers of zinc rich paint. Set the gate posts in minimum 42" deep holes filled with high strength concrete. Gate posts to be prepped and painted with black gloss enamel paint after all welding/cleaning/galvanizing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install chain link fence in accordance with the directions of the manufacturer and these Specifications.
- B. Install fence posts at not more than 10-foot centers and at least 36 inches into the ground or as shown on the Drawings in a Class A concrete base. Allow concrete to cure for at least 7 days before erecting remainder of fence. Fasten fabric to line posts with wire ties spaced about 14 inches apart and to top rail spaced about 24 inches apart.
- C. Use standard chain link fence stretching equipment to stretch the fabric before tying it to the rails and posts. Repeat the stretching and tying operations about every 100 feet.
- D. Erect gates so they swing or slide in the appropriate direction. Provide gate stops as required. Secure hardware, adjust, and leave in perfect working order. Adjust hinges and diagonal bracing so that gates will hang level. Adjust rollers and guides of sliding gates so that gates are level.
- E. At small natural or drainage ditches where it is not practical for the fence to conform to the contour of the ground, span the opening below the fence with wire fastened to stakes of required length. The finished fence shall be plumb, taut, true to line and ground contour. When directed, stake down the chain link fence at several points between posts.

- F. Where new fence joins an existing fence, set a corner post and brace post at the junction and brace as directed. If the connection is made at other than the corner of the new fence the last span of the old fence shall contain a brace.
 - G. Demonstrate to ENGINEER after construction that the equipment operates as designed with a minimum of effort to open and close the gate.
- 3.01 WARRANTY
- A. Provide a one (1) year warranty for fencing materials. Warranty shall be in the name of the Owner.

END OF SECTION

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Section 02911

TOPSOIL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and placing topsoil for finish grading and for seeding, sodding, and planting.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for topsoil under this Section. Include payment in Section 02921 - Hydro-mulch Seeding or Section 02922 - Sodding.
 - 2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Topsoil shall be fertile, friable, natural sandy loam surface soil obtained from excavation or borrow operations having following characteristics:
 - 1. pH value of between 5.5 and 6.5.
 - 2. Liquid limit: 50 or less.
 - 3. Plasticity index: 20 or less.
 - 4. Gradation: maximum of 10 percent passing No. 200 sieve.
- B. Topsoil shall be reasonably free of subsoil, clay lumps, weeds, non-soil materials, and other litter or contamination. Topsoil shall not contain roots, stumps, and stones larger than 2 inches.
- C. Obtain topsoil from naturally well-drained areas where topsoil occurs at minimum depth of 4 inches and has similar characteristics to that found at placement site.

Do not obtain topsoil from areas infected with growth of, or reproductive parts of nut grass or other noxious weeds.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Excavate topsoil for esplanades and areas to receive grass or landscaping from areas to be further excavated. Stockpile in area approved by Project Manager.
- B. Stockpile topsoil to depth not exceeding 8 feet. Cover to protect from erosion.

3.02 TOPSOIL EXCAVATION

- A. Conform to excavation and stockpiling requirements of Section 02315 - Roadway Excavation.

3.03 PLACEMENT

- A. Place no topsoil until subgrade has been approved. For areas to be seeded or sodded, scarify or plow existing material to minimum depth of 4 inches, or as indicated on Drawings. Remove vegetation and foreign inorganic material. Place 4 inches of topsoil on loosened material and roll lightly with appropriate lawn roller to consolidate topsoil.
- B. Increase depth of topsoil to 6 inches when placed over sand bedding and backfill materials specified in Section 02320 - Utility Backfill Material.
- C. For areas to receive shrubs or trees, excavate existing material and place topsoil to depth and dimensions shown on Drawings.
- D. Remove spilled topsoil from curbs, gutters, and paved areas and dispose of excess topsoil in accordance with requirements of Section 01576 - Waste Material Disposal.
- E. Place topsoil to promote good drainage and compact with light roller. Water topsoil after placement until saturated for minimum depth 6 inches, fill in and recompact areas of settlement.

3.04 PROTECTION

- A. Protect topsoil from wind and water erosion until planting is completed.

END OF SECTION

Section 02921

HYDRO MULCH SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Seeding, fertilizing, mulching, and maintenance of areas indicated on Drawings.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

1. Payment for hydro mulch seeding is on an acre basis, within limits of construction if shown on the Drawings.
2. No payment will be made for hydro mulch seeding under this Section if limits of constructions are not shown on the Drawings. Include payment in Section 01740 - Site Restoration.
3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit certification from supplier that each type of seed conforms to these specifications and requirements of Texas Seed Law. Certification shall accompany seed delivery.
- C. Submit certification that fertilizer complies with these specifications and requirements of Texas Fertilizer Law.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: conform to material requirements of Section 02911 - Topsoil.
- B. Seed: Conform to U.S. Department of Agriculture rules and regulations of Federal Seed Act and Texas Seed Law. Seed shall be certified 90 percent pure and furnish 80 percent germination and meet following requirements:

1. Rye: Fresh, clean, Italian rye grass seed (*lolium multi-florum*), mixed in labeled proportions. As tested, minimum percentages of impurities and germination must be labeled. Deliver in original unopened containers.
2. Bermuda: Extra-fancy, treated, lawn type common bermuda (*Cynodon dactylon*). Deliver in original, unopened container showing weight, analysis, name of vendor, and germination test results.
3. Wet, moldy, or otherwise damaged seed will not be accepted.
4. Seed requirements, application rates, and planting dates are:

Type	Application Rate Pounds/A	Planting Date
Hulled Common Bermuda Grass 98/88	40	Jan 1 to Mar 31
Unhulled Common Bermuda Grass 98/88	40	
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88	40	Oct 1 to Dec 31
Unhulled Common Bermuda Grass 98/88	40	
Annual Rye Grass (Gulf)	30	

C. Fertilizer: Dry and free flowing, inorganic, water soluble commercial fertilizer, which is uniform in composition. Deliver in unopened containers which bear manufacturers guaranteed analysis. Caked, damaged, or otherwise unsuitable fertilizer will not be accepted. Fertilizer shall contain minimum percentages of following elements:

1. Nitrogen: 10 Percent
2. Phosphoric Acid: 20 Percent
3. Potash: 10 Percent

D. Mulch:

1. Virgin wood cellulose fibers from whole wood chips having minimum of 20 percent fibers 0.42 inches in length and 0.01 inches in diameter.
2. Cellulose fibers manufactured from recycled newspaper and meeting same fiber content and size as for cellulose fibers from wood chips.
3. Dye mulch green for coverage verification purposes.

E. Soil Stabilizer: "Terra Tack 1" or approved equal.

- F. Weed control agent: Pre-emergent herbicide for grass areas, such as “Benefin,” or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Place and compact topsoil in accordance with requirements of Section 02911 - Topsoil.
- B. Dispose of Objectionable and Waste Materials in accordance with Section 01576 - Waste Material Disposal.

3.02 APPLICATION

- A. Seed: Apply uniformly at rates given in Paragraph 2.01 B for type of seed and planting date.
- B. Fertilizer: Apply uniformly at rate of 500 pounds per acre.
- C. Mulch: Apply uniformly at rate of 50 pounds per 1,000 square feet.
- D. Soil Stabilizer: Apply uniformly at rate of 40 pounds per acre.
- E. Weed Control Agent: Apply at manufacturer's recommended rate prior to hydro mulching.
- F. Sod: Lay single row of sod along perimeter where top soil and pavement intersect. Apply in conformance to Section 02922 - Sodding.
- G. Suspend operations under conditions of drought, excessive moisture, high winds, or extreme or prolonged cold. Obtain Owner's Representative's approval before resuming operations.

3.03 MAINTENANCE

- A. Maintain grassed areas minimum of 90 days, or as required to establish an acceptable lawn. For areas seeded in fall, continue maintenance following spring until acceptable lawn is established.
- B. Maintain grassed areas by watering, fertilizing, weeding, and trimming.
- C. Repair areas damaged by erosion by regrading, rolling, and replanting.
- D. Reseed small, sparse grass areas. When sparse areas exceed 20 percent of planted area, reseed by hydro mulch.

- E. Mow grass when height reaches 3½ inches or greater on average before final acceptance. Mow to height of 2½ inches.

END OF SECTION

Section 02922

SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restoration of existing lawn areas disturbed by construction shall be by installation of new sod.
- B. Planting of sod within areas designated on Drawings for purpose of surface stabilization, channel stabilization or vegetation buffer strips.
- C. Sod is defined as blocks, squares, strips of turf grass, and adhering soil used for vegetative planting. To be placed edge to edge for complete coverage.
- D. Lawn is defined as ground covered with fine textured grass kept neatly mowed.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. Payment for sodding is on a square yard basis.
 - 2. For utility construction, no separate payment will be made for sodding. Include payment in Section 01740 - Site Restoration.
 - 3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

Conform to requirements of Section 01330 - Submittal Procedures.

1.04 QUALITY ASSURANCE

- A. Sod only when weather and soil conditions are deemed by Owner's Representative to be suitable for proper placement.
- B. Water and fertilize new sod.
- C. Guarantee sod to be growing 30 days after substantial completion.

D. Maintenance Period:

1. Begin maintenance immediately after each section of grass sod is installed and continue for 30 day period from date of substantial completion.
2. Resod unacceptable areas.
3. Water, fertilize, control disease and insect pests, mow, edge, replace unacceptable materials, and perform other procedures consistent with good horticultural practice to ensure normal, vigorous, and healthy growth. Install disease control within guidelines set forth by Structural Pest Control Board of the State of Texas.

E. Notify Owner's Representative 10 days before end of maintenance period for inspection.

PART 2 PRODUCTS

2.01 SOD

- A. Species: Bermuda (*Cynodon Dactylon*), Buffalo (*Buchloe Dactyloides*), or St. Augustine (*Stenotaphrum Secundatum*) Gulf Coast variety to match existing sod.
- B. Contents: 95 percent permanent grass suitable to climate in which it is to be placed; not more than 5 percent weeds and undesirable grasses; good texture, free from obnoxious grasses, roots, stones, and foreign materials.
- C. Size: 12 inch wide strips, uniformly 2 inches thick with clean-cut edges.
- D. Sod is to be supplied and maintained in healthy condition as evidenced by grass being normal green color.

2.02 FERTILIZER

Available nutrient percentage by weight: 12 percent nitrogen, 4 percent phosphoric acid, and 8 percent potash; or 15 percent nitrogen, 5 percent phosphoric acid, and 10 percent potash.

2.03 WEED AND INSECT TREATMENT

Provide acceptable treatment to protect sod from weed and insect infestation. Submit treatment method to Owner's Representative for approval. Install insect and disease control within guidelines set forth by Structural Pest Control Board of the State of Texas.

2.04 WATER

Potable, available on-site through Contractor's water trucks.

2.05 BANK SAND

Free of clay lumps, roots, grass, salt, or other foreign material.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that soil placement and compaction have been satisfactorily completed. Verify that soil is within allowable range of moisture content.
- B. Top soil shall be free of weeds and foreign material immediately before sodding.
- C. Do not start work until conditions are satisfactory. Do not start work during inclement or impending inclement weather.
- D. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges, or depressions.
- E. Spread 2 inch layer of bank sand over areas to be sodded prior to planting of sod.
- F. Apply fertilizer at rate of 25 pounds per 1000 square feet. Apply after raking soil surface and not more than 48 hours prior to laying sod. Mix thoroughly into upper 2 inches of soil. Lightly water to aid in dissipation of fertilizer.

3.02 APPLICATION

- A. Full Sodding: Lay sod with closely fitted joints leaving no voids and with ends of sod strips staggered. Lay sod within 24 hours of harvesting.
- B. On slopes 2:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- C. Prior to placing sod, on slopes 3:1 or where indicated, place Hold/Gro or Roll Lite or equal over topsoil. Securely anchor in place with posts sunk firmly into ground at maximum 16 feet on center along pitch of slope and equal to width of wire mesh horizontally across slopes.
- D. After sod is laid, irrigate thoroughly to secure 6-inch minimum penetration into soil below sod.

- E. Tamp and roll sod with approved equipment to eliminate minor irregularities and to form close contact with soil bed immediately after planting and watering. Submit type of tamping and rolling equipment to be used to Owner's Representative for approval, prior to construction.

3.03 MAINTENANCE

A. Watering:

1. Water lawn areas once a day with minimum $\frac{1}{2}$ inch water for first 3 weeks after area is sodded.
2. After 3 week period, water twice a week with $\frac{3}{4}$ inch of water each time unless comparable amount has been provided by rain.
3. Make weekly inspections to determine moisture content of soil unless soil is in frozen condition.
4. Water in afternoon or at night to enable soil to absorb maximum amount of water with minimum evaporation.

B. Mowing:

1. Mow sod at intervals which will keep grass height from exceeding $3\frac{1}{2}$ inches.
2. Set mower blades at $2\frac{1}{2}$ inches.
3. Do not remove more than one-half of grass leaf surface.
4. Mow sodded areas requiring mowing within 1 month after installation with light-weight rotary type mower. Mow sod only when dry and not in saturated or soft condition.
5. Remove grass clippings during or immediately after mowing.

C. Fertilizer and Pest Control:

1. Evenly spread fertilizer composite at rate of 40 pounds per 5,000 square feet or as recommended by manufacturer. Do not place fertilizer until 2 weeks after placement of sod.
2. Restore bare or thin areas by topdressing with mix of 50 percent sharp sand and 50 percent sphagnum peat moss.
3. Apply mixture $\frac{1}{4}$ to $\frac{1}{2}$ inch thick.

- 4. Treat areas of heavy weed and insect infestation as recommended by treatment manufacturer.

 - D. Restrict all traffic from sodded areas until sod is established or for minimum 10 days during growing season. Use wood lath and plastic tape to cordon sodded areas. Maintain tape and lath throughout for minimum 30 days during growing season.
- 3.04 CLEANUP
- A. During course of planting, remove excess and waste materials; keep lawn areas clean and take precautions to avoid damage to existing structures, plants, grass, and streets.

 - B. Remove barriers, signs, and other Contractor material and equipment from project site at termination of establishment period.

 - C. Dispose of unused materials and rubbish in accordance with Section 01576 - Waste Material Disposal.

END OF SECTION

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Section 02951

PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repairing and resurfacing streets, highways, driveways, sidewalks, and other pavements that have been cut, broken, or otherwise damaged during construction.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices:
 - 1. No separate payment will be made for pavement repair and resurfacing under this Section. Payment will be in accordance with Measurement and Payment for work as required in appropriate sections.
 - 2. Refer to Section 01270 - Measurement and Payment for other unit price procedures.
- B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this section is included in total Stipulated Price.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Subgrade:
 - 1. Provide backfill material as required by applicable excavation and fill sections (Sections 02315 through 02319) and Section 02330 - Embankment.
 - 2. Provide material for stabilization as required by applicable portions of Section 02336 - Lime Stabilized Subgrade, Section 02337 - Lime/Fly-Ash Stabilized Subgrade, and Section 02338 - Portland Cement Stabilized Subgrade.
- B. Base: Provide base material as required by applicable portions of Section 02711 - Hot Mix Asphaltic Base Course, Section 02712 - Cement Stabilized Base Course, and Section 02713 - Crushed Concrete Base Course.
- C. Pavement: Provide paving materials as required by applicable portions of Section 02741 - Asphaltic Concrete Pavement, Section 02751- Concrete Paving, Section

02754 - Concrete Driveways, Section 02771 - Curb, Curb and Gutter, and Headers, and Section 02775 - Concrete Sidewalks.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify Owner prior to commencement of excavation in pavement for which an Excavation in Public Way permit has been obtained. Follow directions contained in the permit.
- B. Conform to requirement of Section 02221 - Removing Existing Pavements and Structures, for removals.
- C. Saw cut pavement 18 inches wider than width of trench needed to install utilities unless otherwise indicated on Drawings.
- D. When removing pavement to existing deformed metal strip (i.e. dummy joint), saw cut pavement minimum 2 inches deep on opposite side of deformed metal strip. Place saw joint far enough behind deformed metal strip to obtain continuously straight joint. Remove damaged portion of deformed metal strip as required to provide proper joint. Saw cut and remove metal strip before placement of new concrete pavement.
- E. Protect edges of existing pavement to remain from damage during removals, utility placement, backfill, and paving operations. For concrete pavement, protect undisturbed subgrade that is to remain to support replacement slab.
- F. Dowel in existing pavement where no reinforcement is found or is broken due to construction activities. Unless otherwise directed by Project Manager, provide No. 6 bars 24 inches long, drilled and embedded 8 inches into center of existing slab with 'PO-ROC' epoxy grout or approved equal. Space dowels to match new pavement reinforcement spacing.
- G. Provide transitional paving and earthwork as required to tie proposed pavement to existing pavement when unable to dowel new pavement into existing pavement.

3.02 INSTALLATION

- A. Parking Areas, Service Drives, Driveways, and Sidewalks: Replace with material equal to or better than existing or as indicated on Drawings. Conform to applicable requirements of sections referenced in Paragraph 2.01, Materials.
- B. Street Pavements and Curbs, Curbs and Gutters: Replace subgrade, base, and surface course with like materials or as indicated on Drawings and Standard Detail 02951.01. Curbs and curbs and gutters shall match existing. Conform to requirements of sections referenced in Paragraph 2.01, Materials.

- C. For concrete pavement, install size and length of reinforcing steel and pavement thickness indicated on Drawings and Standard Detail 02751.01. Place types and spacing of joints to match existing or as indicated on Drawings.
- D. Where existing pavement consists of concrete pavement with asphaltic surfacing, resurface with minimum 2-inch depth asphaltic pavement.
- E. Repair state highway and county crossings in accordance with TxDOT permit or county requirements as appropriate and within 1 week after utility work is installed.

3.03 WASTE MATERIAL DISPOSAL

- A. Dispose of waste material in accordance with requirements of Section 01576 - Waste Material Disposal.

3.04 PROTECTION

- A. Maintain pavement in good condition until completion of Work.
- B. Replace pavement damaged by Contractor's operations at no cost to Owner.

END OF SECTION

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SECTION 13110

CATHODIC PROTECTION SYSTEM

PART 1 – G E N E R A L

1.01 SUMMARY

- A. The WORK of this Section includes restoring the portion of the existing cathodic protection system being removed from the following structures as outlined in this Section and on the Drawings:
 - 1. 39-Inch Bar-Wrapped Pipe along Avenue L.
- B. Electrical isolation of the structures from adjacent metallic structures, steel reinforced concrete structures, structures of dissimilar metal or dissimilar coatings, conduits and all other metallic components that may impact the operation of the cathodic protection system.
- C. Electrical bonding of all non-insulated, non-welded pipe joints and mechanical joints.
- D. Testing of system during installation.
- E. Cleanup and restoration of work site.
- F. Testing of installation after installation and backfill (Final System Checkout).

1.02 UNIT PRICES

- A. There is no separate payment for this item. This item will be paid as part of the removal and replacement of the bar-wrapped pipe and butterfly valve along Avenue L.

1.03 REQUIREMENTS

- A. If the products installed as part of this Section are found to be defective or damaged or if the WORK of this Section is not in conformance with these Specifications then the products and WORK shall be corrected at the CONTRACTOR's expense.
- B. Any retesting required due to inadequate installation or defective materials shall be paid for by the CONTRACTOR.
- C. The WORK also requires that one Supplier or Subcontractor accept responsibility for the WORK as indicated, but without altering or modifying the CONTRACTOR's responsibilities under the Contract Documents.

- D. The WORK also requires coordination of assembly, installation and testing between the pipeline contractor and any cathodic protection material supplier or subcontractor.

1.04 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

- 1. Site Safety and Regulatory Requirements
- 2. Excavation, Trenching, Backfilling, and Compacting
- 3. Piping
- 4. Cast-In-Place Concrete
- 5. Protective Coatings

1.05 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

- A. The WORK of this Section shall comply with the current editions of the following codes and standards:

- 1. ASTM ASTM International
 - a. A518 Standard Specification for Corrosion-Resistant High-Silicon Iron Castings
 - b. D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 - c. D1785 Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - d. C94 Standard Specification for Ready-Mixed Concrete
 - e. B3 Standard Specification for Soft or Annealed Copper Wire
 - f. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - g. B843 Magnesium-Alloy Anodes for Cathodic Protection
 - h. B80 Magnesium-Alloy Sand Castings
 - i. B418 Cast and Wrought Galvanic Zinc Anodes

- j. D2220 Standard Specification for Polyvinyl Chloride (PVC) Insulation for Cable and Wire
- 2. AASHTO American Association of State Highway and Transportation Officials
 - a. H20 Specification for Highway Bridges
- 3. NSF National Sanitation Foundation
 - a. NSF 61 Drinking Water System Components
- 4. NACE International, the Corrosion Society
 - a. SP0169 Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems
 - b. RP0196 Galvanic Anode Cathodic Protection of Internal Submerged Surfaces of Steel Water Storage Tanks
 - c. SP0286 Electrical Insulation of Cathodically Protected Pipelines
 - d. RP0375 Wax Coating Systems for Underground Piping Systems
 - e. RP0388 Impressed Current Cathodic Protection of Internal Submerged Surfaces of Steel Water Storage Tanks
 - f. TM0497 Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems
 - g. SP0572 Design, Installation, Operation and Maintenance of Impressed Current Deep Groundbeds
- 5. NFPA National Fire Protection Association
 - a. NFPA 70 National Electric Code (NEC)
- 6. XXX XXXXXX
 - a. Local Well drilling standards for cathodic protection anode deep well
- 7. TXU Electric & Gas Service Requirements (Greenbook)
- 8. NEMA National Electrical Manufacturers Association
 - a. 250 Enclosures for Electrical Equipment (1,000 Volts Maximum)

- b. TC2 Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
- c. TC3 PVC Fittings for Use with Rigid PVC Conduit and
- d. Tubing
- 9. UL Underwriters Laboratories
 - a. 6 Rigid Metal Conduits
 - b. 514B Fittings for Cable and Conduit

B. Whenever the Drawings or these Specifications require a higher degree of workmanship or better quality of material than indicated in the above codes and standards, these Drawings and Specifications shall prevail.

1.06 PERMITS AND JOB ACCESS

- A. Prior to the start of construction, the CONTRACTOR shall apply to the required authorities for permits required for installation of the cathodic protection system.
- B. The CONTRACTOR shall contact Underground Service Alert prior to commencing construction to locate existing utilities in the area of construction. Existing utilities include, but are not limited to, water lines, gas lines, telephone, street lights, sewer and storm drains and overhead and underground electric utilities.
- C. The CONTRACTOR shall be responsible for reviewing the rectifier locations to determine if there are any conflicts with obtaining power from the indicated locations. The CONTRACTOR shall report any conflicts to the ENGINEER prior to proceeding with the Work.
- D. The CONTRACTOR shall submit an application to the local power company for AC power to the new rectifiers. CONTRACTOR shall be responsible for all fees and expenses associated with providing power to the rectifiers.
- E. Traffic control shall satisfy the requirements of the governing locality.

1.07 QUALITY ASSURANCE

- A. Installation of the cathodic protection equipment shall be performed by individuals having at least 5 years of experience in the installation of the cathodic protection equipment described herein.
- B. All well drilling shall be performed by a licensed Well Drilling CONTRACTOR.

- C. All deep well installations shall be installed in accordance with Texas well standards and the applicable sections on wells from local regulations.
- D. All testing required to be performed by a “qualified corrosion technician” shall be performed by a NACE Level 2 CP Technician under the supervision of a Corrosion Engineer. A Corrosion Engineer is a Registered Professional Engineer with minimum 5 years corrosion experience or a NACE Level 4 Cathodic Protection Specialist.

1.08 SUBMITTALS

- A. The following shall be submitted to the ENGINEER prior to any equipment installation.
 - 1. Catalog cuts, bulletins, brochures, or data sheets for all materials specified herein.
 - 2. Certification that the equipment and materials proposed meet the Specifications and the intent of the Specifications.
 - 3. Written certification of experience required.
 - 4. Schedule including the expected start date and planned completion date.
 - 5. Copy of well drilling permits.
- B. The following shall be submitted to the ENGINEER after completion of the WORK.
 - 1. Wire connection testing.
 - 2. Insulating joint testing, before and after backfill.
 - 3. Casing insulator testing, before and after backfill.
 - 4. Joint bond testing, before and after backfill.
 - 5. Well completion report.
 - 6. Electrical log with anode-to-earth resistances.
 - 7. System check-out report.
 - 8. Record Drawings shall be submitted to and approved by the ENGINEER before the WORK is considered complete.
- C. The following shall be included in the Owner’s Manual:
 - 1. Operations and maintenance instructions.

2. List of spare parts recommended for 2 years of successful operation.

1.09 INTERFERENCE AND EXACT LOCATIONS

- A. The locations of cathodic protection equipment, test stations, devices, outlets and appurtenances as indicated are approximate only. Exact locations shall be determined by the CONTRACTOR in the field subject to the approval of the ENGINEER.
- B. The CONTRACTOR shall field verify all data and final locations of work done under other Sections of the Specifications required for placing of the electrical work.
- C. In case of interference with other work or erroneous locations with respect to equipment or structures, the CONTRACTOR shall furnish all labor and materials necessary to complete the WORK in an acceptable manner.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials installed must be new. All equipment and materials supplied shall be similar to that which has been in satisfactory service for at least 5 years.

2.02 RECTIFIERS

- A. Rectifiers shall be air cooled single phase AC input and DC output as shown on Drawings, rectifiers as manufactured by Universal Rectifiers, Inc., Corrpower Rectifiers, Inc., or approved equivalent.
- B. Rectifiers shall be designed to operate continuously at an ambient temperature of 50°C without damage to the rectifier components.
- C. Transformer:
 1. Two-winding, insulating type, meeting requirements of NEMA and UL.
 2. Rectifiers shall be capable of operating continuously at the rated output current at any voltage from zero to 100% without damaging any rectifier components. Full rated DC output voltage shall be adjustable by not less than 25 equal steps from approximately 4% of rated voltage to full rated output voltage. This adjustment shall be accomplished with silver plated or stainless steel connectors and adjustment link bars.
- D. Rectifying element shall be a full-wave bridge, silicon diode stack with efficiency filter, metal oxide thyristors, and current-limiting devices for overvoltage and overcurrent protection of stack. Silicon stacks shall be equipped with silicon diodes rated at a minimum of 800 peak inverse Volts.

