



CONTRACT DOCUMENTS

WATER RESOURCES INTEGRATION PROGRAM PHASE 2 – PIPELINE SEGMENTS 2C AND 3

SAWS Job No. 20-8610 (WATER)

SAWS Solicitation No. CO-00336

July 2020

BID DOCUMENTS

Project Manual and Technical Specifications Engineer Seal Responsibilities

Except as indicated on this sheet, this project manual and all technical specifications were prepared under the direction and supervision of Rob Jenkins, PE# 103589.



CIVIL DESIGN

For only Segment 2C, Technical Specification Sections 02571, 02572 and 05500 were prepared under the direction and supervision of Ernest T Maestas, PE#52938.



CIVIL DESIGN

For only Cathodic Protection System, Technical Specification Section 13110 was prepared under the direction and supervision of Christopher L. Sheldon, PE #112184.



CATHODIC PROTECTION SYSTEM

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CITY OF SAN ANTONIO (COSA) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Latest Edition)

REQUEST FOR COMPETITIVE SEALED PROPOSALS (RFCSP)
Solicitation No. CO-00336

Sealed proposals are requested by the San Antonio Water System for the construction of approximately 84,769 linear feet of 48-inch welded steel water transmission main, polyurethane coated, mortar lined, a cathodic protection system, TxDOT crossings, tree preservation measures and site restoration, for the Water Resources Integration Program Phase 2 – Pipeline Segments 2C and 3 Project, SAWS Job No. 20-8610.

To view additional project information, as well as obtain the plans and specifications for this project, visit our website located at www.saws.org and click on the Business Center. Then select Bidder, Consultant, and Vendor Registration, which is located on the left-hand side of the screen. Select the Register Now button and proceed with registration.

For difficulties downloading plans and specifications, contact the Contracting Department at 210-233-3341.

A non-mandatory pre-proposal WebEx meeting will be held at 10:00 AM (CT) on Wednesday August 12, 2020.

<https://saws.webex.com>
Meeting number (access code): 146 674 1601
Meeting password: yWQeTqmh369
Audio Connection: (210) 233-2090

For questions regarding this solicitation, technical questions or additional information, please contact Florinda Gonzales, Interim Contract Administrator, in writing via email to: florinda.gonzales@saws.org or by fax to (210) 233-4290 until **10:00 AM (CT) on Monday, August 17, 2020**. Answers to the questions will be posted to the web site by **4:00 PM (CT) on Wednesday, August 19, 2020** as a separate document or included as part of an addendum. Be advised that firms responding to this RFCSP (Respondents) are prohibited from communicating with any other SAWS staff, the Consultant, the Developer, or COSA officials regarding this RFCSP up until the contract is awarded as outlined in the Instructions to Respondents.

Due to the COVID-19 emergency and to protect the health of the public, SAWS is implementing new procedures for the submission of bids. Proposals will be received either Electronically or through Sealed proposals, until 10:00 AM (CDT) on Thursday, September 3, 2020. Electronic proposals will be received via the secure SAWS FTP site. Sealed proposals will be received by Contract Administration, 2800 U.S. Hwy 281 North, Tower II, Customer Center Building, via a drop box located on the left wall when walking through the first set of double glass doors of the main Tower II entry on the north side of the building, San Antonio, Texas 78212. See the Electronic Bid Opening Instructions attachment for additional information regarding an electronic bid submittal. Electronic proposals shall be accompanied by a bid bond in an amount not less than five percent of the total bid price. Sealed proposals must be accompanied by a cashier's check, certified check, or bid bond in an amount not less than five percent of the total bid price. Bids will then be publicly opened and read aloud by Contract Administration via WebEx.

If Respondents intend to submit proposals electronically, Respondents will need to submit a request by **Wednesday, September 2, 2020 by 2:00 PM (CDT)** to receive access to the File Transfer Protocol (FTP) site via email to florinda.gonzales@saws.org. Respondent's email requesting access to the FTP site shall provide the legal name of Respondent's company and the intended recipient's email address and phone number. No requests for FTP site access will be accepted after **Wednesday, September 2, 2020 by 2:00 PM (CDT)**.

Proposals opening WebEx meeting will be held at 10:00 AM (CT) on Thursday, September 3, 2020.