- E. All rectifiers shall have overload and lightning protection for both AC and DC circuits.
- F. Both a digital voltmeter and a digital ammeter shall be provided. Voltmeter and ammeter shall be calibrated and adjusted at the factory.
- G. Rectifier cabinets shall be a NEMA 250, Type 3R enclosure.
- H. Rectifier cabinets shall be made of 10-gauge steel shall be shop coated with a baked enamel finish.
- I. Electrical tests shall be performed by the manufacturer and recorded as listed below:
 - 1. AC Volts Input
 - 2. DC Amperes Input
 - 3. Apparent Watts Input
 - 4. True Watts Input
 - 5. Power Factor
 - 6. DC Volts Output
 - 7. DC Amperes Output
 - 8. DC Watts Output
 - 9. Conversion Efficiency
 - 10. Dielectric Strength
 - 11. Transformer Primary to Ground
 - 12. Transformer Secondary to Ground
 - 13. Transformer Primary to Secondary
 - 14. Stack AC to Ground
 - 15. Stack DC to Ground
 - 16. Ripple Voltage at Full Output
- J. The following shall be provided for each rectifier. Each item shall be provided in a waterproof bag or container.

1. One complete set of spare fuses, attached to inside of cabinet
2. Spare parts
3. Operations and Maintenance Manual
4. Circuit Diagram
5. Electrical Test Report

2.03 ELECTRICAL ENCLOSURE

- A. Electrical enclosure shall be a NEMA 250, Type 3R enclosure and shall be sized as shown on the Drawings.
- B. Electrical enclosure shall be made of 10-gauge steel and shall be coated with a baked enamel finish.
- C. Enclosure shall have a single door with a full length hinge and a lockable latch.

2.04 HIGH SILICON CAST IRON ANODES

- A. Cast iron anodes shall be Corrosion Resistant High Silicon Iron Castings in accordance with ASTM A518, Grade 3.
- B. High silicon cast iron anodes shall be tubular type anodes with a minimum wall thickness of 13/32 of an inch, length of 84 inches, and shall be furnished with the wire attached to the interior of the anode and sealed using manufacturer's standard connection.
- C. Anode shall have a 2.65-inch outside diameter, minimum weight of 63 pounds and minimum surface area of 4.9 square feet.
- D. The wire attached to the anodes shall be stranded copper wire and insulated for 600 Volts. Wire size shall be minimum AWG No. 8. Wire insulation shall be a dual extrusion type. The outer insulation jacket shall be HMWPE and the inner insulation shall be fluorinated polymer. The wire shall be Halar cathodic protection wire or equivalent and shall conform to the requirements of ASTM D1248 Type 1, Class C, Grade 5. Anode wire connection shall have a pulling strength exceeding the wire's tensile strength. Any damage to the wire insulation or anode shall require complete replacement of the wire and anode.
- E. The resistance of each anode wire connection shall not exceed 0.004 Ohms. Each anode wire connection should be tested for conformance with these Specifications. A record of tests shall be submitted to the ENGINEER. The records shall include a minimum of three copies of the following information:
 1. Anode numbering system to identify anode under test

2. Anode wire length
 3. Resistance value as indicated by test
 4. Test equipment
 5. Test method
- F. Anodes shall be individually labeled with the length of lead wire and anode number. Anodes shall be consecutively numbered with the deepest anode being Number 1.
- G. Anode wires shall be of one continuous length without splices from the anode connection to the junction box. Anode wires with the attached anodes shall be shipped to the job site with the wire wound on a reel. The minimum core diameter of the reel shall be 5-1/2 inches. The anode wire insulation shall be free of surface damage such as nicks, abrasions, scratches, etc., in all respects throughout the entire length of the wire. Precaution shall be taken during fabrication, transportation and installation of the anodes to see that the wire is not kinked or sharply bent. Bends sharper than 2-1/2 inches in radius are not permissible.

2.05 MIXED METAL OXIDE ANODES

- A. Anodes shall be 1.0 inch in outside diameter by 48 inches in length, mixed metal oxide coated tubes. The anode shall have a minimum life of 50 years at maximum current output of 3 Amperes.
- B. Steel canisters for the anodes shall measure 4 inches in diameter by 60 inches in length and shall be constructed of thin wall galvanized steel conduit. The ends of the canister shall be sealed with wooden end caps which are held in place with screws. The anode shall be centered in the canister and the canister filled with calcined petroleum coke breeze. The canister shall be vibrated during filling to ensure the coke breeze is compacted around the anode and the canister is completely filled.
- C. Anode wire connection shall have a pulling strength exceeding the wire's tensile strength. Any damage to the wire insulation or anode shall require complete replacement of the wire and anode.
- D. The wire attached to the anodes shall be stranded copper wire and insulated for 600 Volts. Wire size shall be minimum AWG No. 8. Wire insulation shall be a dual extrusion type. The inner insulation jacket shall be chlorine resistant 20-mil thick chlorofluorethylene (E-CTFE) primary insulation with an outer jacket of 80-mil thick HMWPE. The wire's insulation shall be rated at 600 Volts.
- E. Anodes shall be furnished with a cable attached to the center of the anode using a mechanical wedge connection. The connection shall be sealed by filling the tube

with epoxy and the ends of the anode shall then be covered with heat shrink tubing for a water tight seal. The pulling strength of the connection shall exceed the tensile strength of the wire.

- F. Anode wires shall be of one continuous length without splices from the anode connection to the junction box. Anode wires with the attached anodes shall be shipped to the job site with the wire wound on a reel. The minimum core diameter of the reel shall be 5-1/2 inches. The anode wire insulation shall be free of surface damage such as nicks, abrasions, scratches, etc., in all respects throughout the entire length of the wire. Precaution shall be taken during fabrication, transportation and installation of the anodes to see that the wire is not kinked or sharply bent. Bends sharper than 2-1/2 inches in radius are not permissible.

206 **CALCINED COKE BREEZE**

- A. Backfill material for impressed current anodes shall be calcined coke breeze with a resistivity of 25 Ohm-cm or less when tested with an applied pressure of 2 psi.
- B. The calcined coke breeze backfill shall have the following chemical properties:
 - 1. Fixed carbon 98.0% minimum
 - 2. Ash 0.5% maximum
 - 3. Sulfur 2.0% maximum
 - 4. Volatile matter 1.0% maximum
 - 5. Moisture 1.0% maximum

2.07 **CALCINED FLUIDIZED PETROLEUM COKE BREEZE**

- A. Backfill material for impressed current anodes shall be calcined coke breeze with a resistivity of 25 Ohm-cm or less when tested with an applied pressure of 2 psi and a bulk density of 64 to 72 pounds per cubic foot. The backfill material shall have a particle size of 200 to 20 mesh.
- B. The calcined coke breeze backfill shall have the following chemical properties:
 - 1. Fixed carbon 98% minimum
 - 2. Ash 0.5% maximum
 - 3. Sulfur 5.8% maximum
 - 4. Volatile matter 1.0% maximum
 - 5. Moisture 1.0% maximum

- C. Coke breeze backfill shall be Loresco SC-2, Asbury 251 or approved equivalent.
- 2.08 ANODE VENT PIPING
- A. Plastic conduit for the impressed current anode vent piping shall be 2-inch diameter PVC, Schedule 80, conforming to ASTM D1785, Type 1 Grade 1, NEMA TC2 for conduit and TC3 for fittings.
- 2.09 ANODE CENTRALIZERS
- A. Centering devices shall be designed and fabricated by the CONTRACTOR or Supplier and shall be submitted to the ENGINEER for acceptance prior to use. The device shall be constructed of metal.
- 2.10 ANODE JUNCTION PANEL BOARDS
- A. Panel boards shall be made of 1/4-inch thick phenolic plastic sized as indicated on the Drawings.
 - B. Connection hardware shall be brass or bronze. All connections shall be double nutted bolts with lock washers.
 - C. Copper bus bar shall be 1/8-inch thick and sized to fit. The copper bus bar shall be per ASTM B187, 98% conductivity.
- 2.11 SOLDERLESS LUG CONNECTORS
- A. Solderless lug connector shall be made of brass or copper with a brass screw. The lug shall be designed for direct burial and shall be appropriately sized for the connection wire. The lug shall be ILSCO Type XT-6DB or approved equivalent.
- 2.12 SHUNTS FOR GALVANIC ANODES
- A. Shunts shall be 0.01-Ohm, 5-Ampere, manganin wire type, as indicated. Shunts shall be Type RS as manufactured by Holloway or equivalent.
- 2.13 SHUNTS FOR IMPRESSED Current ANODES
- A. Shunts for impressed anodes for the impressed current anode systems shall be 0.001-Ohm and 25-Ampere capacity. Shunts shall be Type SS as manufactured by Holloway or equivalent.
- 2.14 POST MOUNTED TEST STATION
- A. Post mounted test boxes shall be Testox, as manufactured by Gerome or equivalent.
- 2.15 CONCRETE TRAFFIC VALVE BOXES

- A. Traffic valve boxes shall be rated to withstand AASHTO H20 traffic loading. The traffic valve boxes shall be G5 Utility Boxes as manufactured by Christy Concrete Products, Inc., No. 3RT Utility Box as manufactured by Brooks Products or approved equivalent. Traffic box covers for test stations shall be cast iron with welded bead legend and labeled "CP TEST" or "ANODE" as required.

2.16 JUNCTION BOXES

- A. Junction boxes shall be NEMA 250, Type 4, fiberglass construction. Junction boxes shall be sized as indicated on the Drawings. Hinges shall be stainless steel and a neoprene gasket shall be furnished with the box to ensure a watertight seal. Junction boxes shall have a latch with a 1/4-inch diameter hole for installation of a pad-lock.

2.17 STEEL POLE

- A. Steel pole shall be 4-inch diameter ANSI B36.10 Schedule 40 steel pipe.
- B. Steel pole shall be painted yellow.
- C. Junction boxes shall be labeled with a black plastic tag bolted to the front panel of the box. This tag shall be engraved in a contrasting color with the identification of the junction box. Minimum height of lettering shall be 3/4-inch.

2.18 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall be in accordance with ASTM C94.

2.19 CONDUIT AND FITTINGS

- A. The minimum conduit size shall be 1 inch unless otherwise indicated. Refer to NFPA 70 (NEC) for additional conduit size requirements.
- B. Conduit and fittings placed below grade shall be PVC, Schedule 80.
- C. Conduit and fittings placed above grade shall be rigid steel. Rigid Steel conduit shall be galvanized conforming to UL 6.
- D. Conduit Straps shall be a 2-hole galvanized steel conduit strap.
- E. Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal, with gasketed covers, Crouse Hinds Condulets, Appleton Unilets, or equivalent. Rigid metallic conduit fittings shall be galvanized conforming to NEMA FB 1, UL 514B listed.
- F. Union couplings for conduits shall be the Erickson or Appleton type EC or 0-Z Gedney 3-piece Series 4, or equivalent.

2.20 UTILITY WARNING AND IDENTIFICATION TAPE

- A. The warning and identification tape shall be an inert plastic film designed for prolonged underground use. The tape shall be a minimum of 3 inches wide and a minimum of 4 mils thick. The tape shall be continuously printed over the entire length with the wording "CAUTION: CATHODIC PROTECTION CABLE BURIED BELOW". The wording shall be printed using bold black letters. The color of the tape shall be red.

2.21 WIRES

- A. Conductors shall consist of stranded copper of the gauge indicated. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall be in conformance with ASTM Designations B3 and B8.
- B. All wires terminating in a junction box or test station shall have a wire identifier attached within 4 inches from the end of wire at the terminal board, prior to backfill, as specified under "Wire Identification".
- C. Crosslinked polyethylene (XLPE) and high molecular weight polyethylene (HMWPE) insulating jackets shall conform to ASTM D-1248.
- D. Joint Bonds:
 - 1. General: Single-conductor, stranded copper wire with 600-Volt HMWPE insulation. Supply joint bonds complete with formed copper sleeve on each end of wire. Bond cable gauge shall be based on the diameter and thickness of the pipe cylinder. Two bond cables shall be used for each non-welded, non-insulating pipe joint.
 - 2. Push-On, Mechanical, or Flanged Joints: 18 inches long, minimum.
 - 3. Flexible Coupling Joints: 24 inches long, with two 12-inch long THHN insulated No. 10 AWG wire pigtails, as manufactured by Erico Products Inc. (Cadweld), Cleveland, OH.
 - 4. Concrete Cylinder Pipe: A minimum of two pipe bonding jumpers for each joint. Bond jumpers shall use 12-inch long stranded copper cable with the steel rods welded to the ends of the wire.
- E. Test Station: Single-conductor, No. 10 AWG stranded copper with 600-Volt THWN, or THHN insulation.
- F. Insulation Colors: As shown on Drawings.

2.22 WIRE IDENTIFIERS

- A. Wire identifiers shall be the wrap-around type with a high resistance to oils,

solvents and mild acids. Wrap-around markers shall fully encircle the wire with imprinted alpha-numeric characters for pipe identification. The letters and numbers shall be printed, minimum 3/16 inch in size.

2.23 EXOTHERMIC WELDS

- A. Exothermic welds shall be in accordance with the manufacturer's recommendations. Exothermic welds shall be Cadweld, as manufactured by Erico Products, Inc. or Thermoweld as manufactured by Continental Industries, Inc., or approved equivalent. Duxseal packing as manufactured by Johns-Manville or approved equivalent shall be used where necessary to prevent leakage of molten weld metal.
- B. The shape and charge of the exothermic weld shall be chosen based on the following parameters:
 - 1. Pipe material
 - 2. Pipe size
 - 3. Wire material/size and requirement for sleeves
 - 4. Number of strands to be welded
 - 5. Orientation of weld (vertical or horizontal)

2.24 CABLE-TO-PIPE COATING MATERIAL

- A. Coating material for exothermic weld connections to the pipelines shall be two part ProPoxy 20 epoxy putty manufactured by the Hercules Chemical Company, or approved equivalent. The epoxy putty shall be non-conductive and have compression strength of 18,000 psi when cured.

2.25 GALVANIC ANODES

- A. High Potential Magnesium anodes shall be cast magnesium anodes in accordance with ASTM B843 Type M1C.
 - 1. Ingot weight: 17 pounds, Packaged Length: 29 to 30 inches
 - 2. Ingot weight: 20 pounds, Packaged Length: 62.5 to 66 inches
 - 3. Ingot weight: 32 pounds, Packaged Length: 28 to 30 inches
 - 4. Ingot weight: 40 pounds, Packaged Length: 64 to 66 inches
 - 5. Ingot weight: 48 pounds, Packaged Length: 34 to 38 inches

6. Ingot weight: 60 pounds, Packaged Length: 64 inches
- B. H-1 Alloy Magnesium anodes shall be H-1 Alloy, Grade B cast magnesium anodes, in accordance with ASTM B80.
 1. Ingot weight: 17 pounds, Packaged Length: 17 inches
 2. Ingot weight: 17 pounds, Packaged Length: 29 inches
 3. Ingot weight: 20 pounds, Packaged Length: 62 inches
 4. Ingot weight: 32 pounds, Packaged Length: 28 to 30 inches
 5. Ingot weight: 48 pounds, Packaged Length: 38 inches
 6. Ingot weight: 50 pounds, Packaged Length: 110 inches
 7. Ingot weight: 60 pounds, Packaged Length: 64 inches
- C. Zinc anodes shall be "High Purity" cast zinc anodes in accordance with ASTM B-418, Type II.
 1. Ingot weight: 30 pounds, Packaged Length: 36 inches
 2. Ingot weight: 30 pounds, Packaged Length: 66 inches
 3. Ingot weight: 45 pounds, Packaged Length: 51 inches
 4. Ingot weight: 60 pounds, Packaged Length: 60 inches
- D. Ribbon anodes shall be 5/8-inch by 5/8-inch zinc ribbon anodes, 1.2 pounds per foot, with a 0.135-inch diameter steel wire core as manufactured by Plattline. Zinc Anode shall meet ASTM B418-88 Type II.
- E. Galvanic anodes shall be prepackaged in a cloth bag containing backfill of the following composition; 75% gypsum, 20% bentonite and 5% sodium sulfate. The anodes shall be of the size indicated and placed where indicated.
- F. The wire attached to the anodes shall be (AWG) stranded, single conductor, copper and insulated for 600 Volts. Wire size shall be minimum No. 12 AWG THHN and shall conform to the requirements of ASTM D2220. Connection of wire to the anode shall have a pulling strength that exceeds the wire's tensile strength.
- G. Anode wires shall be of one continuous length without splices from the anode connection to the test station.

2.26 DIELECTRIC INSULATING FLANGE KITS

- A. Insulating flange gaskets shall include full faced gaskets, insulating sleeves and washers and steel bolts, nuts and washers. The complete assembly shall have a pressure rating equal to or greater than the flanges between which it is installed. Insulating Gasket shall be neoprene faced phenolic, 1/8-inch thick. Insulating sleeves shall be Mylar, 1/32-inch thick. Insulating washers shall be 2 sets of 1/8-inch thick phenolic. Sleeves, gaskets and insulating washers shall have a dielectric constant of 300 Volts per mil, minimum. Steel washers shall fit well within the bolt facing on the flange. Insulating washers shall fit within the bolt facing the flange over the outside diameter of the sleeve.

2.27 MONOLITHIC INSULATING JOINTS

- A. Monolithic insulating joints shall be designed to provide for the permanent electrical isolation of piping sections. They shall be completely factory assembled and designed to be welded into the piping section.
- B. Monolithic Insulating Joints shall be Isojoint as manufactured by Advance Products & Systems Inc., or approved equivalent.

2.28 PETROLATUM TAPE

- A. Petrolatum tape system shall be Trenton Primer and #1 Wax-tape, as manufactured by Trenton Corp., or Denso Paste and Densyl Tape by Denso North America, Inc., or approved equivalent.

2.29 WATERPROOF SPLICE KIT

- A. Splice kit shall be a resin splice kit that completely encapsulates the wire and splice connection and shall be designed for cathodic protection splices. Splice kit shall be Scotchcast 85-14 CP Resin Splicing Kit as manufactured by 3M or approved equivalent.

2.30 RUBBER SPLICING TAPE

- A. Rubber splicing tape shall meet the requirements of ASTM D4388 with a minimum thickness of 30 mils. Tape shall be Scotch Brand linerless rubber splicing tape, Model 130C or approved equal.

2.31 ELECTRICAL TAPE

- A. Vinyl electrical tape shall meet the requirements of ASTM D 30055 with a minimum thickness of 8.5 mils. Electrical tape shall be Scotch Brand Premium Vinyl Electrical Tape, Model Super 88 or approved equal.

2.32 ANODE HEADER CABLE TO ANODE LEAD WIRE SPLICE

- A. The connection between the anode header cable and the anode lead wire shall be a copper split bolt or copper crimp.

- B. The connection shall be covered with a minimum of 2 layers of half lapped rubber splicing tape and 2 layers of half lapped PVC electrical tape on top of the rubber tape.

2.33 CLEVIS ASSEMBLIES

- A. Clevises shall be 1/8-inch flat, galvanized steel with a spool opening of 2-1/8 inches and shall be 4-1/2 inches long to the centerline of the spindle. Spools shall be porcelain, with an outside diameter of 2-1/4 inches and an overall height of 2-1/8 inches. Mounting bolt, nut and washer for clevis shall be [galvanized steel][316 stainless steel].

2.34 PIN INSULATORS

- A. Pin insulator assemblies shall be 4 inches long overall and have a 1/4-inch diameter [galvanized steel][316 stainless steel] bolt 3/4 of an inch long attached to the flat end with a [galvanized steel][316 stainless steel] nut and lock washer. The insulator shall be composed of a porcelain nonconducting material with a hard glazed finish. The insulator shall have a hole through the bottom no smaller than 1/2 inch in diameter.

2.35 HANDHOLE ASSEMBLIES

- A. Hand hole covers shall be [galvanized steel][steel painted to match the tank exterior], 6 inches in diameter and 1/8-inch thick and shall be connected to rubber gaskets, 6 inches in diameter and 1/8-inch thick. The handholes shall be cut 5 inches in diameter. The handhole assemblies shall have 1/2-inch stainless steel bolts and 1/2-inch thick PVC clamping bars.

2.36 PERMANENT REFERENCE ELECTRODE

- A. Reference electrodes shall be copper-copper sulfate, and designed for continuous use in water for a minimum of 10 years as manufactured by Borin Manufacturing or equivalent. The reference electrode shall have a wire which will extend to the junction box without splicing as indicated on the Drawings.

2.37 FASTENERS

- A. All screws, bolts and miscellaneous fasteners used to attach cathodic protection system components to the tank shell shall be [316 stainless steel][galvanized steel].

2.38 TANK GALVANIC ANODES

- A. Suspended tank anodes shall be rod type, high potential magnesium anodes suitable for use in potable water (NSF 61 approved) having a diameter of 2.024 inches and a length as specified on the Drawings. The anode shall have a minimum weight of 37.5 pounds. The anode shall meet the following chemical

composition.

Aluminum	0.010 maximum
Manganese	0.50% to 1.30%
Zinc	0.000%
Silicon	0.000%
Copper	0.020% maximum
Nickel	0.001% maximum
Iron	0.030% maximum
Magnesium	Remainder
Lead	0.000%
Other	0.30% maximum

- B. Anodes shall be cast with an iron wire core. One end of the anode shall be recessed to provide access to the rod for connection of the lead wire. The lead wire shall be silver brazed to the rod, making a mechanically secure connection. The connection shall be insulated to a 600-Volt rating by filling the recess with asphalt. The asphalt material shall be extended over the lead wire insulation by not less than 1/2 inch. The CONTRACTOR shall replace anodes if the lead wire insulation is damaged.

2.39 WIREWOUND POWER RHEOSTAT

- A. Wirewound power rheostat shall be Vishay [MP6] [12.5]-Watt, [2]-Ohm, or equivalent.

2.40 IR FREE COUPON

- A. IR free coupon shall consist of a copper-copper sulfate reference electrode and a steel coupon. The steel coupon shall be located within 1/4 of an inch of the reference electrode to minimize voltage drop (IR drop) errors in coupon-to-soil potential measurements.
- B. The copper-copper sulfate reference electrode shall be designed for continuous use in soil for a minimum of 20 years while maintaining a stability of 10 milliVolts over that 20-year period.
- C. The coupon shall be a 1 cm² steel coupon.

- D. The coupon shall have three color coded wires, one yellow reference electrode wire, and two coupon wires (brown and black). All wires shall be long enough to extend to the junction box without splicing.
- E. Coupons shall be as manufactured by Borin Manufacturing or equivalent.

PART 3 EXECUTION

3.01 STORAGE OF MATERIALS

- A. All materials and equipment to be used in construction shall be stored in such a manner to be protected from detrimental effects from the elements. If warehouse storage cannot be provided, materials and equipment shall be stacked well above ground level and protected from the elements with plastic sheeting or other method as appropriate.

3.02 EXCAVATION AND BACKFILL

- A. Buried wires shall have a minimum cover of 24 inches.
- B. Caution tape shall be installed above buried wire. Caution tape shall be installed a minimum of 6 inches above underground wires and conduits.
- C. Anode wire identification tags shall be placed on the wires prior to placing wire in conduit or backfilling.

3.03 RECTIFIER

- A. Approximate locations of rectifiers and electrical power are shown on the Drawings. Rectifier installation includes provision of AC power to the rectifier by the CONTRACTOR. CONTRACTOR shall furnish and install all required wiring, conduits, cables, meters, splice boxes, and equipment as necessary for operation of the rectifier and as required by the local power agency.
- B. The CONTRACTOR may propose an alternative rectifier location to the CITY for review and approval. The reinforced concrete pad shall be constructed such that water will not collect against the rectifier cabinet. The concrete pad at the Cone Valve location shall extend 2 inches above grade. The asphalt adjacent to the concrete pad at the pump station shall slope away from the concrete pad for a distance of 1 foot. The vent pipe riser and conduits into the enclosure shall be cast into the concrete pad. After the concrete is set, the enclosure shall be securely anchored to the pad with expanding anchor bolts. Use leveling nuts below the cabinet flange to create space for the grout seal. Apply the non-shrink grout as shown on the enclosure detail.

3.04 IMPRESSED CURRENT ANODE INSTALLATION

- A. Impressed current anode beds shall be installed in accordance with

NACE RP0572, Montgomery County Well Standards and these Specifications.

B. Well Drilling

1. The CONTRACTOR shall obtain and pay for all fees and permits required for well drilling.
2. The CONTRACTOR shall protect the well bore from the intrusion of contaminants into the hole at all times. The CONTRACTOR is responsible for the cost of all cleanup associated with contamination of the well and/or job site resulting from the CONTRACTOR's WORK.
3. Fresh water shall be circulated from the bottom of the hole to clear the well of drilling mud and cuttings after the well is drilled.
4. Loading of anodes and other equipment in the well shall be done in the presence of the ENGINEER. A minimum of 48 hours notice shall be given by the CONTRACTOR to the ENGINEER prior to loading anodes. Loading of the anodes into the well shall begin early enough in the day to ensure completion of all loading, including backfilling, during regular working hours.
5. The well shall be covered with a steel trench plate or other heavy device that blocks access and that cannot be removed by hand whenever the well is left unattended.

C. Well Casing

1. The CONTRACTOR may elect to install the well with or without a casing. In the event that the well collapses, for any reason, including the elimination of the casing, the well shall be relocated, redrilled and the original hole abandoned at the CONTRACTOR's expense. Only a metallic casing may be used in the coke breeze column.

D. Vent Pipe

1. The bottom of the vent pipe shall be securely capped.
2. The top of the vent pipe shall be temporarily sealed during the coke breeze loading process. Any foreign material entering the vent pipe shall be removed.

E. Anodes

1. The ENGINEER shall visually inspect the insulation on the anode lead wire for abrasion or other damage to the insulation and wire as the anode is lowered into place. Anodes with damaged insulation or wire are not acceptable and shall not be installed. Splices are not allowed on the anode

wire.

2. Attach the centering devices to the anodes using the adjustable stainless steel bands. The terminal end of the anode cables shall be identified with permanent cable markers. Anode No. 1 shall be attached to the bottom section of the anode vent pipe with adjustable stainless steel bands and lowered into the hole. A digital soil resistance meter, furnished and operated by the ENGINEER, shall be connected between the anode cable for Anode No. 1 and the drain cable. The drain cable must be installed and be accessible to the ENGINEER during time of testing. The CONTRACTOR shall stop lowering the anode at 10-foot intervals to tape the anode lead to the vent pipe and to allow the ENGINEER to measure the resistance profile of the anode well. This shall continue to the bottom of the hole and the vent pipe shall be secured in place.
3. Continuing with Anode No. 2, with centralizers attached, the anodes shall be lowered into the hole supported by the attached lead wires. The CONTRACTOR shall fabricate an apparatus that allows the anodes to be lowered by the lead wire but does not bend the wire into a radius less than 2.5 inches. All sharp edges on the centering device assembly shall be taped with vinyl electrical tape to preclude damaging any wires while lowering anodes into place. The vent pipe shall not be attached to Anodes No. 2 to No. 10. The ENGINEER may adjust the depths of the individual anodes to avoid high resistance soil layers. When an anode has been placed at the final depth it shall be securely fixed in that position prior to coke breeze backfill. Anodes shall not be backfilled until the ENGINEER has inspected the placement of the anodes and given permission to backfill.

F. Coke Breeze Backfill.

1. Coke backfill shall be placed using a slurry pump which pumps the coke into the bottom of the hole, allowing the hole to be filled from the bottom up. Coke shall not be pumped through the vent pipe.
2. Coke breeze shall be mixed with water when introduced into the hole to prevent bridging or the creation of voids. At the time of introduction of the backfill, the hole shall contain sufficient water to minimize bridging and the rate of introduction of the backfill shall be controlled to minimize the possibility of bridging. In the event that voids or bridging does occur, the CONTRACTOR shall correct the deficiency to the satisfaction of the ENGINEER.
3. Coke breeze shall be placed in the hole at a steady rate to ensure that the coke breeze does not bridge or block the hole. The hole shall be kept completely full of water during placement of backfill.
4. Settling of the backfill and coverage of the anodes will be determined by

measuring the anode-to-earth resistance from the digital resistance meter. During coke breeze backfill, the ENGINEER will measure the resistance between the lowermost uncovered anode and the protected structure. Coverage of the anode will be indicated by a rapid decrease in resistance, normally by at least 50%. As soon as coverage of a lower anode is indicated, the circuit shall be attached to the next highest anode in the hole.

Testing will continue until coverage of all anodes has been verified. The ENGINEER shall record the resistance of each backfilled anode. Coke breeze shall be added to a minimum of 20 feet above the top anode. The CONTRACTOR shall sound the anode hole with a weighted tape measure and determine the final height of the coke breeze column.

5. Coke shall be allowed 24 hours to settle. After 24 hours, the coke column shall be topped off as required to achieve the specified coke column length.
6. Incomplete coverage of each anode with coke breeze shall be cause for rejection of the anode well.
7. The CONTRACTOR shall record the total weight of coke breeze placed in each anode well.

G. Well Seal

1. Backfilling operations above the coke breeze column shall begin no sooner than 24 hours after installation of the coke breeze to allow for settling. Backfilling shall be done continuously, without interruption, until the hole is sealed.
2. Collapse of the hole prior to the introduction of the seal material shall be cause for abandonment of the well at the CONTRACTOR's expense.
3. Sealing materials shall not be allowed to drop from the top of the hole. All materials shall be pumped into the hole from the top of the coke breeze column to the top of the hole.
4. If well casing materials are used in the construction of the well, then the annular space between the well bore and the casing shall also be sealed with a conductive grout.
5. Sealing material shall not enter the vent pipe.
6. The CONTRACTOR shall record the volume of sealing material installed in the hole.

H. Storage and disposal of drilling fluids, cuttings and mud:

1. During the drilling and loading process, drilling fluids, cuttings, and mud shall be stored onsite in uncontaminated, watertight, lockable debris boxes.

Alternative storage methods may be utilized only with prior approval of the ENGINEER.

2. Drilling mud and cuttings shall be disposed of by the CONTRACTOR at a suitable disposal site.

3.05 SURFACE GROUND BED INSTALLATION

- A. Anode Field Location: Install individual anodes in a vertical position at the approximate anode depth, hole location, and spacing shown on Drawings. Individual anode locations can be moved up to a maximum of 10 feet to allow adjustment for field conditions or to maintain separation from existing structures. Establish and stake the anode locations in the field with wood lath for review and approval by the ENGINEER.
- B. Drilling: Drill holes and seal in accordance with rules and regulations of the state, city, county, or other governing bodies having jurisdiction. Anode hole shall be nominal depth and diameter shown on Drawings. Avoid entrance of foreign matter into hole, movement of soil strata, or collapsing of hole during progress drilling and anode loading. Should movement of soil strata or collapse of drilled hole interfere with the proper completion of groundbed installation, recover wire and anode, and ream or redrill hole. Carefully pour coke breeze into drilled hole so as to avoid bridging or caving of the hole. Thoroughly compact the coke breeze around the anodes. Maintain anode in center of coke breeze column.
- C. Earthfill: Carefully place and compact soil above coke breeze in 6-inch lifts to a point 2 feet above coke breeze. Complete backfilling and compacting to grade. Stop backfill at grade to allow placing of topsoil, pavement, road base, or concrete where required.
- D. Anode Cables: Install cables in PVC conduit set at the center of trench. Maintain sufficient slack in wire to prevent cable from being unduly stressed or broken during backfill operations.

3.06 TEST STATIONS AND JUNCTION BOXES

- A. Test stations and Junction Boxes shall be installed at the approximate locations shown on the Drawings. Flush mounted test stations shall be located behind the curb and other areas not subject to vehicular traffic. Post mounted test stations shall be located in dirt areas outside of paved areas and within the pipeline easement. The CONTRACTOR shall field verify final location of the test stations. Wire identifiers shall be placed on all wire prior to backfill and installation of test stations.
- B. The CONTRACTOR shall notify the owner of foreign utility piping for which foreign pipeline crossing test stations are to be installed. Notification shall be provided at least 2 weeks in advance. Test leads to foreign pipelines shall be

installed in the presence and to the satisfaction of a representative of the foreign pipeline owner.

- C. The CONTRACTOR shall provide global positioning system (GPS) coordinates of each test station location with a minimum accuracy of 1 meters or 3 feet. The contractor shall submit the GPS coordinates of the test stations to the ENGINEER after installation.

3.07 WIRES

- A. Buried wires shall be laid straight without kinks. Each wire run shall be continuous in length and free of joints or splices, unless otherwise indicated. Care shall be taken during installation to avoid punctures, cuts or other damage to the wire insulation. Damage to insulation shall require replacement of the entire length of wire at the CONTRACTOR's expense.
- B. At least 18 inches of slack (coiled) shall be left for each wire at each flush-to-grade test station. Wire slack shall be sufficient to allow removal of wire extension for testing. Wire shall not be bent into a radius of less than 2 inches.
- C. The wire conduits must be of sufficient diameter to accommodate the wires. This shall be determined by the number and size of wires in accordance with the applicable codes and standards.

3.08 WIRE IDENTIFIERS

- A. All wires shall be coded with wire identifiers.
- B. Wire identifiers shall be placed on the wires prior to backfill.

3.09 EXOTHERMIC WELD CONNECTIONS

- A. Exothermic weld connections shall be installed in the manner and at the locations indicated. Coating materials shall be removed from the surface over an area of sufficient size to make the connection. The surface shall be cleaned to bare metal by grinding or filing prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed. A copper sleeve shall be fitted over the conductor. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold.
- B. The CONTRACTOR shall be responsible for testing all test lead and bond wire welds. The ENGINEER, at his or her discretion, shall witness these tests.
- C. After the weld has cooled, all slag shall be removed and the metallurgical bond shall be tested for adherence by the CONTRACTOR. A 22-ounce hammer shall be used for adherence testing by striking a blow to the weld. Care shall be taken to avoid hitting the wires. All defective welds shall be removed and replaced.

- D. After backfilling pipe, all test lead pairs shall be tested for broken welds using a standard ohmmeter. The resistance shall not exceed 150% of the theoretical wire resistance as determined from published wire data.
- E. The CONTRACTOR shall inspect both the interior and exterior of the pipe to confirm that all coatings and linings removed or damaged as a result of the welding have been repaired. The CONTRACTOR shall furnish all materials, clean surfaces and repair protective coatings and linings damaged as a result of the welding. Repair of any coating or lining damaged during welding shall be performed in accordance with coating or lining manufacturer's recommendations.
- F. All exposed surfaces of the copper and steel shall be covered with insulating materials as indicated.
- G. For dielectrically coated pipes, a bitumastic coating shall be applied to all exothermic weld locations. The coating shall be covered with a plastic weld cap. All surfaces must be clean, dry and free of oil, dirt, loose particles, and all other foreign materials prior to application of the coating.
- H. For mortar coated pipes, a mortar shall be applied to all wire-to-pipe connections. The mortar shall match the exterior mortar. Coating repairs shall be performed in accordance with coating manufacturer's recommendations.

3.10 JOINT BONDS

- A. Bond wires shall be provided across flexible couplings and all nonwelded joints, as necessary to ensure electrical continuity, except where insulating joints have been installed to provide electrical isolation. Joint bonds shall be of the size and number shown on the Drawings and installed as indicated. The bond wires shall be at least 18 inches long and shall be installed so as to allow for movement of at least 2 inches in the pipe joint. The wire shall be attached by exothermic welding. At least 2 bonds shall be provided between all discontinuous joints.
- B. For ductile iron pipe, the CONTRACTOR may, at his or her own expense, provide weld plates, installed by the pipe manufacturer, at the spigot end of the pipe. Provision of the weld plates does not relieve the CONTRACTOR from responsibility for repair of damage to the coating or lining as a result of exothermic welding of the pipe. Coating repairs shall be performed in accordance with coating manufacturer's recommendations.

3.11 PETROLATUM TAPE SYSTEM APPLICATION

- A. Petrolatum tape system shall be applied on insulating joints and as indicated in the Drawings. Petrolatum tape system shall be applied in accordance with NACE RP0375, and these Specifications. The materials shall be applied according to the Manufacturer's recommendations.

- B. All loose scale shall be removed from the surface to be coated with hand tools (wire brush, scraper, rags). Debris and moisture shall be wiped from surface with clean rag. Petrolatum tape shall be applied immediately after applying the primer, using a 1-inch overlap. A spiral wrap shall be used and a slight tension shall be applied to ensure that there are no air pockets or voids. After applying the tape, the applicator shall firmly press and smooth out all lap seams and crevice areas. The tape shall be in tight intimate contact with all surfaces.

3.12 GALVANIC ANODE INSTALLATION

- A. Prepackaged anodes shall be installed at the locations indicated. Plastic or paper wrapping shall be removed from the anode prior to lowering the anode into the hole. Anodes shall not be suspended by the lead wires. Anodes shall be backfilled with native soil. Upon completion of compaction of backfill to the top of the anode, and prior to filling the hole and compacting the backfill to the surface, a minimum of 10 gallons of water shall be poured into the hole to saturate the prepackaged anode backfill and surrounding soil.
- B. Backfilling with native soil shall proceed in 6-inch lifts, compacting the soil around the anode during each lift until the backfill has reached grade. Damage to the canvas bag, anode-to-wire connection, copper wire or wire insulation will require replacement of the entire assembly. Anodes shall not be backfilled prior to inspection and approval.
- C. Anode lead wires shall be installed as shown in the Drawings, and attached to the panel board.

3.13 INTERNAL ANODES

- A. The cast iron anode strings shall be installed at the length indicated on the Drawings at each of the anode handhole locations. The anode string shall be suspended from the clevis assemblies bolted to the interior roof of the tank. The anode header wire shall be suspended from the pin insulators bolted to the interior roof of the tank, adjacent to each handhole. The anode lead wire shall be spliced to the anode header wire using the epoxy splice kit shown on the Drawings. The splice kit and the anode header wire shall be suspended above the waterline.

3.14 ANODE HEADER CABLE TO ANODE LEAD WIRE SPLICES

- A. Secure the copper split bolt or copper crimp onto the wires to provide electrical continuity between the wires. Apply two half lapped layers of rubber splicing tape to the split bolt or crimp forming a smooth, water-tight seal over the split bolt and exposed copper. The rubber splicing tape shall extend 2 inches over the wire's insulation. Cover the rubber tape with two layers of half lapped PVC electrical tape.

3.15 REFERENCE CELLS

- A. Two reference electrodes shall be installed for the tank interior as shown on the Drawings. Electrode No. 1 shall be suspended less than 6 inches above the floor and Electrode No. 2 shall be suspended 10 feet above the floor.

3.16 HANDHOLES

- A. The handholes shall be cut by the tank fabricator and shall be coordinated by the CONTRACTOR installing the cathodic protection WORK. Handholes shall be cut using a magnetic base and an electric hole saw. A torch shall not be used to cut or burn the holes in the roof.

3.17 HANDHOLE COVERS

- A. Handhole covers shall be installed over each handhole to prevent dirt, debris or rainwater from entering the tank. The clamping bar shall be installed to ensure the anode lead wire or anode header wire is not clamped between the tank roof and the clamping bar.

3.18 WIRE CONNECTIONS

- A. After installation, all wire connections shall be tested at the test station locations, by the CONTRACTOR, to ensure that they meet the requirements and intent of the Contract Documents.

3.19 INSULATING JOINTS/DIELECTRIC UNIONS

- A. Insulating joints shall be installed to effectively isolate metallic piping from foreign metallic structures. The CONTRACTOR shall test the performance of these insulating joints before and after backfill.
- B. Before backfill, the CONTRACTOR shall test the insulating joint using a Gas Electronics Model No. 601 Insulation Checker, or approved equivalent. If the testing results indicate less than 100% insulation, the insulating joints shall be repaired and retested at the CONTRACTOR's expense.
- C. After backfill, testing shall be performed by measurement of native pipe-to-soil potentials at both sides of the insulating joint. If the difference in native pipe-to-soil potentials on both sides of the insulating joint is within +/-50 milliVolts, then additional testing shall be performed as follows. Temporary cathodic protection current shall be circulated on one side of the insulating joint. "On" and "Instant Off" pipe-to-soil potentials shall be measured on the other side of the insulating joint. If the "Instant Off" potential is more negative than the native potential, the insulating joint shall be considered deficient and shall be repaired and retested at the CONTRACTOR's expense.

3.20 MONOLITHIC INSULATING JOINT

- A. Monolithic Insulating joints shall be installed to effectively isolate metallic piping

from foreign metallic structures.

- B. After backfill, testing shall be performed by measurement of native pipe-to-soil potentials at both sides of the insulating joint. If the difference in native pipe-to-soil potentials on both sides of the insulating joint is within +/-50 milliVolts, then additional testing shall be performed as follows. Temporary cathodic protection current shall be circulated on one side of the insulating joint. "On" and "Instant Off" pipe-to-soil potentials shall be measured on the other side of the insulating joint. If the "Instant Off" potential is more negative than the native potential, the insulating joint shall be considered deficient and shall be repaired and retested at the CONTRACTOR's expense.

3.21 CASING INSULATORS

- A. Casing insulators shall be installed as indicated in the Drawings to effectively isolate the pipeline from the casing. The CONTRACTOR shall test the performance of the casing insulators before and after backfill.
- B. After backfill, testing shall be performed by measurement of native pipe-to-soil potentials on the pipeline and the casing at both ends of the casing. If the difference in native pipe-to-soil potentials is greater than 50 milliVolts, the casing shall be considered isolated from the pipeline. If the difference in native pipe-to-soil potentials between pipe and casing is less than 50 milliVolts, then additional testing shall be performed as follows. Temporary cathodic protection current shall be applied to the pipeline. "On" and "Instant Off" pipe-to-soil potentials shall be measured on the pipeline and the casing at both ends of the casing. If the "Instant Off" potential of the casing is more negative than the native potential of the casing, the pipe is not isolated from the casing and shall be repaired and retested at the CONTRACTOR's expense.

3.22 CONTINUITY TESTING

- A. Continuity testing of joint bonds shall be performed by the CONTRACTOR's qualified corrosion technician as defined in this section after backfill. The electrical continuity test may additionally be performed before backfill at the CONTRACTOR's option.
- B. The pipe shall be tested for electrical continuity. Continuity shall be verified using the linear resistance method. The pipe shall be tested in spans that are no less than 250 feet unless the pipe is shorter than 250 feet and no more than 1,000 feet. Each test span shall have two test leads connected to the pipe at each end. Existing test stations can be used. A direct current shall be applied through the pipe using two of four test leads. The potential across the test span shall be measured using the other two test leads. The current applied and voltage drop shall be recorded for a minimum of three different current levels.
- C. The theoretical resistance of the pipe shall be calculated. It shall take into account

the pipe wall thickness, material, and joint bonds.

- D. Acceptance of the test span; the average measured resistance shall be compared to the theoretical resistance of the pipe and bond wires. If the measured resistance is greater than 125% of the theoretical resistance, then the joint bonds shall be considered deficient and shall be repaired and retested at the CONTRACTOR's expense. If the measured resistance is less than 100% of the theoretical resistance then the test and/or calculated theoretical resistance shall be considered deficient and the test span shall be retested and/or recalculated at the CONTRACTOR's expense. If the piping forms a loop which allows current to flow both in and out of the test span, then consideration shall be made for current circulating through both the loop and the test span.

3.23 SYSTEM CHECKOUT

- A. Upon completion of the installation, the CONTRACTOR shall provide testing of the completed system by a qualified corrosion technician and the data shall be reviewed by a Corrosion Engineer to ensure conformance with the Contract Documents, NACE SP0169, and NACE RP0286.
- B. The testing described herein shall be in addition to and not substitution for any required testing of individual items at the manufacturer's plant and during installation.
- C. Testing shall be performed at all test leads of all test stations and at the locations of exposed pipe as soon as possible after installation of the cathodic protection system.
- D. Testing shall include the following and shall be conducted in accordance with NACE TM0497:
 - 1. Measure and record native pipe-to-soil, casing-to-soil and anode-to-soil potentials at all test locations.
 - 2. Verify electrical isolation at all insulating joints, insulating unions, and casing insulators per NACE RP0286.
 - 3. Confirm electrical continuity of the pipeline or cathodically protected structure in accordance with this Section.
 - 4. Measure and record the "On" and "Instant Off" structure-to-soil or structure-to-water potentials at each location.
 - 5. Measure and record the current output of each anode.
- E. Test results shall be analyzed to determine compliance with NACE SP0169.
- F. Test results shall be analyzed to determine if stray current interference is present.

Stray current interference is defined as a +/-50 milliVolt shift in a pipeline's pipe-to-soil potential that is caused by a foreign current source. Stray current interference shall be tested on the project pipeline and foreign pipelines that have a reasonable chance of being affected by stray currents.

- G. The CONTRACTOR shall provide a written report, prepared by the Corrosion Engineer, documenting the results of the testing and recommending corrective work, as required to comply with the Contract Documents. Any deficiencies of systems tested shall be repaired and re-tested by the CONTRACTOR at no additional cost to the OWNER.

END OF SECTION

Section 13120

PRE-CAST CONCRETE BUILDING PREFABRICATED

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pre-cast, post-tensioned concrete transportable buildings.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 - General Requirements.

1.02 MEASUREMENT AND PAYMENT

A. Unit Price. Payment for pre-cast concrete buildings is on a unit price basis for each type of pre-cast building installed.

B. Stipulated Price (Lump Sum). If Contract is a Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):

a. ACI-318-05, "Building Code Requirements for Structural Concrete".

2. American Society of Civil Engineers (ASCE):

a. ASCE-7-05, "Minimum Design Loads for Buildings and Other Structures".

3. American Society for Testing and Materials (ASTM):

a. C150 - Standard Spec. for Type I and Type II - Low Alkali Portland Cement.

b. C33 - Standard Spec. for Concrete Aggregates.

c. A36 - Standard Spec. for Carbon Structural Steel.

- d. A615 - Standard Spec. for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - e. A 706 - Standard Spec. for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - f. A416 - Standard Spec. for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
 - g. A185 - Standard Spec. for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - h. A307 - Standard Spec. for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - i. A123 - Standard Spec. for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - j. A153 - Standard Spec. for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. Precast/Prestressed Concrete Institute:
- a. PCI Design Handbook. 5th Edition.
5. Underwriters Laboratories, Inc:
- a. UL752 – Standard for Safety for Bullet Resisting Equipment.
6. Concrete Reinforcing Institute:
- a. Manual of Standard Practice.
7. Applicable Codes:
- a. International Building Code (IBC):
 - 1) International Building Code and associated standards, 2009 Edition including all amendments, referred to herein as Building Code.
 - b. International Energy Conservation Code (IECC):
 - 1) International Energy Conservation Code and associated standards, 2009 Edition including all amendments, referred to herein as International Energy Conservation Code.

B. Qualifications:

1. Building fabricator must have a minimum of 5 years experience manufacturing pre-cast concrete buildings.

1.04 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01330 – Submittal Procedures for the requirements for the mechanics and administration of the submittal process.
2. Submit building engineering calculations that are designed and sealed by a professional engineer, licensed in the state of Texas.
3. Provide detailed drawn to scale interior and elevation layouts of building showing electrical and mechanical equipment. Building manufacturer shall coordinate with electrical and mechanical equipment suppliers for actual dimensions of equipment. Layout shall be submitted with initial building submittal.

1.05 QUALITY ASSURANCE

- A. Walls to be UL-752 Test Method Level 5 for bullet resistance, certified by an independent structural engineer.
- B. Building fabricator must have a minimum of 10 years of experience manufacturing pre-cast concrete buildings.

PART 2 P R O D U C T S

2.01. ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Lonestar Prestress Mfg., Inc., Houston, Texas:
 2. Approved equal.
- B. Submit request for substitution in accordance with Specification Section 01630 – Product Substitutions Procedures.

2.02 DESIGN REQUIREMENTS

A. Dimensions:

1. Exterior: .

2. Interior:
3. Standard Design Loads:
 - a. Standard Wind Loading - 140 MPH (ASCE 7-05, Category II, Exposure C, Enclosed Building)
 - b. Standard Roof Live Load - 60 PSF
 - c. Standard Floor Live Load - 250 PSF
 - d. Seismic Design category 'D', Seismic use Group I=1.0
4. Roof: Roof panel shall be sloped 1" from front to back. The roof shall extend a minimum of 3" beyond the wall panel on each side and have a turndown design which extends 1/2" below the top edge of the wall panels to prevent water migration into the building along top of wall panels. Roof shall also have an integral architectural ribbed edge.
5. Roof, floor and wall panels must each be produced as single component monolithic panels. No roof, floor, or vertical wall joints will be allowed, except at comers. Wall panels shall set on top of floor slab.
6. Walls to be of an insulated precast concrete sandwich panel type. The walls shall have an extruded polystyrene core sandwiched between interior and exterior concrete wythes. The wall panels shall have a minimum thickness of 6". Minimum wythe thickness shall be 2". The walls shall have a minimum equivalent wood framed wall R-value of R-26 per the 2009 International Energy Conservation Code.
7. Building to be provided by manufacturer will all necessary openings as specified in conformance with manufacturer's structural requirements.

2.03 MATERIALS

- A. Concrete: Steel-reinforced, 6000 PSI minimum 28-day compressive strength.
- B. Reinforcing Steel: ASTM A615, grade 60 or ASTM A185, grade 80 unless otherwise indicated.
- C. Post-tensioning Strand: 41K Polystrand CP50, .50, 270 KSI, 7-wire strand, greased plastic sheath, (ASTM A416), roof and floor to be each post-tensioned by a single, continuous tendon. Said tendon shall form a substantially rectangular configuration having gently curving comers and a comer where the tendon members are anchored. Tendons shall be greased and enclosed within a sheath.
 1. If post-tensioning is not used in the roof panel, the following guidelines must be followed to ensure a watertight roof design.

- a. The entire pre-cast concrete roof panel surface must be cleaned and primed with a material that prepares the concrete surface for proper adherence to the coating material.
 - b. The entire pre-cast concrete roof panel surface shall be sealed with a .045 EPDM continuous membrane cemented to the concrete with a compound designed for this purpose.
- D. Caulking: All joints between panels shall be caulked on the exterior and interior surface of the joints. Caulking shall be SIKAFLEX-IA elastic sealant or equal. Exterior caulk joint to be 3/8" x 3/8" square so that sides of joint are parallel for correct caulk adhesion. Back of joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.
- E. Panel Connections: All panels shall be securely fastened together with 3/8" thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A36 and hot dipped galvanized after fabrication. All fasteners to be 1/2" diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-63, or equal. All inserts for corner connections must be secured directly to form before casting panels. Floating of connection inserts will not be allowed.

2.04 ACCESSORIES

- A. Door and Frame: Shall comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100), and as herein specified. The building shall be equipped with two types of doors. The frames shall be 16-gauge galvanized steel, the doors shall be 18-gauge galvanized steel. The door and frame shall be painted with one coat of rust inhibitor primer and one finish coat of epoxy paint, medium gray, if no other color is specified. All active door leaves have exit devices.
- B. Door
1. Single 3'-0" x 7'-0" x 1-3/4", doors, quantity as indicated on drawings, with insulated core. The doors shall open as noted on drawings.
- C. Door Hardware:
1. Handle: Lindstrum pull-handle stainless steel, 8-1/2" x 2", or passage knob or equal.
 2. Lockset: Cal-Royal lever lock or Easi-Set or equal.
 3. Deadbolt: Yale or Easi-Set stainless steel keyed outside only or equal.
 4. Hinges: Hagar stainless steel five knuckle ball bearing with non-removable pins or approved equal.

5. Threshold: Hagar or National Guard Products extruded aluminum with neoprene seal or approved equal.
6. Door Closer: Norton 7500 or Yale 4410 with hold open or equal.
7. Surface Bolts (Upper and Lower): Magnokrom Inc. 400-401 cadmium plated finish or equal, as required for double doors.
8. Astragals: Galvanized steel, same finish and brand as door, as required for double doors.
9. Door Stop: Ives 445B26D brushed chrome (inactive leaf only) or equal, as required for double doors.

2.05 FINISHES

A. Interior of Building:

1. Smooth steel form finish on all interior concrete panel surfaces. Walls and ceiling to be painted with white, two-part, epoxy paint.
2. Floor surface to be painted with gray textures, two-part, epoxy paint.

B. Exterior of Building:

1. Washed San Jacinto river-stone aggregate finish on all exterior wall surfaces. Aggregate must be seeded into top of panel while in form, chemically retarded, and high-pressure water-washed to expose the aggregate to a depth of 1/8". As noted on drawings.
2. Exterior roof panel shall be covered with a single coat of Super Therm (White) coating, for a minimum insulated R-value of R19.

PART 3 EXECUTION

3.01 PREPARATION

- A. Contractor to prepare a crushed stone foundation in accordance with the Drawings.

3.02 INSTALLATION

- A. Contractor must provide level unobstructed area large enough for crane and tractor/trailer to park adjacent to pad. Crane must be able to place outriggers within 5'-0" of edge of pad and truck and crane must be able to get side-by-side under their own power. No overhead lines may be within 75' radius of center of pad.
- B. Contractor to furnish pre-cast, post-tensioned concrete transportable building.