<https://saws.webex.com>
Meeting number (access code): 146 985 9903
Meeting password: PNt345HEZFa
Audio Connection: (210) 233-2090

INSTRUCTIONS TO RESPONDENTS

1. Proposals will be submitted in accordance with the following:
 - a. Eight (8) sealed proposals, one (1) original, clearly marked and signed in blue ink, and seven (7) copies will be **personal/hand delivered** to and received by **Counter Services** in the Customer Service office across from the Guard Station, **San Antonio Water System, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 141 , San Antonio, Texas 78212**, until the time specified in the Invitation for Competitive Sealed Proposals.
 - b. If the submittal of a sealed proposal is by any **means other than personal/hand delivery**, then it is the Respondents sole responsibility to San Antonio Water System, 2800 U.S. Hwy 281 North, Customer Center Building - **Contract Administration, Suite 171**, San Antonio, Texas 78212, no later than the exact time specified in the Invitation for Competitive Sealed Proposals.
 - c. All sealed proposals errantly submitted or delivered to a location other than the exact location stated above will be returned unopened.
 - d. All sealed proposals received after the exact time set for in the Invitation for Competitive Sealed Proposals will be returned unopened.
 - e. The San Antonio Water System Contracting Office may, at its sole discretion, without waiver of rights or authority, in equity or at law, return unopened, any sealed proposals not meeting the exact requirements as stated above.
2. Proposals will be opened, evaluated and awarded in accordance with the following:
 - a. Proposals will be opened in a public setting and the names of the offerors and all prices stated in each proposal will be read aloud by a Contract Administration representative.
 - b. Not later than the 45th day after the date of the opening of the proposals, SAWS will evaluate the responses based on the selection criteria set out herein and on its ranking evaluation.
 - c. SAWS will first attempt to negotiate a contract with the selected offeror. SAWS and its engineers or architects may discuss with the selected offeror options for a scope or time modification and any price change associated with the modification. If SAWS is unable to negotiate a contract with the selected offeror, SAWS shall, formerly and in writing, end negotiations with that offeror and proceed to the next offeror in the order of selection ranking until a contract is reached or all proposals are rejected.
 - d. SAWS will select the offeror that offers the best value for SAWS. In determining best value, SAWS is not restricted to consider price alone, but will consider the other factors stated in the evaluation criteria set out in the request for sealed proposals. Respondent shall print or type their name and manually sign the schedule and each continuation sheet on which each entry is made.

- e. No proposal may be withdrawn after the solicitation deadline without the written consent of a Contract Administration representative.
3. All proposals must be accompanied by Certified or Cashier's Check or an approved Bid Bond in the amount of not less than five percent (5%) of the total offer, payable without recourse to the San Antonio Water System. Surety shall provide a copy of the Power of Attorney authorizing the Executing Agent the authority to execute the bid bond documents and bind the Surety to the bid bond conditions. The bid bond shall have a corporate Surety that is licensed to conduct business in the State of Texas and authorized to underwrite bonds in the amount of the bid bond. Submission of an individual surety is not acceptable for purposes of bonding a bid bond. Bid bonds, Certified or Cashier's checks will be retained for the first, second, and third lowest bidders until the contract is executed. Proposals without bond Security will not be considered.
 4. Proposal packets must be submitted with the original price proposal form attached herein and shall be sealed in an envelope plainly marked on the outside with solicitation number, the date and time of the solicitation deadline, and the name of the project.
 5. Proposals will be prepared in accordance with the following:
 - a. The Respondent shall thoroughly examine the drawings, specifications, schedule, instructions and all other documents.
 - b. Respondents shall make all investigations necessary to inform themselves thoroughly regarding plant and facilities for delivery of material and equipment as required by the project conditions. Respondents shall determine for themselves by examination at the site of the Work the conditions which exist and under which they will be expected to perform their work. Prior to presenting their sealed proposals, Respondents are encouraged to take their own representative samples of existing coating systems; e.g., exterior, interior and piping coating systems, test samples in a state certified laboratory for total lead, chromium and cadmium, and use their best judgment in determining their construction method, labor hazard protection, equipment and materials to perform the scope of work in full compliance with EPA, TCEQ, and OSHA Regulations. SAWS will presume that the necessary examination, samples, and testing have been conducted prior to Respondents submitting their offer for consideration. No plea of ignorance by the Respondent of conditions that exist, or that may hereafter exist as a result of failure or omission on the part of the Respondent to make the necessary examinations and investigations to fulfill in every detail the requirements of the contract documents, will be accepted as the basis for varying the requirements of the San Antonio Water System or the compensation to the Contractor.
 - c. The Respondent is required to submit a Contractor's Qualification Statement formatted as directed in the Supplementary Instructions to Respondents.
 - d. The Respondent shall furnish all information required by the price proposal form, including the Proposal Certification page. The Respondent shall print or type their name and manually sign the Price Proposal in the required area of the document.
 - e. The Respondent is required to submit a Good Faith Effort Plan and all SMWVB Certification Certificates for the Respondent and all subcontractors as part of the proposal.