- C. Building to be delivered and placed on prepared crushed stone foundation in accordance with the Drawings.

END OF SECTION

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BID # 228101-1-BID 10
OPEN DATE
TIME 2:00 P.M.

SECTION VI
Project Drawings

OPINION OF PROBABLE CONSTRUCTION COST					Sheet 1 of 10
I-45/HWY 6 Water Distribution System				Estimated	30-Mar-16
Client Galveston County/Texas General Land Office				By: CLC	Checked
Project No. 145701					By:
Item No.	Description	Quantity			Total
		No. Units	Unit Meas.	Unit Cost (B)	
GENERAL ITEMS					
1	Mobilization	LS	1	\$109,000.00	\$109,000.00
2	Clearing and Grubbing	AC	6	\$13,000.00	\$78,000.00
3	Storm Water Pollution Prevention Implementation	MO	9	\$700.00	\$6,300.00
4	Filter Fabric Fence	LF	2,660	\$2.00	\$5,320.00
5	HydroMulch Seeding, Fertilizer and Watering	AC	7	\$1,400.00	\$9,800.00
6	Stabilized Construction Roads, Parking Areas, Exits and Truck Washing Area	SY	220	\$18.00	\$3,960.00
7	Site Restoration	LF	7,270	\$10.00	\$72,700.00
Subtotal of General Items					\$285,080.00
PAVING ITEMS					
8	Remove and Replace Asphalt Pavement and Subgrade	SY	95	\$100.00	\$9,500.00
Subtotal of Paving Items					\$9,500.00
PIPING ITEMS					
9	Remove a Portion of the Existing 39" Water Line Along Avenue L and Replace It with a Two (2) - 39" Spool Pieces, Two (2) - 39" x 36" Reducers, One (1) - 39" x 24" Tee, and One (1) - Butt Strap Joint	LS	1	\$170,000.00	\$170,000.00
10	24" Water Line, Open Cut	LF	7,270	\$150.00	\$1,090,500.00
11	24" Water Line, Trenchless	LF	730	\$700.00	\$511,000.00
12	16" Water Line, Open Cut	LF	45	\$115.00	\$5,175.00
13	36" Butterfly Valve with Service MH	EA	1	\$40,000.00	\$40,000.00
14	24" Butterfly Valve with Valve Box	EA	4	\$13,500.00	\$54,000.00
15	16" Gate Valve with Valve Box	EA	1	\$10,000.00	\$10,000.00
16	Extra Depth for Manholes Greater than 8 Ft.	VF	2	\$200.00	\$400.00
17	2" Combination Air Release Valve with MH and Vent Piping, 3 Bollards	EA	3	\$25,000.00	\$75,000.00
18	24" Access Manway with Service MH for 39" Water Line	EA	2	\$24,000.00	\$48,000.00
19	6" Blow-Off Assembly	EA	1	\$2,000.00	\$2,000.00
20	Flushing Hydrant	EA	2	\$15,600.00	\$31,200.00
21	16" Wet Connection	EA	1	\$6,000.00	\$6,000.00
22	Trench Safety System	LF	7,270	\$2.00	\$14,540.00
23	6" Overexcavation of Trench Bottom	LF	7,270	\$8.00	\$58,160.00
24	Dewatering	LF	7,270	\$20.00	\$145,400.00
25	Installation and Maintenance of Traffic Control Devices	LS	1	\$15,000.00	\$15,000.00
26	Flagmen	LS	1	\$5,000.00	\$5,000.00
27	Remove and Replace 30" Storm Sewer	LF	10	\$150.00	\$1,500.00
28	Perimeter Fencing and Vehicle Gate at Meter Station Site	LS	1	\$4,000.00	\$4,000.00
29	8' x 8' Pre-Cast Concrete Building on Crushed Rock Bedding Foundation	LS	1	\$35,000.00	\$35,000.00
30	Furnish and Install 12-Inch Standard Meter Station Slab on Grade, Including Concrete Slab and Appurtenances, As Indicated on Plans, Complete in Place	LS	1	\$50,000.00	\$50,000.00
31	Furnish and Install 12-Inch Standard Pressure/Flow Control Station Slab on Grade, Including Concrete Slab, Valves, Piping, and Appurtenances, As Indicated on Plans, Complete in Place.	LS	1	\$75,000.00	\$75,000.00
Subtotal of Piping Items					\$2,446,875.00
EXTRA UNIT PRICE ITEMS					
32	Extra Removal and Replacement of Asphalt Pavement and Subgrade	S.Y.	50	\$100.00	\$5,000.00
33	Extra Placement of Sodding	S.Y.	100	\$10.00	\$1,000.00
34	Bedding and Backfill for Wet Conditions	L.F.	100	\$15.00	\$1,500.00
35	Extra Excavation Around Structures	C.Y.	100	\$25.00	\$2,500.00
36	Extra Hand Excavation	C.Y.	100	\$25.00	\$2,500.00
37	Extra Machine Excavation	C.Y.	100	\$15.00	\$1,500.00
38	Extra Placement of Backfill Material	C.Y.	100	\$10.00	\$1,000.00
39	Extra Select Backfill	C.Y.	100	\$25.00	\$2,500.00
40	Extra Cement-Stabilized Sand	C.Y.	100	\$20.00	\$2,000.00
41	Extra 24" Ductile Iron Compact Fittings in Place	EA	4	\$1,000.00	\$4,000.00
42	Crushed Stone Manhole Foundations for Wet Conditions	EA	5	\$150.00	\$750.00
Subtotal of Extra Unit Items					\$24,250.00
CASH ALLOWANCE ITEMS					
43	Furnish and Install Radio Tower and Related SCADA Communications Equipment, including concrete footings/pads, etc., as Directed by the Engineer, Complete in Place.	ALLOW	1	\$20,000.00	\$20,000.00
44	SCADA Communications and Electrical at Metering Station and Pressure/Flow Control Station, Complete in Place.	ALLOW	1	\$60,000.00	\$60,000.00
Subtotal of Cash Allowance Items					\$80,000.00
TOTAL					\$2,845,705.00
ROUND TO					\$2,846,000.00

CONSTRUCTION PLANS FOR I-45/HWY 6 WATER DISTRIBUTION SYSTEM



GALVESTON COUNTY

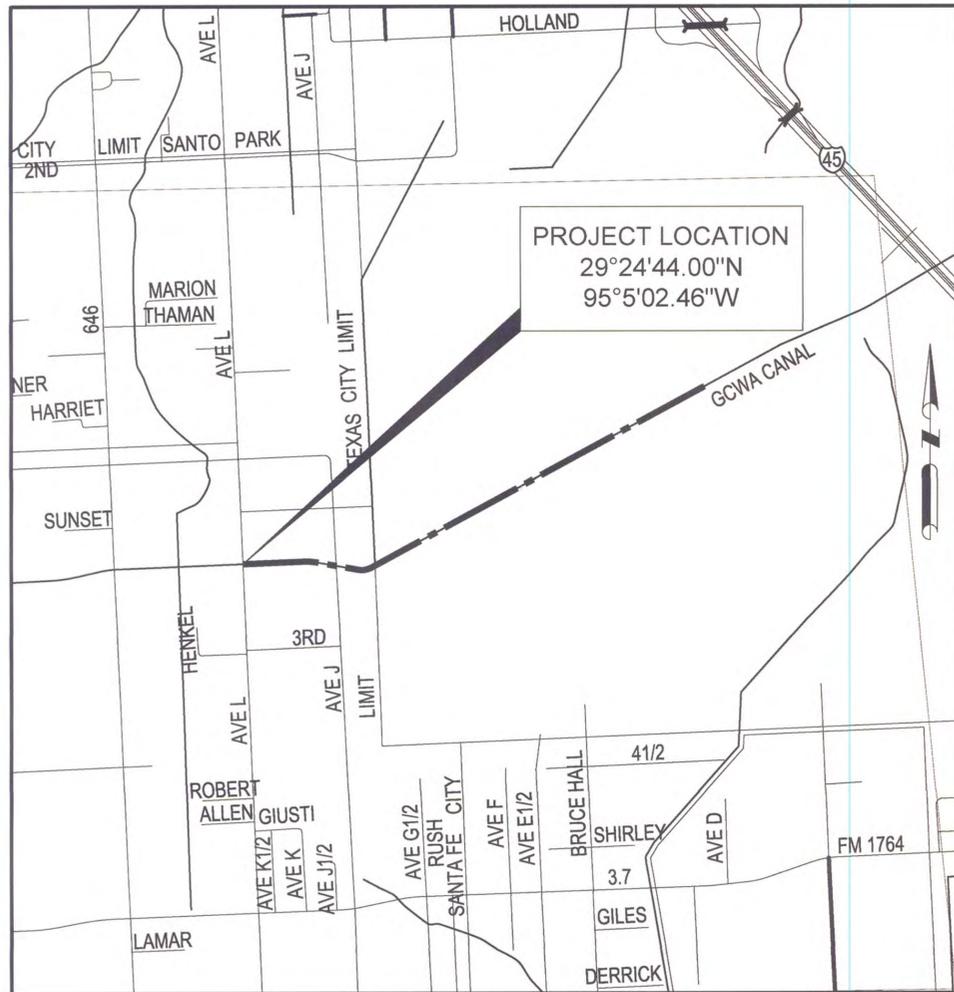
GLO CONTRACT No. 13-465-000-7974
PROJECT No. P21465
BID PACKAGE No. 228101-1_BID10



1710 Seamist Drive Houston, Texas 77008 (713) 869-3433

Sheet List Table

#	Description
1	COVER SHEET
2	CONSTRUCTION NOTES
3	SHEET LAYOUT
4	PROJECT SIGN
5	24" WATERLINE PLAN & PROFILE B.L. STA: 0+00 TO B.L. STA: 5+00
6	24" WATERLINE PLAN & PROFILE B.L. STA: 5+00 TO B.L. STA: 10+00
7	24" WATERLINE PLAN & PROFILE B.L. STA: 10+00 TO B.L. STA: 15+00
8	24" WATERLINE PLAN & PROFILE B.L. STA: 15+00 TO B.L. STA: 20+00
9	24" WATERLINE PLAN & PROFILE B.L. STA: 20+00 TO B.L. STA: 25+00
10	24" WATERLINE PLAN & PROFILE B.L. STA: 25+00 TO B.L. STA: 30+00
11	24" WATERLINE PLAN & PROFILE B.L. STA: 30+00 TO B.L. STA: 35+00
12	24" WATERLINE PLAN & PROFILE B.L. STA: 35+00 TO B.L. STA: 40+00
13	24" WATERLINE PLAN & PROFILE B.L. STA: 40+00 TO B.L. STA: 45+00
14	24" WATERLINE PLAN & PROFILE B.L. STA: 45+00 TO B.L. STA: 50+00
15	24" WATERLINE PLAN & PROFILE B.L. STA: 50+00 TO B.L. STA: 55+00
16	24" WATERLINE PLAN & PROFILE B.L. STA: 55+00 TO B.L. STA: 60+00
17	24" WATERLINE PLAN & PROFILE B.L. STA: 60+00 TO B.L. STA: 65+00
18	24" WATERLINE PLAN & PROFILE B.L. STA: 65+00 TO B.L. STA: 70+00
19	24" WATERLINE PLAN & PROFILE B.L. STA: 70+00 TO B.L. STA: 75+00
20	24" WATERLINE PLAN & PROFILE B.L. STA: 75+00 TO B.L. STA: 79+00
21	24" WATERLINE PLAN & PROFILE B.L. STA: 79+00 TO B.L. STA: 81+00
22	STORM WATER POLLUTION PREVENTION PLAN
23	TRAFFIC CONTROL PLAN ONE-LANE CLOSURE
24	METERING / FLOW CONTROL SITE
25	FLOW CONTROL/ PRESSURE REDUCING STATION DETAILS
26	METERING STATION DETAILS
27	METER STATION AND PRESSURE SLAB ON GRADE
28	STANDARD MECHANICAL DETAILS
29	WATER DETAILS
30	MISCELLANEOUS DETAILS
31	AIR VALVE IN SERVICE MANHOLE DETAILS
32	VALVE AND VENT PIPING AND SERVICE MANHOLE DETAILS
33	MANHOLE COVER
34	EXCAVATION, BEDDING BACKFILL AND PAVEMENT REPAIR DETAILS
35	BEDDING AND BACKFILL AUGER PIT AND HOLE DETAIL AND TUNNEL AND CASING DETAIL
36	BAR-WRAPPED CONCRETE CYLINDER PIPE DETAILS
37	STORM WATER POLLUTION PREVENTION DETAILS
38	PRE-CAST CONCRETE BUILDING DETAILS
39	CATHODIC PROTECTION DETAILS
40	SURVEY CONTROL
41	SURVEY CONTROL



VICINITY MAP
N.T.S.

WORK ORDER No. 7975
DATE: FEBRUARY 2016

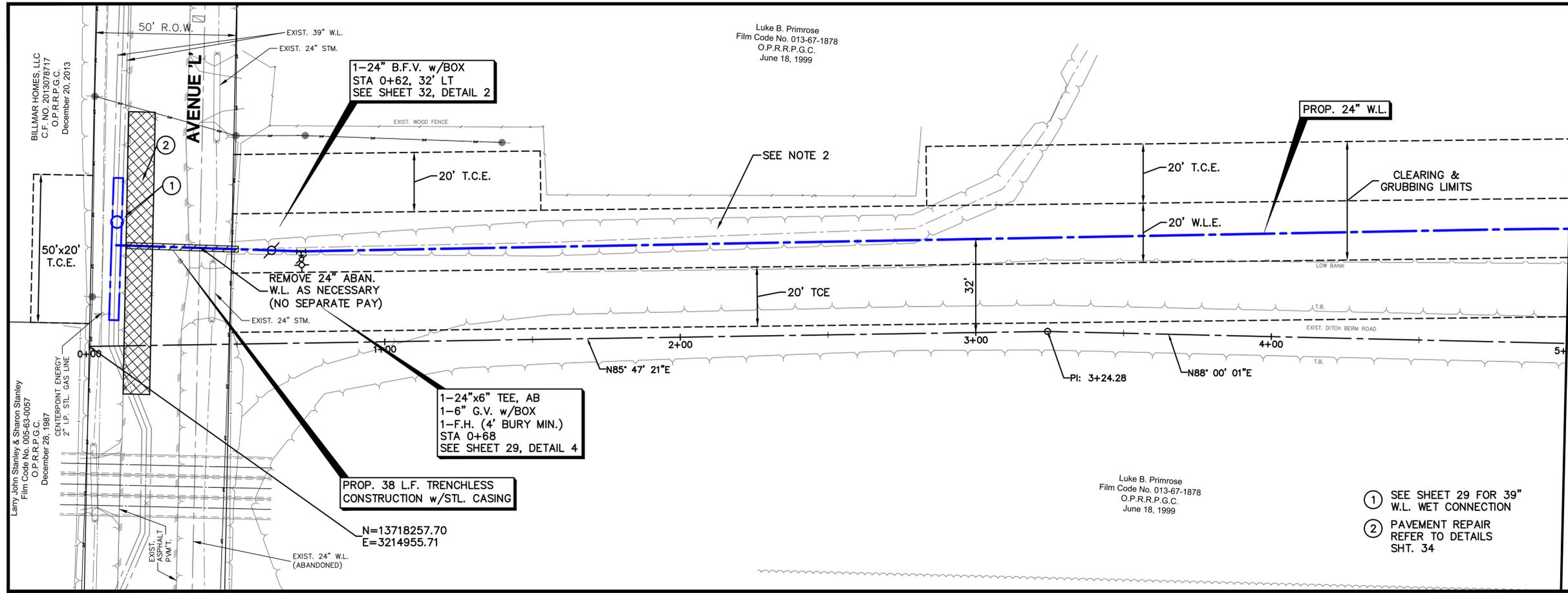
APPROVED: *Ivan Langford II* DATE: 3/22/16
IVAN LANGFORD - GULF COAST WATER AUTHORITY

APPROVED: *Douglas Kneupper* DATE: 3-22-16
DOUGLAS KNEUPPER - CITY OF TEXAS CITY



GLO CONTRACT NO 13-465-000; WORK ORDER # 7975

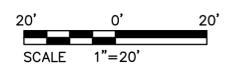
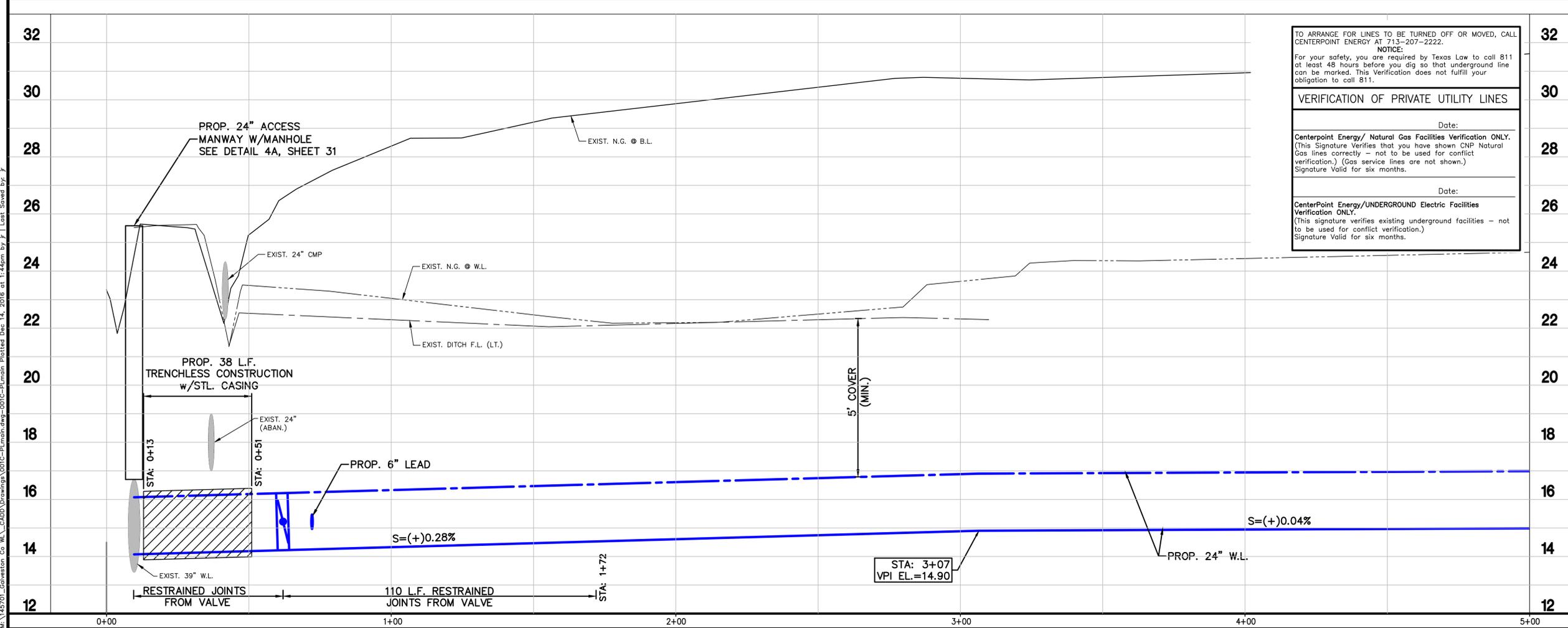
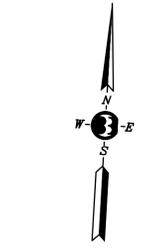
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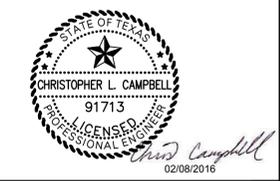
MATCHLINE B.L. STA. 5+00

- NOTES:
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- ① SEE SHEET 29 FOR 39" W.L. WET CONNECTION
- ② PAVEMENT REPAIR REFER TO DETAILS SHT. 34



MK.	DESCRIPTION	DATE	DWN.	CHK.



Binkley & Barfield, Inc.
consulting engineers
Texas Registration Number F-257
1710 Seacrest Drive - Houston, Texas 77008 (713) 869-3433



I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
PLAN & PROFILE
B.L. STA: 0+00 TO B.L. STA: 5+00

Project No.: 145701
Date: Dec 14, 2016
Dwn By: J.T.S.
Chk'd By: J.M.B.

Scale:
HORZ: 1"=20'
VERT: 1"=2'

SHEET
5
OF 41

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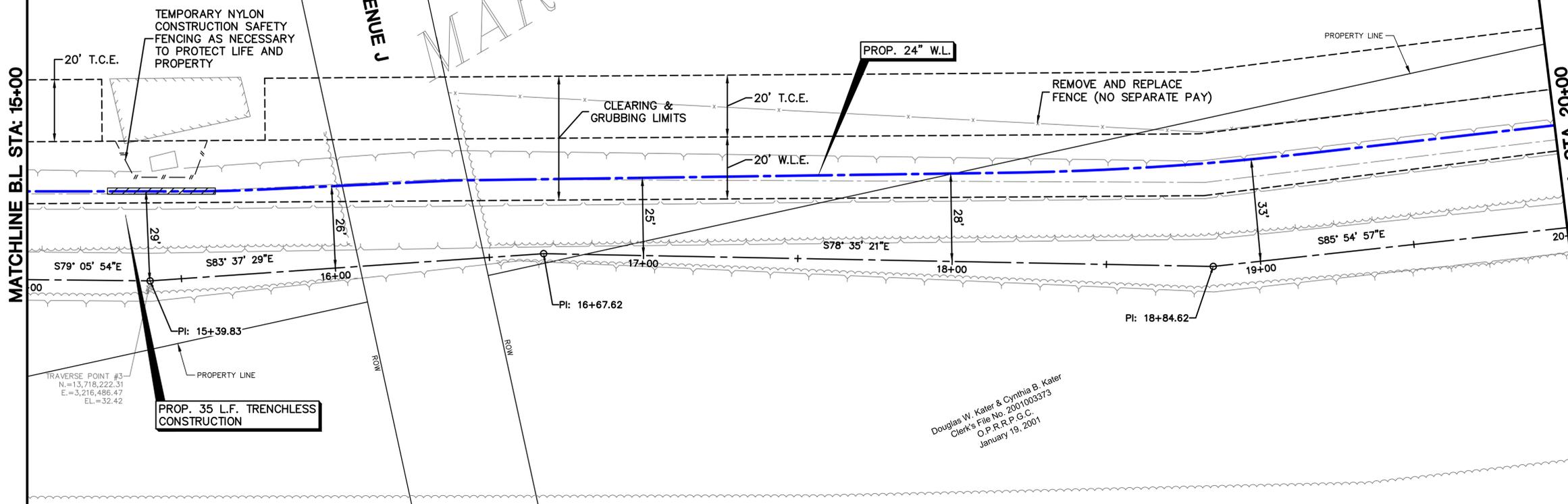
KEITH A. ROLL
C.F. NO. 2014009984
O.P.R.R.P.G.C.
FEB. 28, 2014

Joseph Alan Walton, Sr.
Clerk's File No. 2000053783
O.P.R.R.P.G.C.
October 16, 2000

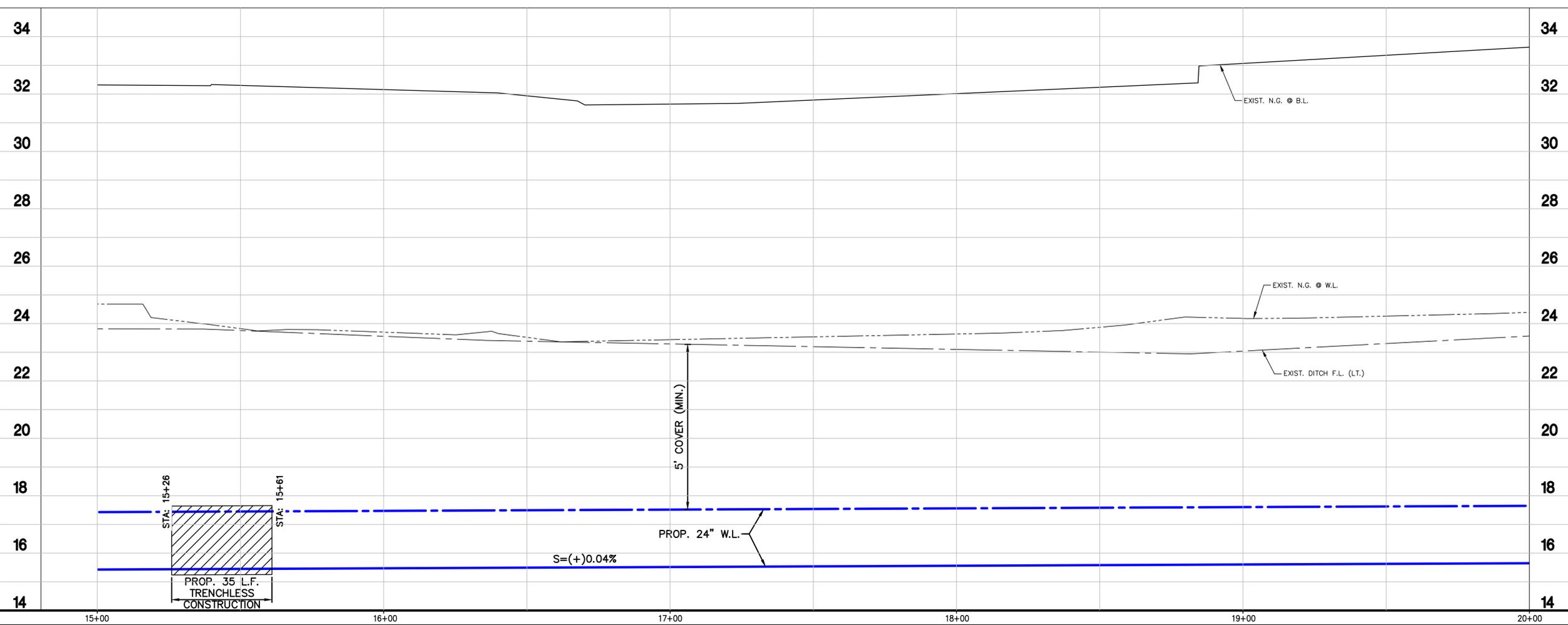
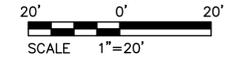
Douglas W. Kater & Cynthia B. Kater
Clerk's File No. 2001003573
O.P.R.R.P.G.C.
January 19, 2001

MATCHLINE B.L. STA: 15+00

MATCHLINE B.L. STA: 20+00



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MK.	DESCRIPTION	DATE	DWN.	CHK.



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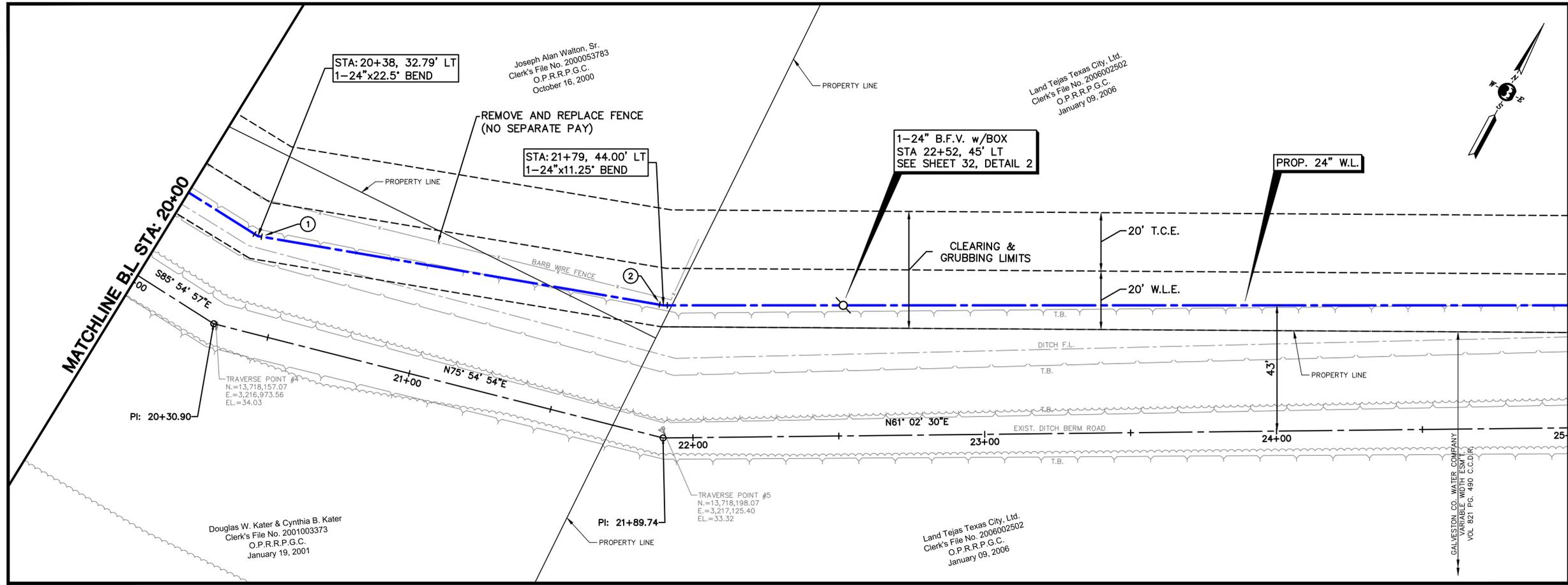


I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
PLAN & PROFILE
B.L. STA: 15+00 TO B.L. STA: 20+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chkd By: J.M.B.		

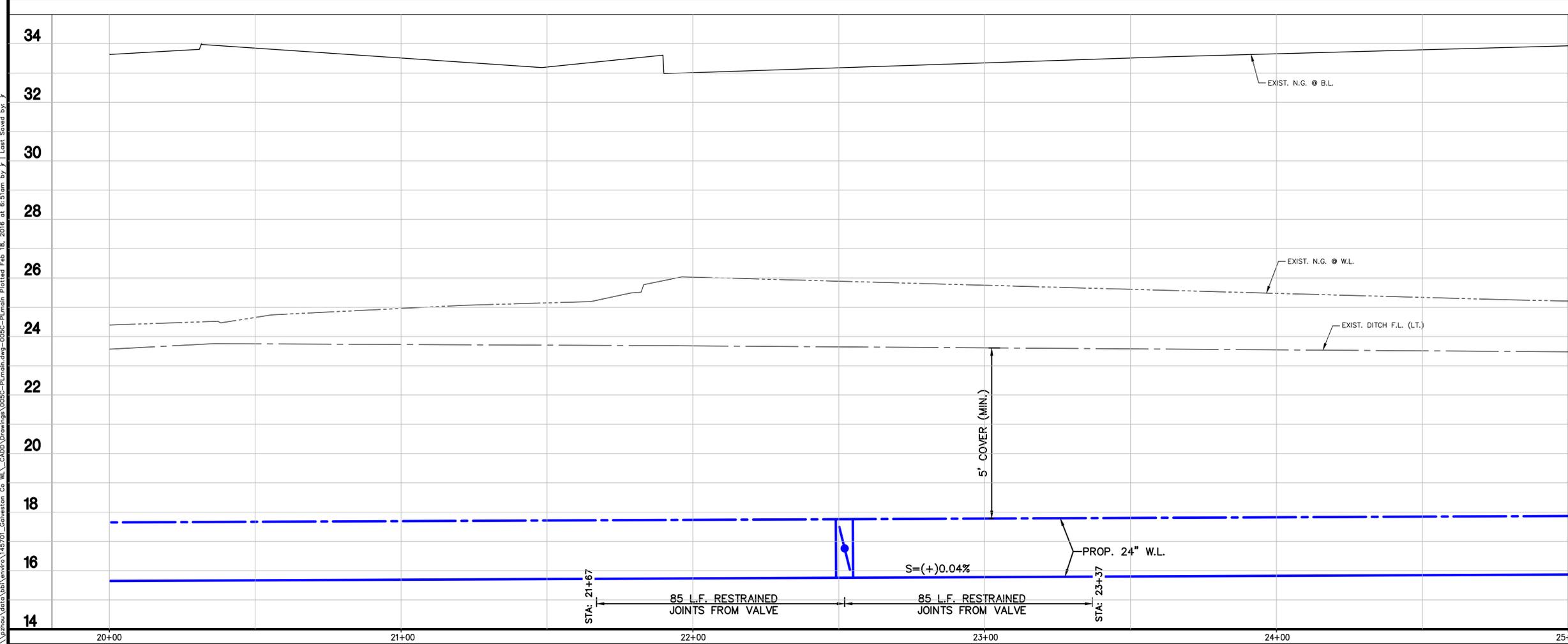
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MATCHLINE B.L. STA 25+00

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- ① 15 L.F. RESTRAINED JOINTS CENTERED ON BEND
- ② 10 L.F. RESTRAINED JOINTS CENTERED ON BEND



MK.	DESCRIPTION	DATE	DWN.	CHK.



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 Texas Registration Number F-257
 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433



I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
 PLAN & PROFILE
 B.L. STA: 20+00 TO B.L. STA: 25+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chkd By: J.M.B.		

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ALEXANDER



STA: 26+89, 39.82' LT
1-2" COMBINATION AIR-VACUUM
VALVE ASSEMBLY
IN SERVICE M.H.
SEE DETAIL SHT. 31

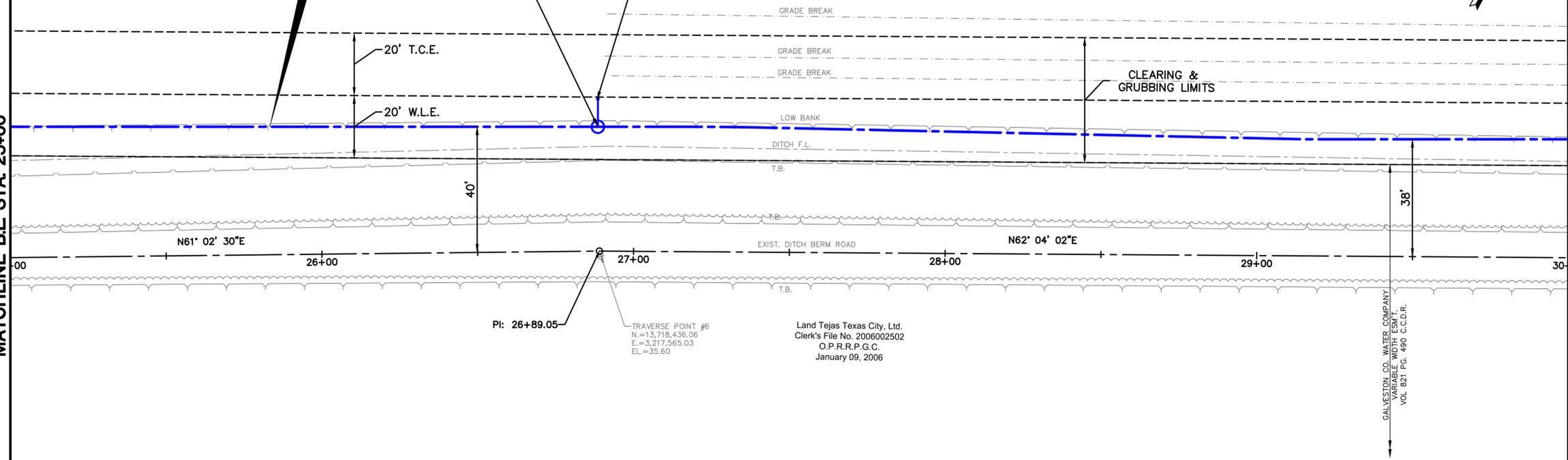
Land Tejas Texas City, Ltd.
Clerk's File No. 2006002502
O.P.R.R.P.G.C.
January 09, 2006

STA: 26+88.79, 48.33' LT
2" VENT PIPE W/1 BOLLARD
SEE DETAIL SHT. 32

PROP. 24" W.L.

MATCHLINE BL STA: 25+00

MATCHLINE BL STA: 30+00

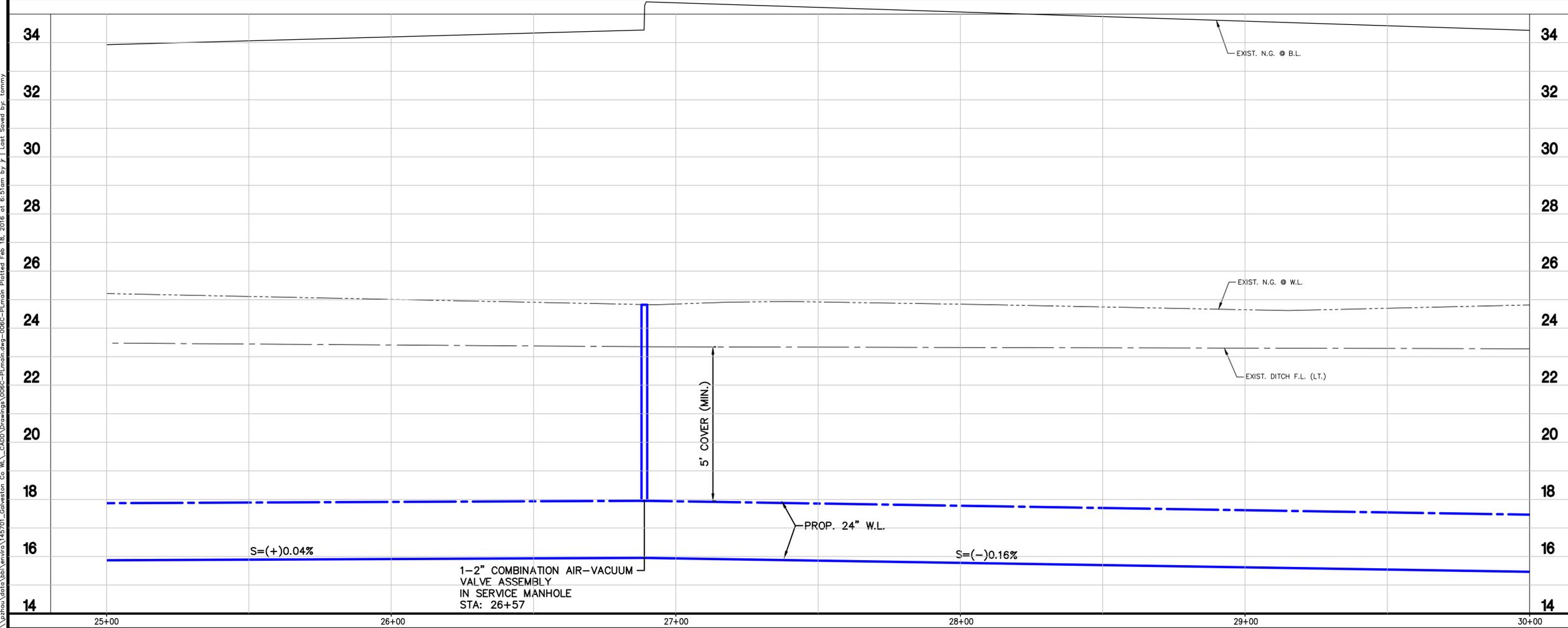
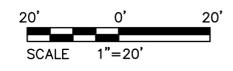


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PI: 26+89.05
TRAVERSE POINT #6
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E=3,217,555.03
EL=35.60

Land Tejas Texas City, Ltd.
Clerk's File No. 2006002502
O.P.R.R.P.G.C.
January 09, 2006

GALVESTON CO. WATER COMPANY
GALVESTON WATER MAINS
VOL. 821 PG. 480 C.G.D.R.



MK.	DESCRIPTION	DATE	DWN.	CHK.



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1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433



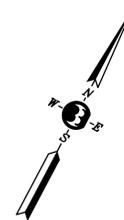
I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
PLAN & PROFILE
B.L. STA: 25+00 TO B.L. STA: 30+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chk'd By: J.M.B.		

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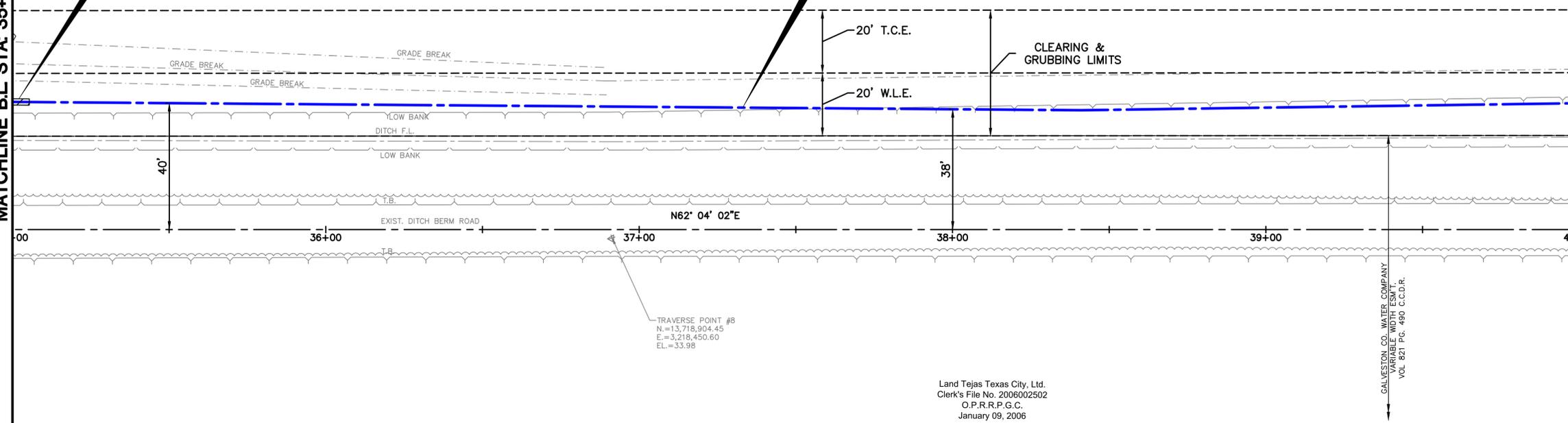
Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006



MATCHLINE B.L. STA: 35+00

PROP. 5 L.F. TRENCHLESS
 CONSTRUCTION w/STL. CASING

PROP. 24" W.L.

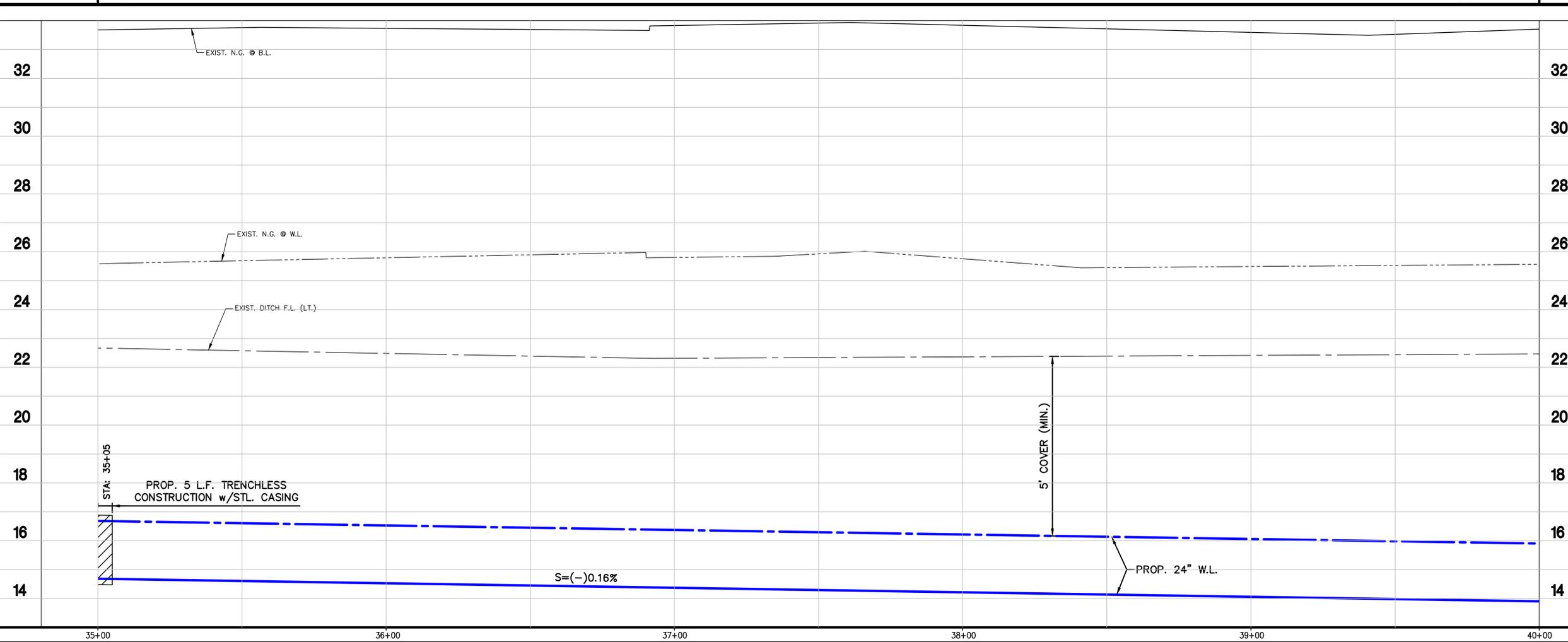
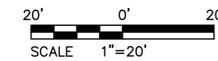


MATCHLINE B.L. STA: 40+00

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 5. ALL VALVES AND FITTINGS SHALL HAVE MECHANICAL JOINTS UNLESS SHOWN OTHERWISE. CARRIER PIPE ENCASED IN STEEL CASING SHALL BE RESTRAINED AT ALL JOINTS. NO SEPARATE PAYMENT SHALL BE MADE FOR FITTINGS, VALVES, AND RESTRAINTS AND SHALL BE INCLUDED IN THE PERTINENT BID ITEM IN THE BID.
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Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006

GALVESTON CO. WATER COMPANY
 VOL. 821 PG. 499 C.C.D.R.



MK.	DESCRIPTION	DATE	DWN.	CHK.



Binkley & Barfield, Inc.
 consulting engineers
 Texas Registration Number F-257
 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433

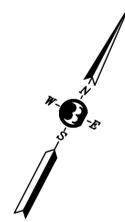


I-45 & HWY-6 WATER DISTRIBUTION SYSTEM
 24" WATERLINE
 PLAN & PROFILE
 B.L. STA: 35+00 TO B.L. STA: 40+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chkd By: J.M.B.		

\\pzhau\dra\bb\enviro\145701_Galveston Co. W... \CAAD\Drawings\08C-Plan\dwg-08C-Plan.dwg-08C-Plan Plotted Feb 18, 2016 at 6:53am by J. Last Saved by: F

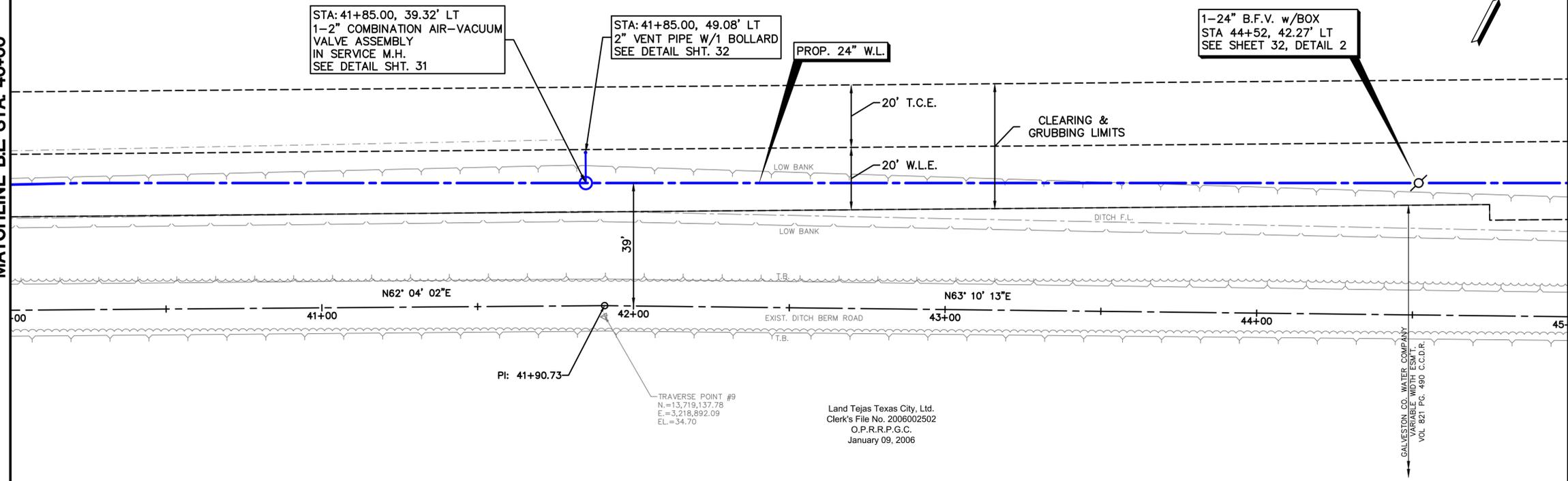
Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006



- NOTES:
1. THE CONTRACTOR IS MADE AWARE THAT CLEARING AND GRUBBING (I.E. REMOVAL AND DISPOSAL OF TREES, BUSHES (ANY SIZE, TYPE)) WILL BE REQUIRED TO FACILITATE INSTALLATION OF WATER LINE.
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MATCHLINE B.L. STA: 40+00

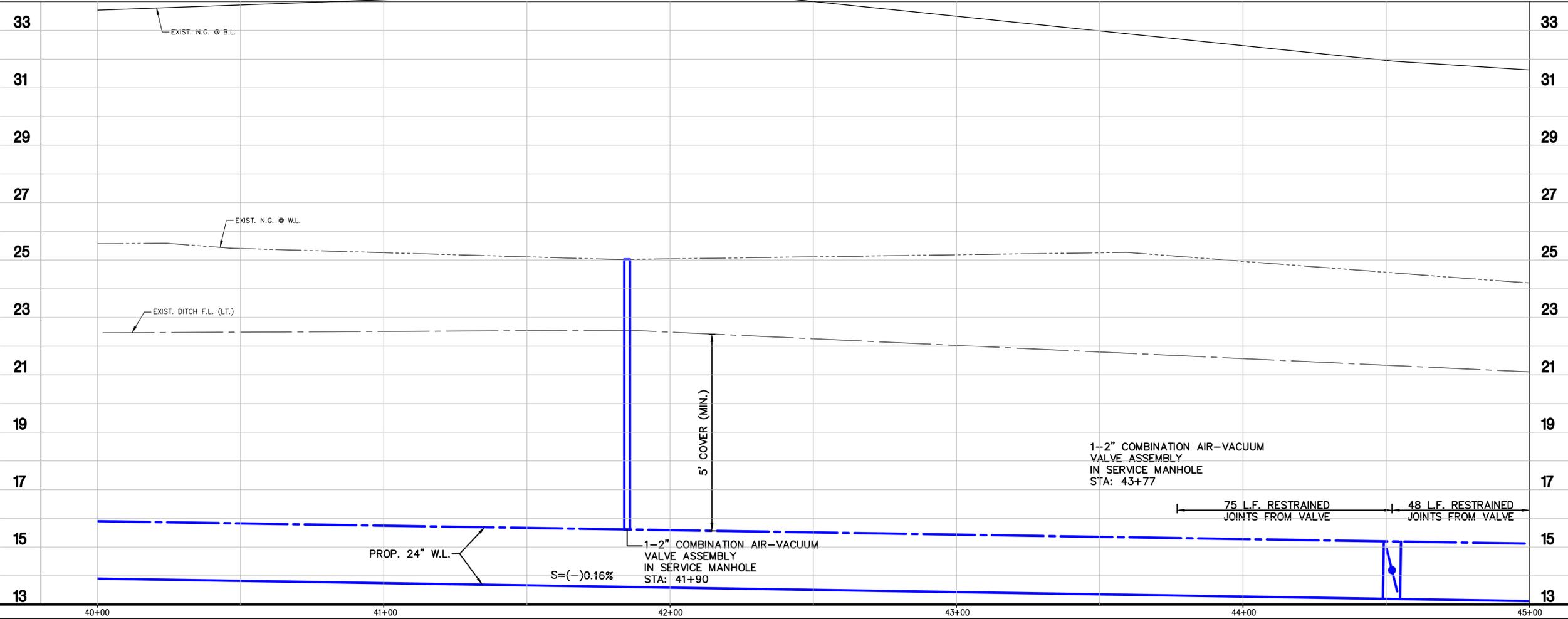
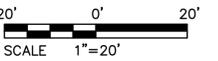
MATCHLINE B.L. STA: 45+00



Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006

TRAVERSE POINT #9
 N=13,719,137.78
 E=3,218,892.09
 EL=34.70

GALVESTON CO. WATER COMPANY
 VARIABLE WIDTH ESWT
 VOL 821 PG. 490 C.C.D.R.



MK.	DESCRIPTION	DATE	DWN.	CHK.