Respondents and/or their agents may contact the SMWVB Program Manager at 210-233-3420 for assistance or clarification with issues specifically related to the Small, Minority, Woman Business and Veteran-owned (SMWVB) Program policy and/or completion of the Good Faith Effort Plan form.

- f. The Respondent is required to submit a Conflict of Interest Questionnaire (CIQ Form). Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with SAWS shall file a completed Conflict of Interest Questionnaire (CIQ) with SAWS. The CIQ will be submitted as part of the proposal. Form is available from the Texas Ethics Commission at www.ethics.state.tx.us. Please consult your own legal advisor if you have questions regarding the statute or form. To report suspected ethics violations impacting The San Antonio Water System, please call 1-800-687-1918.
 - g. The Respondent is required to submit as part of the proposal a letter from the insurance provider stating provider's commitment to insure the Contractor for the types of coverage's as or an Insurance Certificate to be in conformance with the types of coverage specified in the General Conditions Section 5.7 – Contractor's Insurance Requirements, if awarded the contract.
 - h. Pursuant to Section 151.311 of the Texas Tax Code, as amended, in order for the San Antonio Water System to continue to benefit from its status as a State Sales and Use Tax Exempt Organization, construction contracts must be awarded on a "separated contract" basis. A "separated contract" is one that distinguishes the value of the tangible personal property (materials such as pipe, bricks, lumber, concrete, paint, etc.) to be incorporated into the project from the total contract price. Under the "separated contract" format, the contractor in effect becomes a "seller" to the San Antonio Water System of materials that are to be physically incorporated into the project realty. As a "seller", the contractor will issue a "Texas Certificate of Resale" to the supplier in lieu of paying the sales tax on materials at the time of purchase. The contractor will also issue a "Certificate of Exemption" to the supplier demonstrating that the personal property is being purchased for resale and that the resale is to a department of the City of San Antonio, Texas, which is a sales tax exempt entity. Contractors should be careful to consult the most recent guidelines of the State Comptroller of Public Accounts regarding the sales tax status of supplies and equipment that are used and consumed during project work but that are not physically incorporated into the project realty. Contractors that have questions about this law are asked to inquire with the State Comptroller of Public Accounts, Tax Administration Division, State of Texas, Austin, Texas 78774 (512) 463-4600. Respondents will not include any federal taxes in offered prices since the San Antonio Water System is exempt from payment of such taxes. "Texas Certificates of Exemption", "Texas Certificates of Resale" and "Texas Sales Tax Permits" are forms available to the contractor through the regional offices of the State Comptroller of Public Accounts.
6. Respondents should adhere to the following restrictions in communication:
- a. Respondents or their representatives are prohibited from communicating with any City of San Antonio officials regarding this solicitation from the time it is released until it has been acted upon by the Board of Trustees, which includes:
 - City Council members (as defined by the City of San Antonio Ethics Code),