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 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433

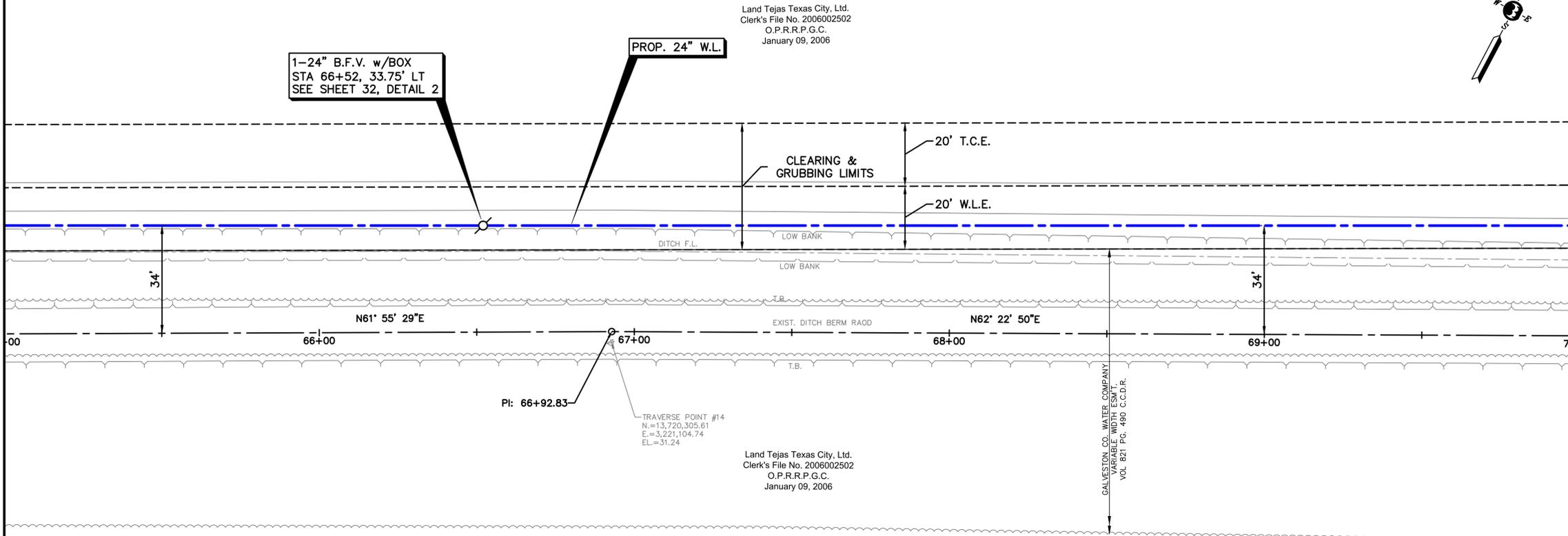


I-45 & HWY-6 WATER DISTRIBUTION SYSTEM
 24" WATERLINE
 PLAN & PROFILE
 B.L. STA: 40+00 TO B.L. STA: 45+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chkd By: J.M.B.		

MATCHLINE B.L. STA: 65+00

MATCHLINE B.L. STA: 70+00



1-24" B.F.V. w/BOX
STA 66+52, 33.75' LT
SEE SHEET 32, DETAIL 2

PROP. 24" W.L.

Land Tejas Texas City, Ltd.
Clerk's File No. 2006002502
O.P.R.R.P.G.C.
January 09, 2006

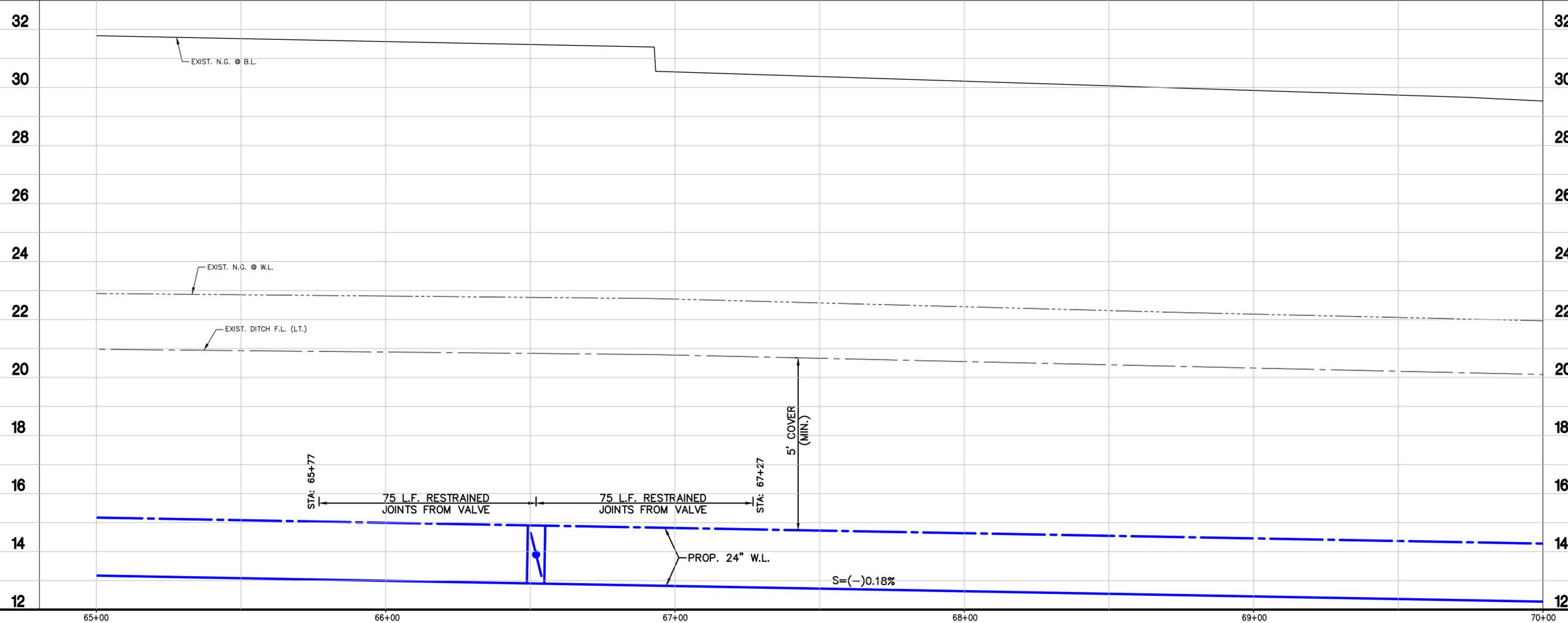
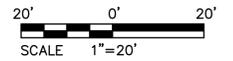
Land Tejas Texas City, Ltd.
Clerk's File No. 2006002502
O.P.R.R.P.G.C.
January 09, 2006

GALVESTON CO. WATER COMPANY
VARIABLE WIDTH ESM/L
VOL. 821 PG. 490 C.C.D.R.

PI: 66+92.83
TRAVERSE POINT #14
N.=13,720,305.61
E.=3,221,104.74
EL.=31.24



- NOTES:
1. THE CONTRACTOR IS MADE AWARE THAT CLEARING AND GRUBBING (I.E. REMOVAL AND DISPOSAL OF TREES, BUSHES (ANY SIZE, TYPE)) WILL BE REQUIRED TO FACILITATE INSTALLATION OF WATER LINE.
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Binkley & Barfield, Inc.
 consulting engineers
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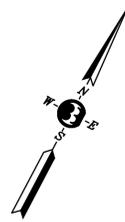
I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
PLAN & PROFILE
B.L. STA: 65+00 TO B.L. STA: 70+00

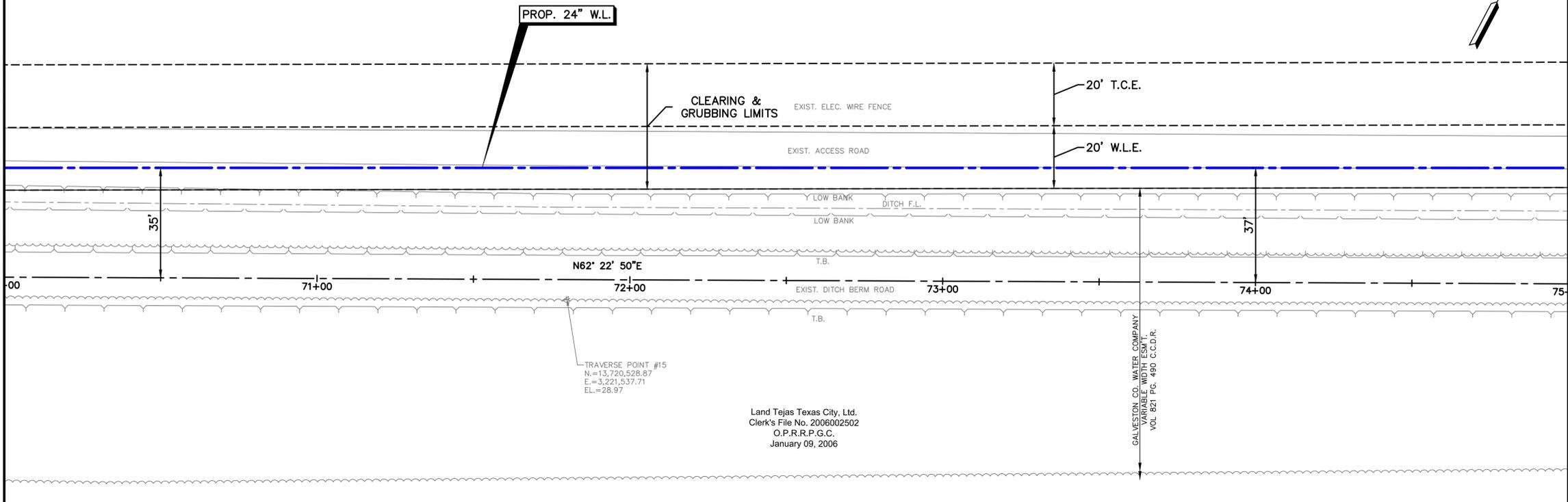
Project No.: 145701	Scale: HORZ: 1"=20'	SHEET
Date: Feb 18, 2016	VERT: 1"=2'	
Dwn By: J.T.S.		OF 41
Chkd By: J.M.B.		

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Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006



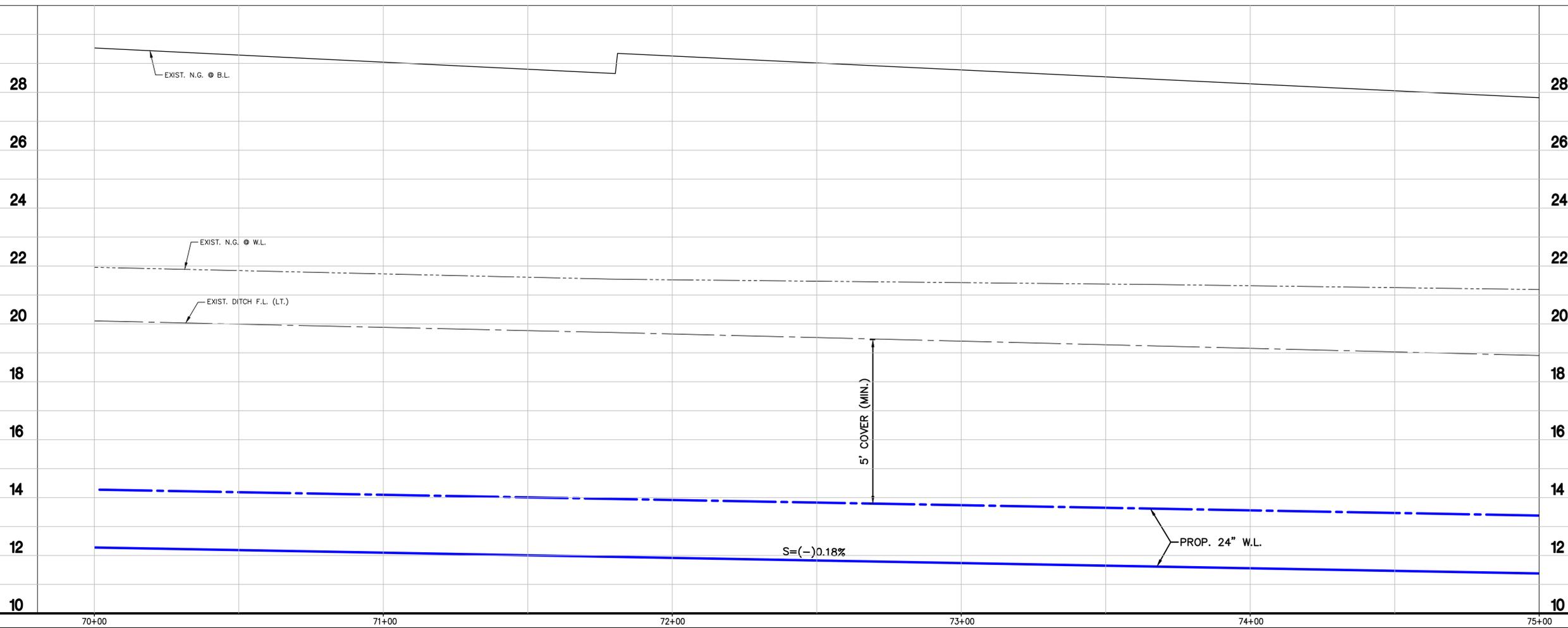
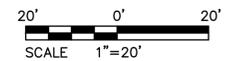
MATCHLINE B.L. STA: 70+00



Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006

MATCHLINE B.L. STA 75+00

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MK.	DESCRIPTION	DATE	DWN.	CHK.

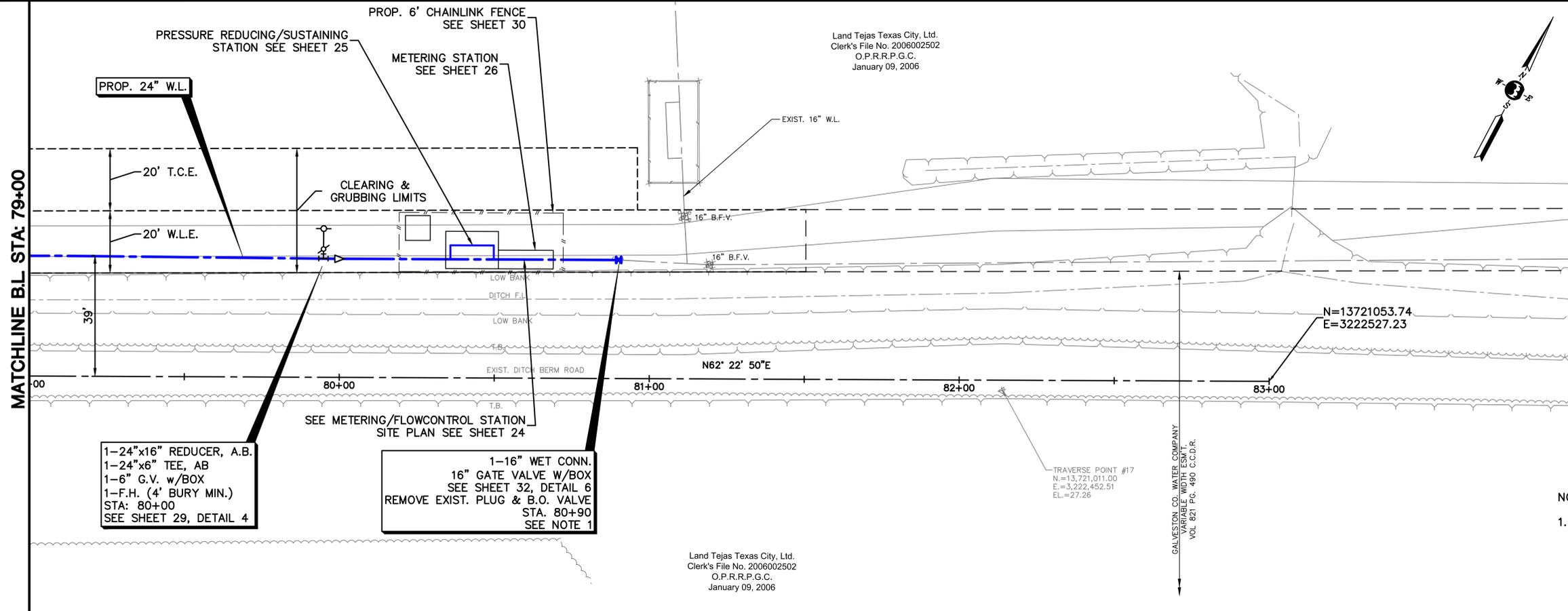
Binkley & Barfield, Inc.
 consulting engineers
 Texas Registration Number F-257
 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433

I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

24" WATERLINE
 PLAN & PROFILE
 B.L. STA: 70+00 TO B.L. STA: 75+00

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=20'	OF 41
Dwn By: J.T.S.	VERT: 1"=2'	
Chkd By: J.M.B.		

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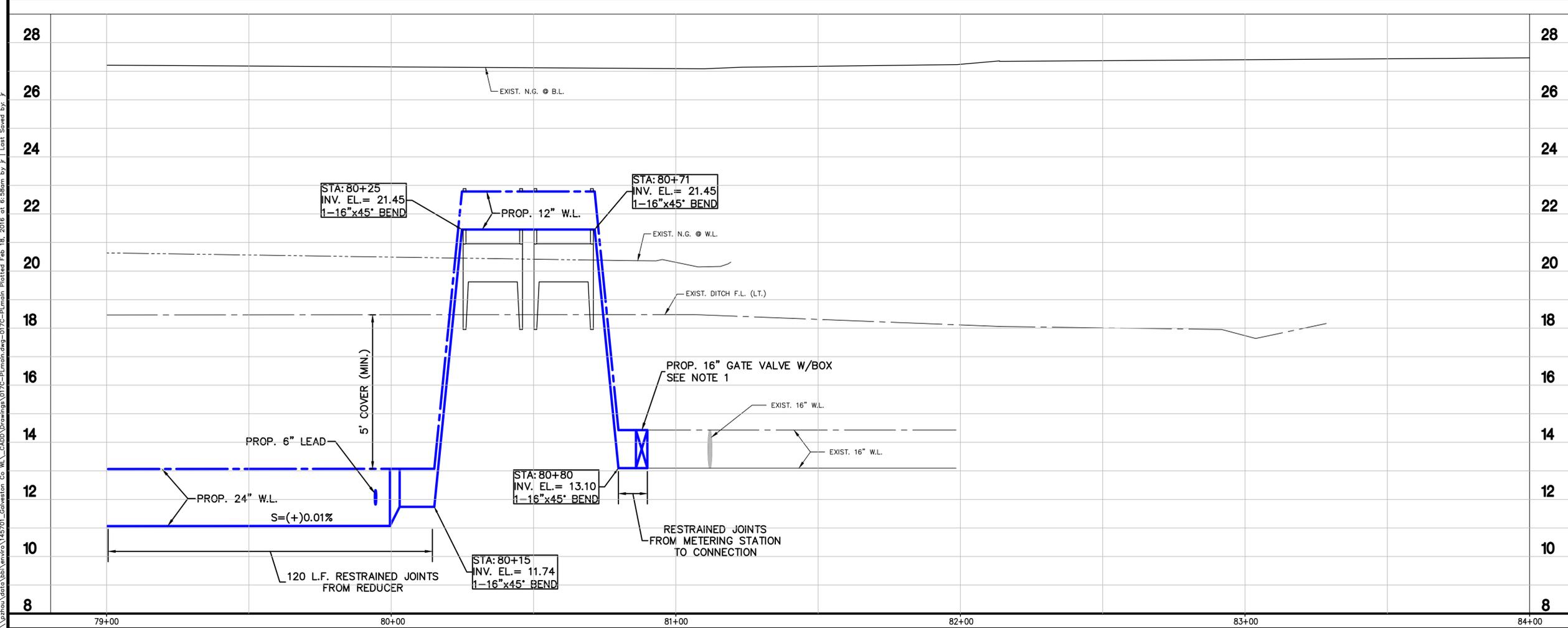
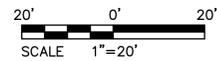
1-24"x16" REDUCER, A.B.
 1-24"x6" TEE, AB
 1-6" G.V. w/BOX
 1-F.H. (4' BURY MIN.)
 STA: 80+00
 SEE SHEET 29, DETAIL 4

1-16" WET CONN.
 16" GATE VALVE W/BOX
 SEE SHEET 32, DETAIL 6
 REMOVE EXIST. PLUG & B.O. VALVE
 STA: 80+90
 SEE NOTE 1

TRAVERSE POINT #17
 N=13,721,011.00
 E=3,222,452.51
 EL.=27.26

Land Tejas Texas City, Ltd.
 Clerk's File No. 2006002502
 O.P.R.R.P.G.C.
 January 09, 2006

NOTE:
 1. CONTRACTOR SHALL PERFORM WET CONNECTION OF 16" GATE VALVE AT NIGHT SO AS TO MINIMIZE IMPACT TO LOCAL BUSINESSES.



MK.	DESCRIPTION	DATE	DWN.	CHK.

Binkley & Barfield, Inc.
 consulting engineers
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 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433



THE STATE OF TEXAS
 COUNTY OF GALVESTON

I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

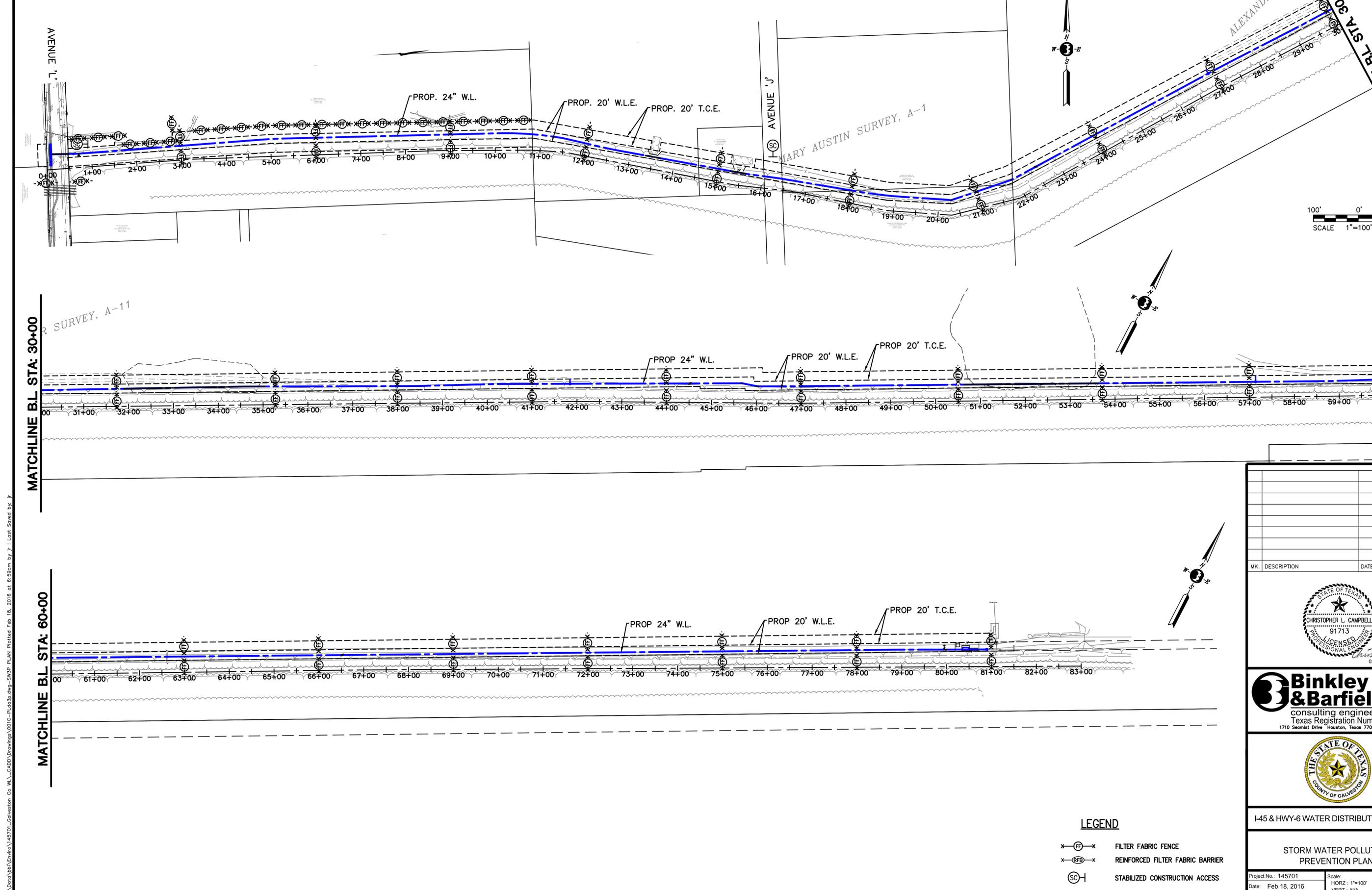
24" WATERLINE
 PLAN & PROFILE
 B.L. STA: 79+00 TO B.L. STA: 81+00

Project No.: 145701
 Date: Feb 18, 2016
 Dwn By: J.T.S.
 Chkd By: J.M.B.

Scale:
 HORZ: 1"=20'
 VERT: 1"=2'

SHEET
 OF 41

\\pzhnu\data\bb\enviro\145701_Galveston Co. W..._CAAD\Drawings\07C-Plan\dwg-07C-Plan.dwg-07C-Plan Plotted Feb 18, 2016 at 6:58am by J. Lant Saved by J.

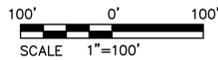


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MATCHLINE B.L. STA. 30+00

MATCHLINE B.L. STA. 60+00

MATCHLINE B.L. STA. 60+00



MK.	DESCRIPTION	DATE	DWN.	CHK.



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 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433



I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

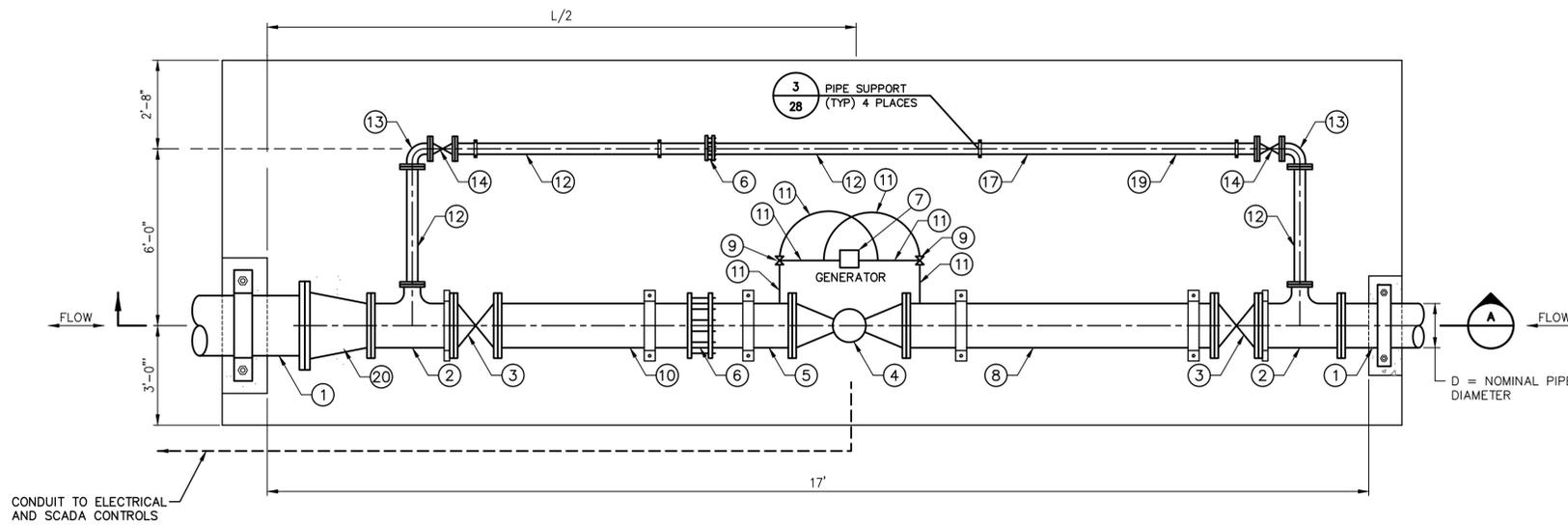
STORM WATER POLLUTION PREVENTION PLAN

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: 1"=100'	
Dwn By: J.T.S.	VERT: N/A	
Chkd By: J.M.B.		OF 41

- LEGEND**
- FILTER FABRIC FENCE
 - REINFORCED FILTER FABRIC BARRIER
 - STABILIZED CONSTRUCTION ACCESS

SLAB ON GRADE PRESSURE/FLOW CONTROL STATION

(SEE NOTE D)	PIPE RUN SIZE = METER NOMINAL INSIDE DIAMETER, DIA. (INCH) =	DIA. = 12 INCH
ITEM	FITTING DESCRIPTION	FITTING SIZE (INCH)
1	PIPE (DIAMETER)	16
2	TEE (DIAMETER, RUN X RUN X BRANCH)	12X12X12
3	VALVE, GATE GV-1 (SEE NOTE A) (DIAMETER)	12
4	VALVE, PRESSURE REDUCING-SUSTAINING, FLOW CONTROL W/LOW FLOW BYPASS 131G-CE-BCNSKC (SEE NOTE B) (DIAMETER)	12
5	PIPE SPOOL (LENGTH) = (5 X DIA.) MINIMUM	12
6	FLEXIBLE COUPLING (DIAMETER)	12
7	GENERATOR -CLA-VAL/SOER TECHNOLOGY X143 HP	-
8	PIPE SPOOL (LENGTH) = (5 X DIA.) MINIMUM	12
9	3-WAY VALVE	-
10	PIPE SPOOL (DIAMETER)	12
11	2" PIPING	-
12	PIPE SPOOL (DIAMETER)	12
13	ELBOW, 90 DEGREE (DIAMETER)	12
14	VALVE, GATE GV-1 (SEE NOTE A) (DIAMETER)	12
15	NOT USED	-
16	NOT USED	-
17	PIPE SPOOL (DIAMETER)	12
18	NOT USED	-
19	PIPE SPOOL (DIAMETER)	12
20	REDUCER	16x12

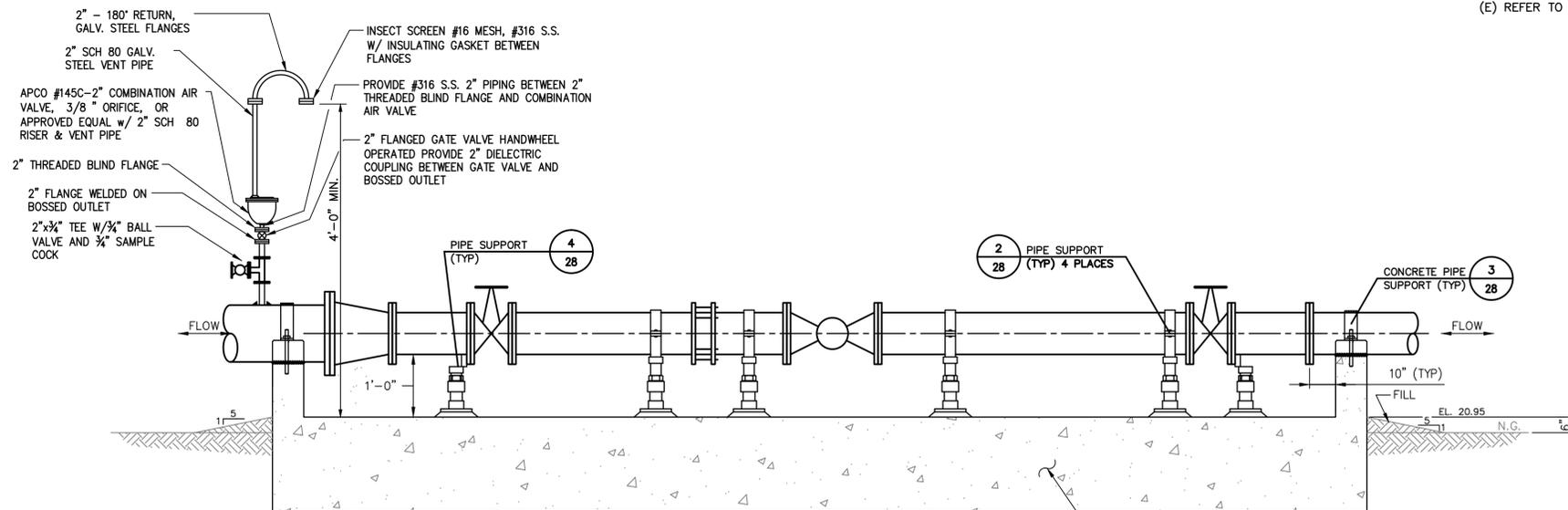


PLAN - SLAB ON GRADE PRESSURE/FLOW CONTROL STATION

SCALE: NTS

NOTES:

- (A) DESIGN IS BASED ON AMERICAN R/D RESILIENT GATE VALVE, PATTERN 2052 W/HAND WHEEL OPERATOR OR APPROVED EQUAL.
- (B) DESIGN IS BASED ON THE CLA-VAL 131G-CE-BCNSKC 150 WITH C105LCW LIMIT. ELECTRONIC CONTROL VIA CLA-VAL VC-22P ELECTRONIC CONTROLLER OR APPROVED EQUAL.
- (C) IF THE ENGINEER REQUIRES AN INCREMENTAL PIPE RUN WITH A NOMINAL INSIDE DIAMETER NOT APPEARING IN THESE STANDARD DRAWINGS, THE STRUCTURE, HEREIN DESIGNATED, FOR THE NEXT LARGER NOMINAL DIAMETER SHOULD BE USED.
- (D) PROVIDE AND INSTALL INSTRUMENTATION AND CONTROLS PER TECHNICAL SPECIFICATIONS.
- (E) REFER TO STRUCTURAL DRAWINGS FOR REINFORCING STEEL DETAILS.



SECTION A

SCALE: NTS

SEE NOTE F

MK.	DESCRIPTION	DATE	DWN.	CHK.



Binkley & Barfield, Inc.
 consulting engineers
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 1710 Seemist Drive Houston, Texas 77008 (713) 869-3433



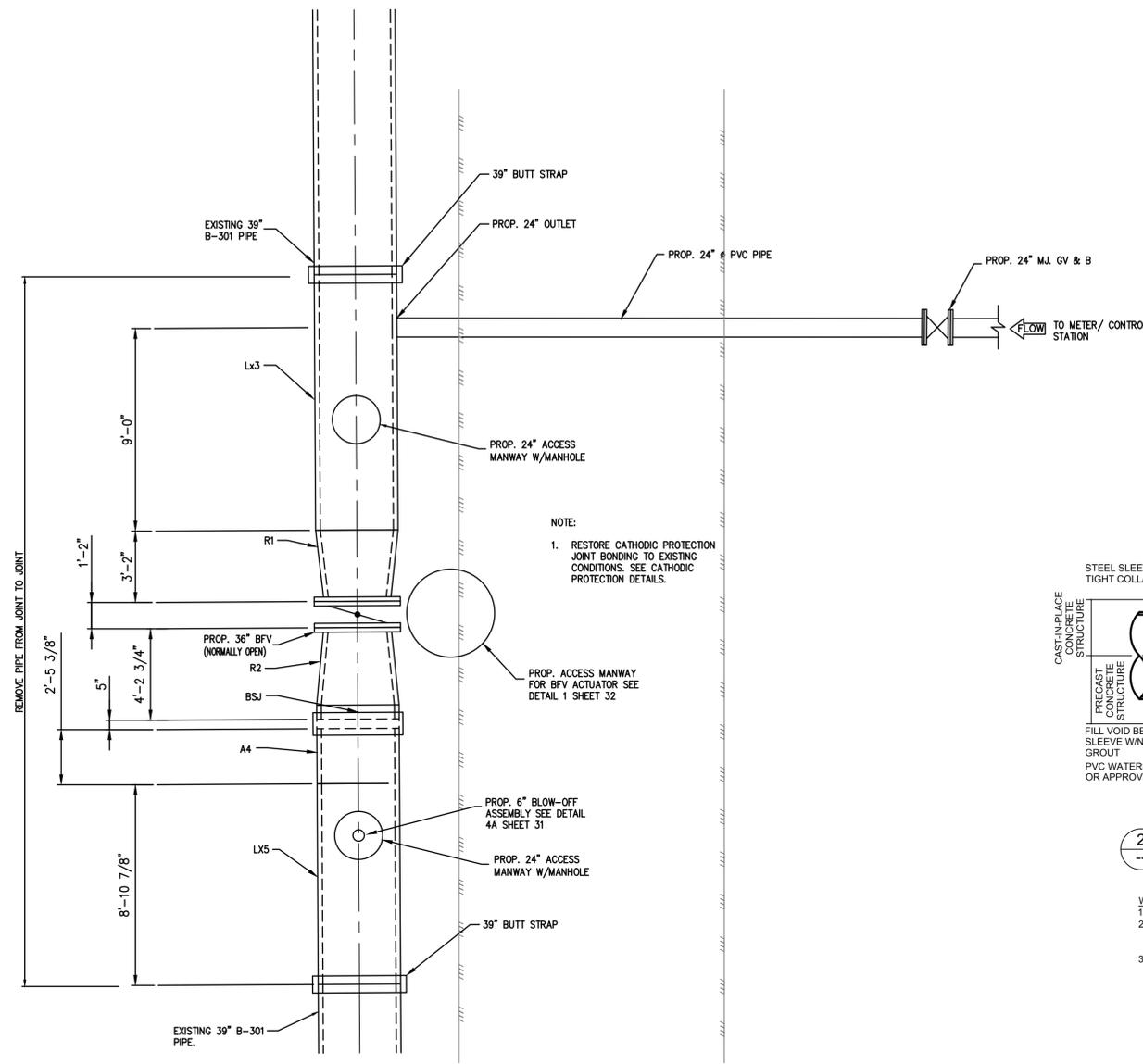
I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

FLOW CONTROL/
 PRESSURE REDUCING STATION
 DETAILS

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: N/A	5
Dwn By: J.T.S.	VERT: N/A	OF 41
Chkd By: J.M.B.		

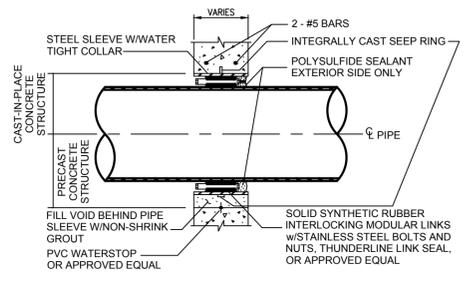
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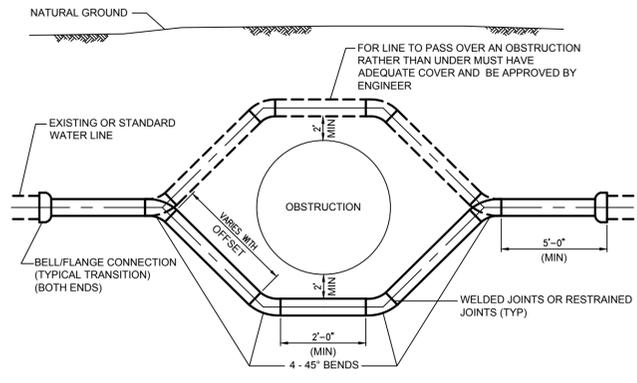
PC.	QTY.	DESCRIPTION
Lx3	1	39" LB W/24" OUTLET W/ 24" BF (ACCESS)
R1	1	39" LS x 36" FLG REDUCER
R2	1	39" CPE x 36" FLG REDUCER
BSJ	1	39" SPLIT BUTT STRAP JOINT
A4	1	39" CEP x LB ADAPTOR
LX5	1	39" LS x LB SHORT w /24" OUTLET w/ 24" BF (ACCESS)

1 24" CONNECTION TO EXISTING 39" SUPPLY LINE



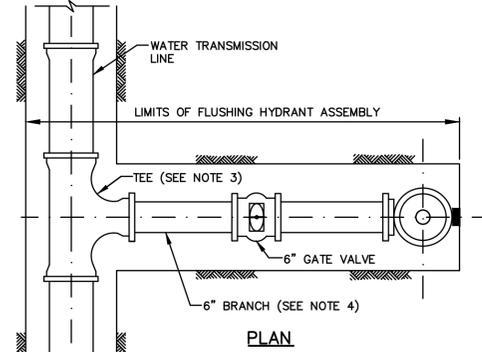
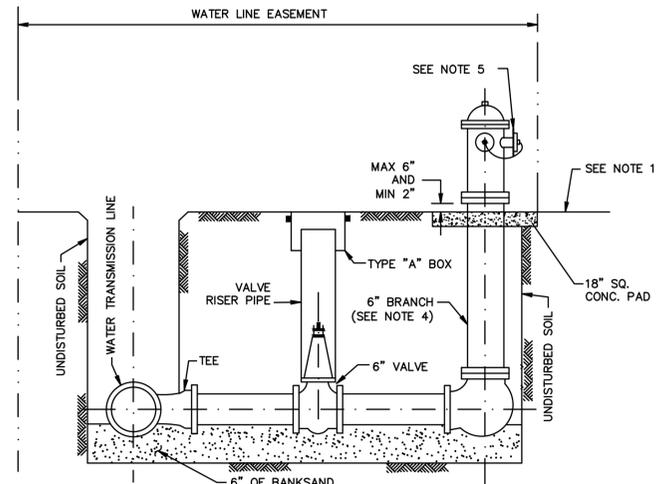
2 TYPICAL WALL PENETRATION DETAIL

WALL PENETRATION NOTES:
 1. POLYSULFIDE SEALANT EXTERIOR SIDE ONLY.
 2. SOLID SYNTHETIC RUBBER INTERLOCKING MODULAR LINKS W/STAINLESS STEEL BOLTS AND NUTS, THUNDERLINE LINK SEAL, OR APPROVED EQUAL.
 3. IF MANHOLE IS CAST IN PLACE CONSTRUCTION, PROVIDE DETAIL(S) FOR WALL PENETRATION INCLUDING EXTRA REINFORCING. DETAILS TO BE SEALED BY A PROFESSIONAL ENGINEER LICENSED IN TEXAS.



3 TYPICAL PIPE OFFSET SECTION FOR WATER MAINS

NOTES:
 1. ALL MATERIALS AND COATINGS TO BE IN ACCORDANCE WITH WATER MAIN STANDARD SPECIFICATIONS.
 2. RESTRAIN EXISTING PIPING BEYOND OFFSET SECTION AS REQUIRED TO PREVENT MOVEMENT.



NOTES:
 1. LOCATE FLUSHING HYDRANTS AS SHOWN ON PLANS. PROVIDE TEMPORARY MEANS TO DIFFUSE FLOW FROM HYDRANT AND PREVENT EROSION OF EXISTING GROUND DURING FLUSHING.
 2. IN OPEN-DITCH ROADWAYS OR OTHER CORRIDORS, SET THE FLUSHING HYDRANTS WITHIN 3 FEET OF RIGHTS-OF-WAY LINES, EASEMENT LINE OR AS SHOWN ON PLANS.
 3. IF WATER TRANSMISSION LINE IS PVC OR D.I. PIPE MATERIAL, INSTALL A D.I. TEE.
 4. PROVIDE RESTRAINED JOINTS FOR FLUSHING HYDRANT ASSEMBLY.
 5. PAINT FLUSHING HYDRANT BLACK. INSTALL DISK ON PUMPER NOZZLE AND LABEL "GCWA - FOR FLUSHING ONLY".

4 STANDARD FLUSHING HYDRANT ASSEMBLY N.T.S. (FOR WATER LINES 30-INCHES AND SMALLER IN DIAMETER)

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
 CHRISTOPHER L. CAMPBELL
 91713
 LICENSED PROFESSIONAL ENGINEER
 02/08/2016

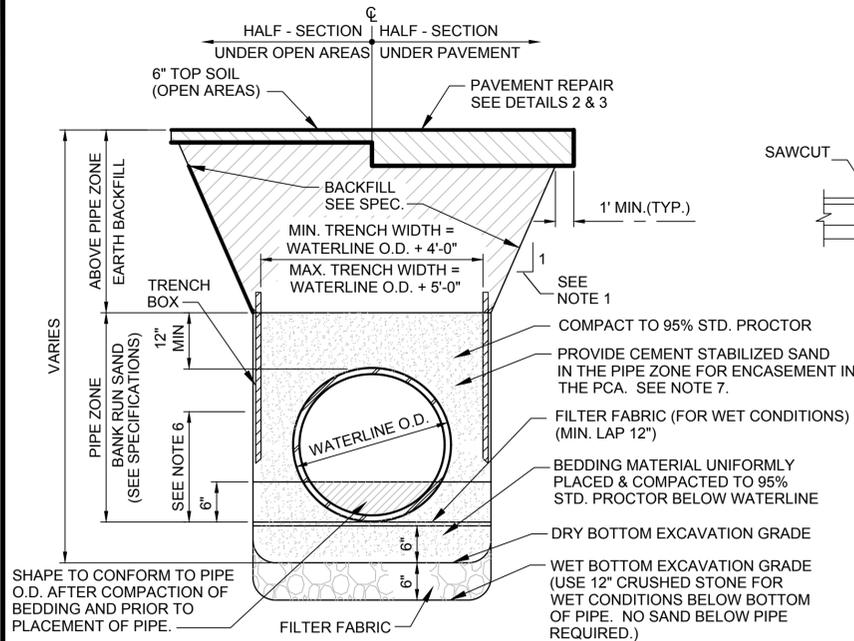
Binkley & Barfield, Inc.
 consulting engineers
 Texas Registration Number F-257
 1710 Seacrest Drive Houston, Texas 77008 (713) 869-3433

THE STATE OF TEXAS
 COUNTY OF GALVESTON

I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

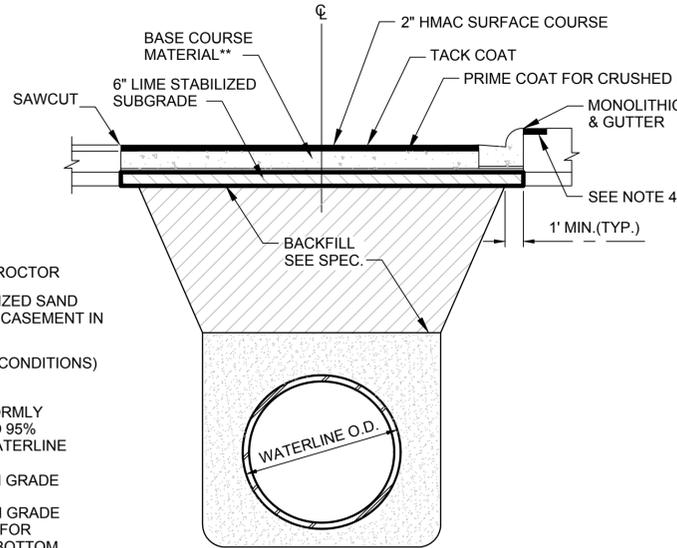
WATER DETAILS

Project No.: 145701	Scale:	SHEET
Date: Feb 18, 2016	HORZ: N/A	
Dwn By: J.T.S.	VERT: N/A	
Chkd By: J.M.B.		OF 41



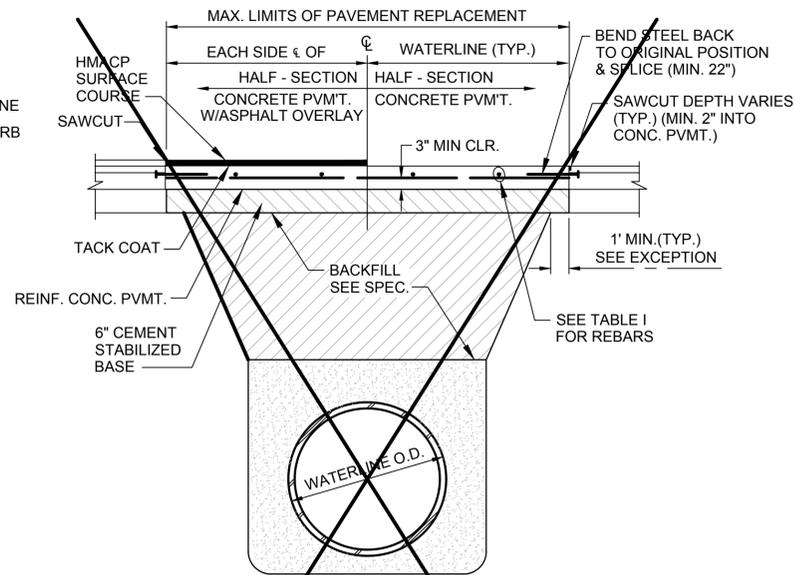
1 EXCAVATION & BACKFILL DETAIL

- NOTES:
1. SEE TRENCH SAFETY SYSTEM SPECIFICATIONS FOR MAXIMUM ALLOWABLE SLOPES.
 2. FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN.
 3. KEY CONCRETE TRENCH DAM MINIMUM OF 6 INCHES INTO TRENCH BOTTOM AND WALLS.
 4. TRENCH DAM MAY BE FORMED OR UNFORMED. ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING 6-INCH MINIMUM THICKNESS AND 6-INCH KEY DEPTH REQUIREMENTS.
 5. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY PIPELINE STRUCTURE (EACH SIDE). SEE SECTION 02317 FOR OTHER REQUIREMENTS.
 6. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
 7. USE FILTER FABRIC AS A BOND BREAKER BETWEEN CEMENT STABILIZED SAND AND PIPE.



2 TYPICAL REPAIR OF FLEXIBLE BASE PAVEMENT

- NOTES:
- * OMIT CURB WHEN EXISTING ROADWAY DOES NOT HAVE ONE
 - ** BASE COURSE MATERIAL SHALL CONSIST OF THE FOLLOWING OPTIONS:
 1. 6" HOT MIX ASPHALTIC BASE COURSE (BLACK BASE)
 2. 8" RECYCLED CRUSHED CONCRETE BASE COURSE
 3. FOR ENTIRE ROADWAY REPLACEMENT.
 4. INSTALL 1 FOOT STRIP OF SOD GRASS TO PREVENT EROSION UNTIL GRASS IS ESTABLISHED.



3 TYPICAL REPAIR OF CONCRETE PAVEMENT OR CONCRETE PAVEMENT w/ ASPHALT OVERLAY

- NOTES:
1. MIN. THICKNESS 6" FOR ROADWAY WIDTH LESS THAN OR EQUAL TO 27' F/F OF CURB.
 2. MIN. THICKNESS 7" FOR ROADWAY WIDTH GREATER THAN 27' F/F OF CURB.
 3. MIN. THICKNESS 8" FOR MAJOR THOROUGHFARES.
 4. REINFORCING STEEL ARE SHOWN ON TABLE I & II.
 5. SEAL CONCRETE JOINTS BEFORE APPLYING ASPHALT OVERLAY

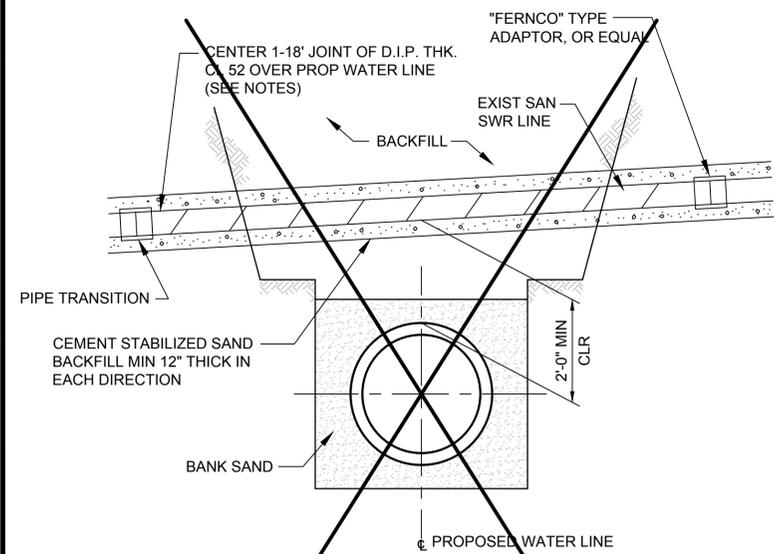
TABLE I : REINFORCING STEEL INFORMATION FOR VARIOUS PAVEMENT THICKNESS (F) WITH L = EXPANSION JOINT SPACING = 80 FT. FC = 3000 PSI AND FY = 60,000 PSI

F (IN.)	REBAR SIZE & SPACING	MIN LENGTH OF LAP (IN.)
6	A) #3 AT 11 IN., B) #4 AT 20 IN.	16 & 22
7	#4 AT 17 IN.	22
8	A) #5 AT 23 IN., B) #4 AT 15 IN.	22
9	A) #5 AT 20 IN., B) #4 AT 13 IN.	22
10	A) #4 AT 12 IN., B) #5 AT 18 IN.	22 & 27
11	A) #4 AT 10 IN., B) #5 AT 16 IN.	22 & 27
12	A) #4 AT 10 IN., B) #5 AT 15 IN.	22 & 27

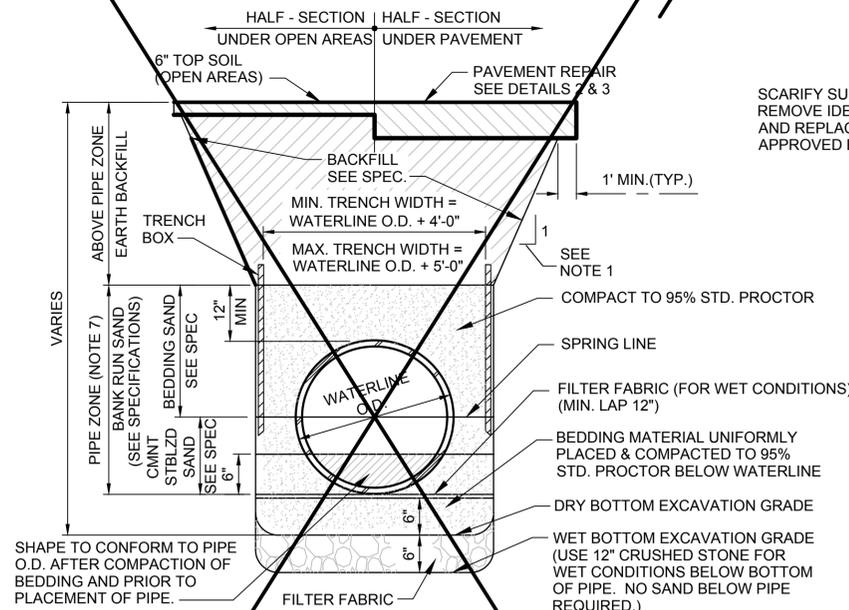
DOWELS AT EXPANSION JOINTS FOR REINFORCED PAVEMENT: CHANGE THE DOWEL SIZES & SPACING AT EXPANSION JOINTS FOR REINFORCED PAVEMENTS FROM 3/4 IN. DIAMETER, 10 IN. LONG & SPACED AT 22 IN. ON CENTERS TO THE FOLLOWING: (SEE TABLE II, BELOW)

TABLE II: DOWEL SIZES & SPACINGS AT EXPANSION JOINTS FOR VARIOUS PAVEMENT THICKNESS.

DOWEL SIZES & SPACING			
PAVEMENT THICKNESS (IN.)	DIAMETER (IN.)	LENGTH (IN.)	SPACING (IN.)
6	3/4"	18	12
7	7/8"	18	12
8	1"	18	12
9	1-1/8"	20	12
10	1-1/4"	20	12
11	1-1/4"	20	12
12	1-1/4"	20	12

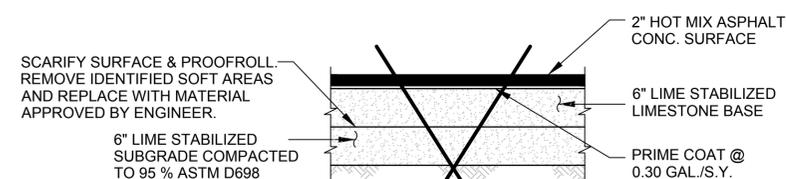


4 D.I.P. OVER PROPOSED WATER LINE



4 EXCAVATION & BACKFILL DETAIL (FOR LARGE DIAMETER WATER LINES)

- NOTES:
1. SEE TRENCH SAFETY SYSTEM SPECIFICATIONS FOR MAXIMUM ALLOWABLE SLOPES.
 2. FOR WET BOTTOM EXCAVATION LIMITS OF CRUSHED STONE, EXTEND AS SHOWN.
 3. KEY CONCRETE TRENCH DAM MINIMUM OF 6 INCHES INTO TRENCH BOTTOM AND WALLS.
 4. TRENCH DAM MAY BE FORMED OR UNFORMED. ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING 6 INCH MIN. THICKNESS AND 6 INCH KEY DEPTH REQUIREMENTS.
 5. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT. AWAY FROM ANY PIPELINE STRUCTURE (EACH SIDE). SEE SECTION 02317 FOR OTHER REQUIREMENTS.
 6. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
 7. USE POLYETHYLENE WRAP AS A BOND BREAKER BETWEEN CEMENT STABILIZED SAND AND PIPE.



6 TEMPORARY ASPHALT PAVEMENT SECTION

- GENERAL NOTES:
1. ROADWAY EXCAVATION, SITE GRADING, AND HYDROMULCH SEEDING OR SODDING WITHIN R.O.W. AND/OR LIMITS OF CONSTRUCTION IN ACCORDANCE WITH CONSTRUCTION SPECIFICATIONS.
 2. MEASUREMENT AND PAYMENT (INCLUDING DRIVEWAYS) SHALL BE AS PER SPECIFICATION SECTIONS UNLESS OTHERWISE SHOWN ON BID FORM.
 3. NEW ASPHALTIC PAVEMENTS SHALL BE MIN. 2" HMAC TOP w/BASE AND SUBGRADE PER DETAILS AND SPECIFICATIONS.
 4. NEW CONCRETE PAVEMENTS TO BE SAME THICKNESS AS EXISTING, UNLESS OTHERWISE DIRECTED.
 5. STREETS OR DRIVEWAYS SHALL BE REPAIRED OR REPLACED USING HIGH EARLY STRENGTH CONCRETE AS INDICATED ON DRAWINGS, ACCORDING TO PAVEMENT REPLACEMENT SCHEDULE WHERE PROVIDED.
 6. APPLICABLE TO EXISTING CONCRETE AREAS THAT REQUIRE REMOVAL AND REPLACEMENT CONCRETE DUE TO OPEN TRENCH (EXCLUDE THE MEDIAN ISLAND).
 7. ANY REMOVAL AND REPLACEMENT OF PAVEMENT NOT IDENTIFIED ON THE DRAWINGS SHALL BE COORDINATED WITH THE PROJECT MANAGER.
 8. ALL PAVEMENT REPLACEMENT SHALL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE CONSTRUCTION SPECIFICATIONS.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
 CHRISTOPHER L. CAMPBELL
 91713
 LICENSED PROFESSIONAL ENGINEER
 02/08/2016

Binkley & Barfield, Inc.
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 1710 Seacrest Drive - Houston, Texas 77008 (713) 869-3433

THE STATE OF TEXAS
 COUNTY OF GALVESTON

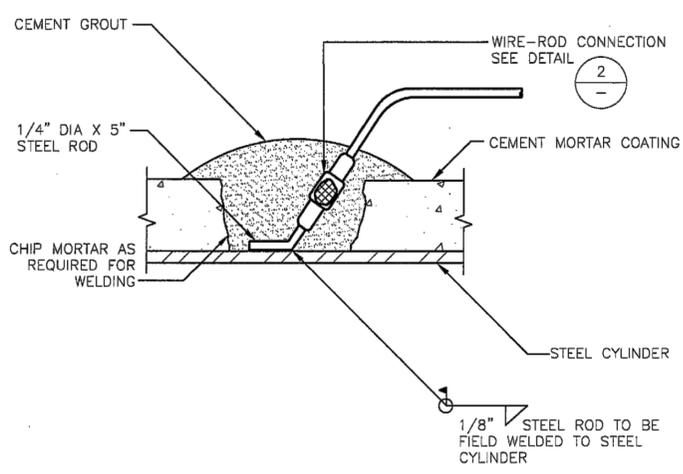
I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

EXCAVATION, BEDDING BACKFILL AND PAVEMENT REPAIR DETAILS

Project No.: 145701
 Date: Feb 18, 2016
 Dwn By: J.T.S.
 Chkd By: J.M.B.

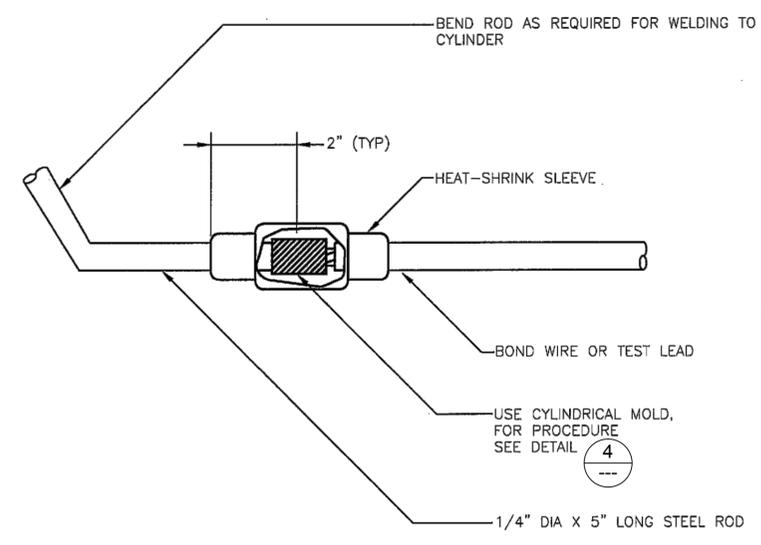
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 VERT: N/A

SHEET
 OF 41

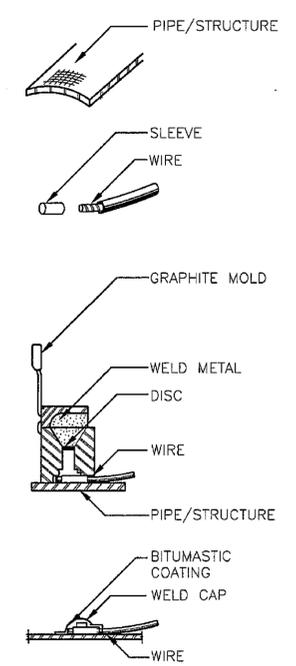


- NOTES:**
1. REINFORCING WIRE NOT SHOWN FOR CLARITY.
 2. TEST LEAD CONNECTION TO THE PIPE AT PIPE BELL ONLY.

1 TEST LEAD CONNECTION MORTAR COATED STEEL PIPE AND AWWA C - 303
N.T.S.

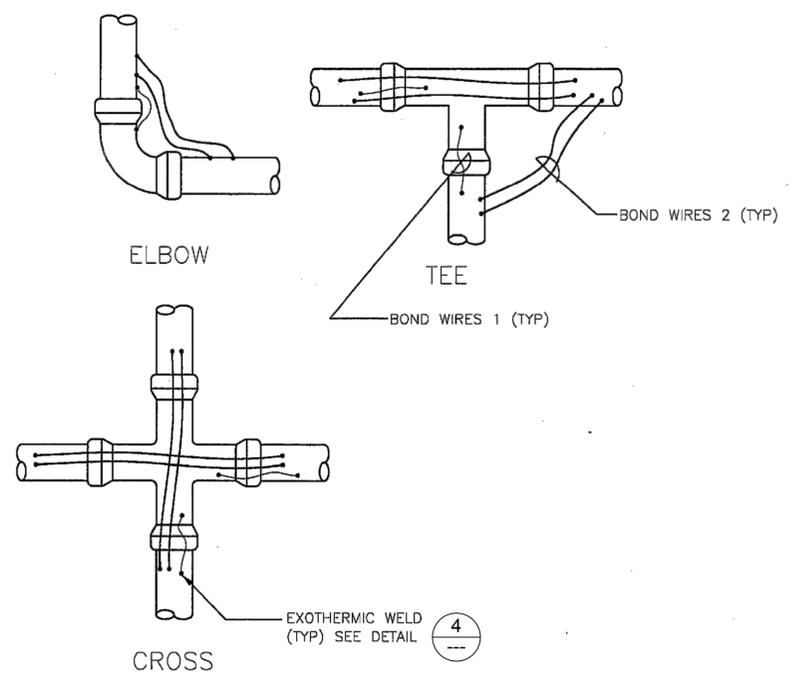


2 WIRE - ROD CONNECTION
N.T.S.

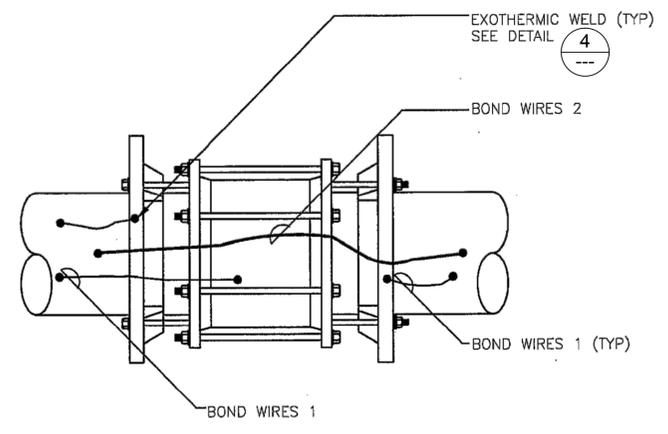
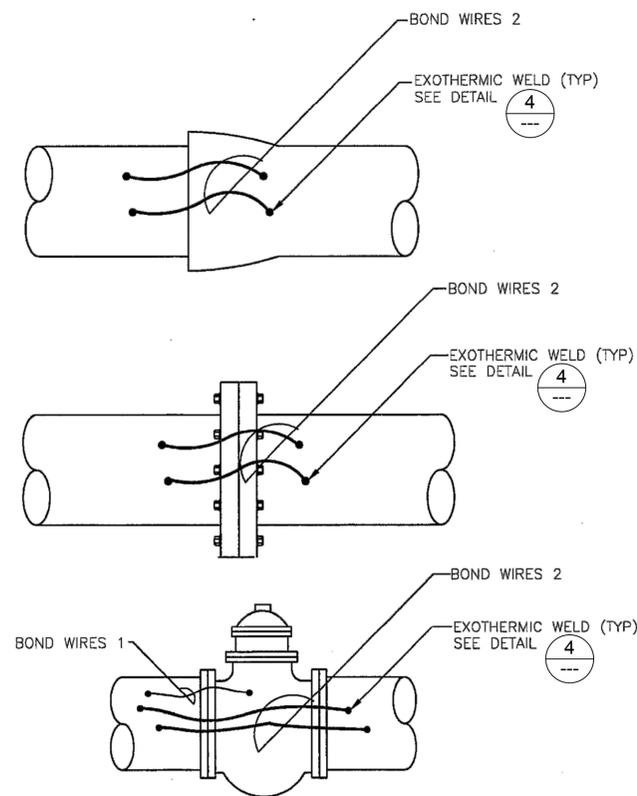


4 EXOTHERMIC WELD
N.T.S.

1. FILE PIPE/STRUCTURE TO BARE METAL AND CLEAN SURFACE.
2. STRIP INSULATION FROM WIRE AND ATTACH SLEEVE.
3. HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN REMOVE SLAG FROM CONNECTION WITH CHIPPING HAMMER.
4. COVER CONNECTION WITH BITUMASTIC COATING OVER ALL EXPOSED METAL, PLACE WELD CAP OVER CONNECTION. REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH MFG RECOMMENDATIONS.



3 JOINT BENDS
N.T.S.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
 CHRISTOPHER L. CAMPBELL
 91713
 LICENSED PROFESSIONAL ENGINEER
 02/08/2016

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THE STATE OF TEXAS
 COUNTY OF GALVESTON

I-45 & HWY-6 WATER DISTRIBUTION SYSTEM

CATHODIC PROTECTION DETAILS

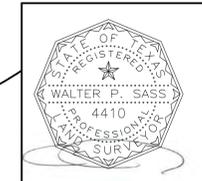
Project No.: 145701	Scale: HORZ: N.T.S.	SHEET
Date: Feb 18, 2016	VERT:	
Dwn By: J.T.S.		
Chkd By: J.M.B.		OF 41

\\PZHQ\Data\Bldg\Enviro\145701 - Galveston Co. W. CAD\Drawings\001C-D\Catp.dwg - CATHODIC PROTECTION DETAILS Plotted Feb 18, 2016 at 7:04am by J. Lost Sowed by J.



Basis of Bearings.
 All Bearings Based on the Texas State Plane Coordinate System, South Central Zone No. 4204. The Coordinates Shown Hereon are State Plane Surface Coordinates and May Be Brought to Grid by Multiplying by the Combined Scale Factor of 0.99986661.

Benchmark.
 HGCSO MON. No. 59
 Stainless Steel Rod w/ Cap
 Stamped "HGCSO 59 1986"
 Located 0.1 Mile N.W. Along Hwy. 6 from F.M. 646 To Bank of Santa Fe Property on Right.
 Elev. = 22.6' NAVD88 2001 Adj.



3	ADD SCALE FACTOR NOTE	J.C.M.	02/10/16
2	RENUMBER SHEETS	J.C.M.	02/02/16
1	CHANGE SHEET SIZE	J.C.M.	06/11/15
REV.	DESCRIPTION	BY	DATE

WEISSER Engineering Co.
 19500 Park Row, Suite 100
 Houston, Texas 77084
 (281) 579 - 7300
 www.weissereng.com
 T&P.E.R. # 88 T&P.L.S. #100518-00

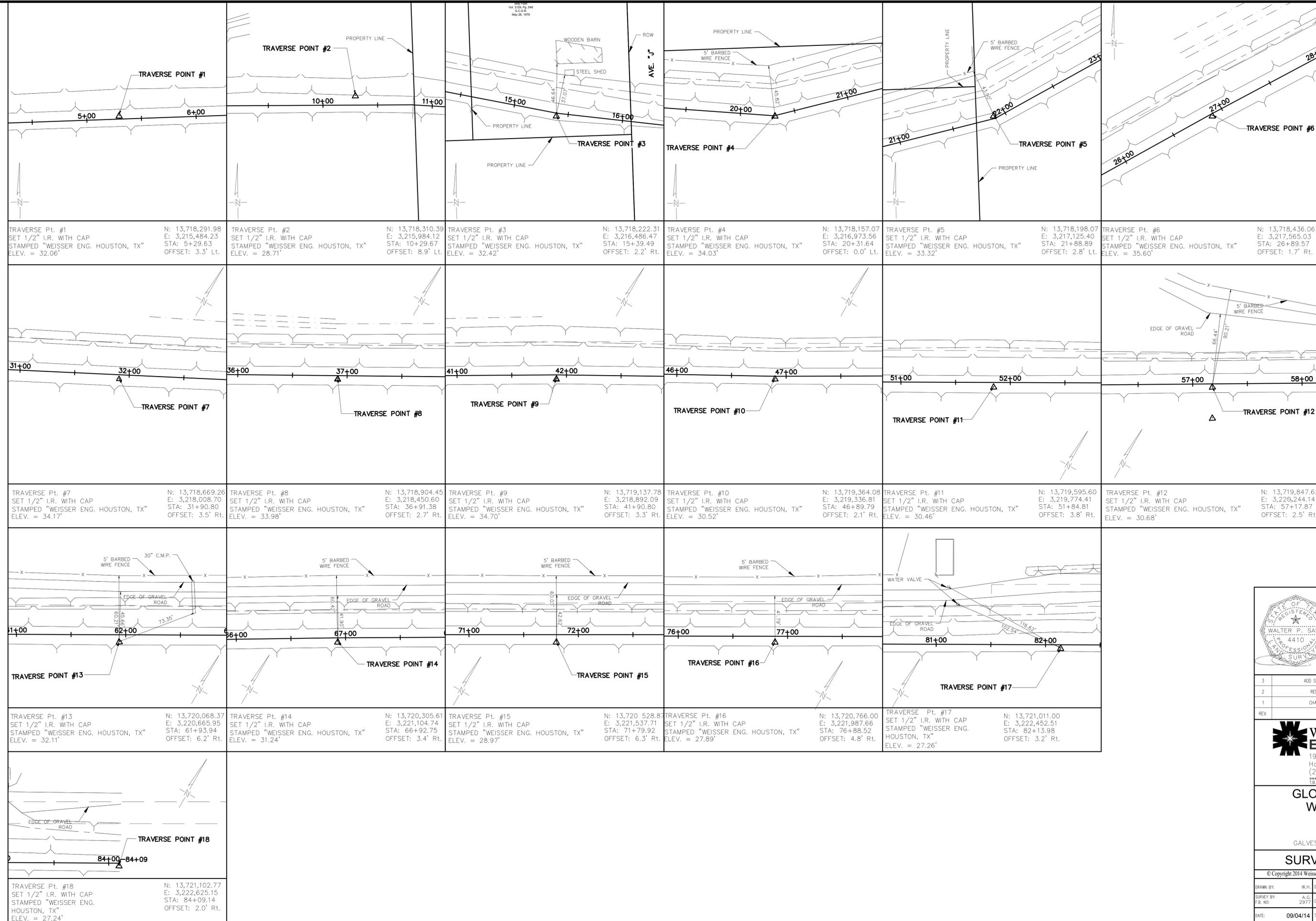
GLO I-45 / HWY 6 WATER LINE

I-45 AT HIGHWAY 6
 GALVESTON COUNTY, TEXAS

SURVEY CONTROL

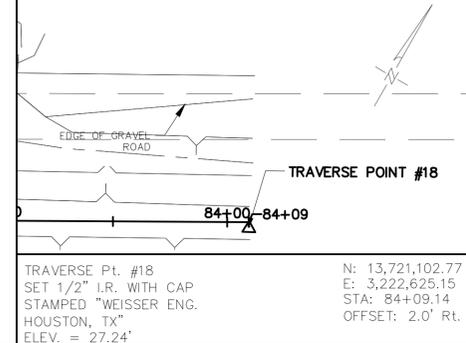
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DRAWN BY:	W.H.	DESIGNED BY:	W.E.C.	SHEET	40 OF 41
SURVEY BY:	W.E.C.	CHECKED BY:	L.Y./J.C.M.		
F.B. NO.:	1234				40
DATE:	09/04/14	SCALE:	VERT: 1" = N/A HOR: 1" = N/A	JOB NO.:	EG685 (1234-567)



TRAVERSE Pt. #1 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 32.06' N: 13,718,291.98 E: 3,215,484.23 STA: 5+29.63 OFFSET: 3.3' Lt.	TRAVERSE Pt. #2 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 28.71' N: 13,718,310.39 E: 3,215,984.12 STA: 10+29.67 OFFSET: 8.9' Lt.	TRAVERSE Pt. #3 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 32.42' N: 13,718,222.31 E: 3,216,486.47 STA: 15+39.49 OFFSET: 2.2' Rt.	TRAVERSE Pt. #4 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 34.03' N: 13,718,157.07 E: 3,216,973.56 STA: 20+31.64 OFFSET: 0.0' Lt.	TRAVERSE Pt. #5 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 33.32' N: 13,718,198.07 E: 3,217,125.40 STA: 21+88.89 OFFSET: 2.8' Lt.	TRAVERSE Pt. #6 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 35.60' N: 13,718,436.06 E: 3,217,565.03 STA: 26+89.57 OFFSET: 1.7' Rt.
TRAVERSE Pt. #7 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 34.17' N: 13,718,669.26 E: 3,218,008.70 STA: 31+90.80 OFFSET: 3.5' Rt.	TRAVERSE Pt. #8 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 33.98' N: 13,718,904.45 E: 3,218,450.60 STA: 36+91.38 OFFSET: 2.7' Rt.	TRAVERSE Pt. #9 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 34.70' N: 13,719,137.78 E: 3,218,892.09 STA: 41+90.80 OFFSET: 3.3' Rt.	TRAVERSE Pt. #10 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 30.52' N: 13,719,364.08 E: 3,219,336.81 STA: 46+89.79 OFFSET: 2.1' Rt.	TRAVERSE Pt. #11 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 30.46' N: 13,719,595.60 E: 3,219,774.41 STA: 51+84.81 OFFSET: 3.8' Rt.	TRAVERSE Pt. #12 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 30.68' N: 13,719,847.62 E: 3,220,244.14 STA: 57+17.87 OFFSET: 2.5' Rt.

TRAVERSE Pt. #13 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 32.11' N: 13,720,068.37 E: 3,220,665.95 STA: 61+93.94 OFFSET: 6.2' Rt.	TRAVERSE Pt. #14 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 31.24' N: 13,720,305.61 E: 3,221,104.74 STA: 66+92.75 OFFSET: 3.4' Rt.	TRAVERSE Pt. #15 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 28.97' N: 13,720,528.87 E: 3,221,537.71 STA: 71+79.92 OFFSET: 6.3' Rt.	TRAVERSE Pt. #16 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 27.89' N: 13,720,766.00 E: 3,221,987.66 STA: 76+88.52 OFFSET: 4.8' Rt.	TRAVERSE Pt. #17 SET 1/2" I.R. WITH CAP STAMPED "WEISSER ENG. HOUSTON, TX" ELEV. = 27.26' N: 13,721,011.00 E: 3,222,452.51 STA: 82+13.98 OFFSET: 3.2' Rt.
--	--	--	--	--



Basis of Bearings:
 All bearings based on the Texas State Plane Coordinate System, South Central Zone No. 4204. The Coordinates Shown Hereon are State Plane Surface Coordinates and May Be Bought to Grid by Multiplying by the Combined Scale Factor of 0.99986661.

Benchmark:
 HCCSD MON. No. 59
 Stainless Steel Rod w/ Cap
 Stamped "HCCSD 59 1986"
 Located 0.1 Mile N.W. Along Hwy. 6 from F.M. 646 To Bank of Santa Fe Property on Right.
 Elev. = 22.6' NAVD88 2001 Adj.



3	ADD SCALE FACTOR NOTE	J.C.M.	02/10/16
2	RENUMBER SHEETS	J.C.M.	02/02/16
1	CHANGE SHEET SIZE	J.C.M.	06/11/15
REV.	DESCRIPTION	BY	DATE

WEISSER Engineering Co.
 19500 Park Row, Suite 100
 Houston, Texas 77084
 (281) 579 - 7300
 www.WeisserEng.com
 T.B.P.L.S. # 4410 T.B.P.L.S. #100518-00

GLO I-45 / HWY 6 WATER LINE

GALVESTON COUNTY, TEXAS

SURVEY CONTROL

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DRAWN BY:	W.H.	DESIGNED BY:	W.E.C.	SHEET	41 OF 41
SURVEY BY:	A.G.	CHECKED BY:	L.Y./J.C.M.		
F.B. NO.:	2977				41
DATE:	09/04/14	SCALE:	VERT: 1"= 50' HOR: 1"= 50'	JOB NO.:	EG685 (1400-085)

P:\EG685\Drawings\Survey\Central\Drawings\Details\02/10/16\2-48-DRAWN.pch