- City Council member's staff, and
 - San Antonio Water System (SAWS) Board of Trustees.
- b. Respondents or their representatives are prohibited from communicating with SAWS employees regarding this RFCSP, except as provided under "Technical Questions" to the point of contact identified within the Invitation to Competitive Sealed Proposals, from the time the solicitation is released until the contract is awarded.
 - c. Respondents or their representatives are prohibited from communicating with the Consultant, Developer, or any contract staff who were or are involved in the development of this RFCSP, regarding this RFSCP, from the time the solicitation is released until the contract is awarded.
 - d. Communication includes "thank you" letters, phone calls, emails, and any contact that results in direct or indirect discussion of the IFB and/or bid submitted.
 - e. If it is determined that a Bidder violates this provision, SAWS may disqualify the bid from consideration.
7. Any catalogue or manufacturer's reference used in describing an item is merely descriptive, and not restrictive unless otherwise noted, and is used only to indicate type and quality of material. When items proposed differ in any way from those specified, Respondents are required to state exactly what they intend to furnish. Otherwise, they shall be required to furnish the items as specified.
 8. The work shall be done and completed in accordance with the following Contract Documents as furnished by the San Antonio Water System:
 - a. The Invitation for Competitive Sealed Proposals
 - b. The Instructions to Respondents
 - c. The Supplementary Instructions to Respondents
 - d. The Price Proposal
 - e. The Payment Bond
 - f. The Performance Bond
 - g. The General Conditions of the Contract
 - h. The Supplemental Conditions of the Contract
 - i. The Special Conditions of the Contract
 - j. The Construction Specifications
 - k. The Standard Drawings
 - l. Addenda
 - m. Change Orders
 - n. Good Faith Effort Plan
 - o. Conflict of Interest Questionnaire
 9. The successful Respondent will be required to execute the standard San Antonio Water System Contract Agreement, Performance and Payment Bonds as outlined in the General Conditions. These forms will be prepared and furnished by the San Antonio Water System. As part of the contract requirements:

- a. Surety shall provide a copy of the Power of Attorney authorizing the Executing Agent the authority to execute the bond documents and bind the Surety to the bond conditions. Surety shall also provide evidence that the Surety is authorized to provide service in the State of Texas at the amount on the Bond. Contractor agrees that all Performance and Payment Bonds required shall be submitted in accordance with General Conditions, Sections 3.5 & 3.6.
 - b. Contractor agrees that, unless i) it is a sole proprietorship or ii) it is a company with fewer than 10 full-time employees and the value of this Contract is less than \$100,000, it does not boycott Israel and will not do so during the term of this Contract. This provision is in compliance with §2270.001 of the Texas Government Code. SAWS agrees to comply with the United States and Texas Constitutions in consideration of whether to enforce this provision.
10. Where there is an error in the extension, the San Antonio Water System Contracting Office will extend the written unit price and make any corrections necessary. Any error will be corrected, and the correct amount will be the basis for determining the offer position.
11. Respondents are advised that estimated quantities of anticipated requirements during the contract period are not calculated with certainty. It is the policy of the Board, however, as a matter of prudent buying and contracting, to establish in advance of actual purchase or performance of the work, the price of the work which is anticipated, and the price on certain items calculated on the maximum number of a particular item which it might need during a contract period. Respondents are advised that during such period, the Board may determine not to purchase any of the items or may delete any or all of the work listed in a price proposal form or invitation. Under such a contract, the Board's only commitment is to purchase the items from or proceed with the work by the successful Respondent at the price proposed if the Board should, in fact, decide to purchase such items during the contract period or proceed with such work as proposed. On all proposals, the Board reserves the right to reject a proposal, which in the Board's judgment contains a price proposal that is "unbalanced." An "unbalanced price proposal" is defined as one in which a particular item or a class of items is offered at a figure sufficiently less than or higher than either general market price or Respondent's cost, so as to make the Respondent low on the overall price proposal but high on a significant number of other items. The Board reserves the right to exercise its judgment and reject such proposal as unqualified. If the Board nevertheless accepts such an unbalanced price proposal and the contract is awarded, the Board reserves the right to delete any or all of such items from the purchases to be made or work to be done.
12. SAWS will provide all necessary easements for the project.
13. No owner, stockholder, partner, officer, or employee of the Respondent, or any person who has a financial interest in this contract in any way, whether direct or indirect, shall be an officer or employee of the San Antonio Water System or the City of San Antonio at the time of submitting a proposal on this contract, or during the life of this contract. Any violations of this provision will render the proposal or contract void.
14. The Contractor will establish a San Antonio address and telephone number and file that information with the Contracting Officer prior to starting work. The Contractor's local address

and telephone number will be maintained until the work is completed and accepted by the owner.

15. In case of ambiguity, duplication or obscurity in the proposals, the San Antonio Water System Contracting Office reserves the right to construe and apply the meaning thereof. The San Antonio Water System Contracting Department reserves the right to reject any and all proposals and to waive formalities.
16. The San Antonio Water System Contracting Office reserves the right, subject to the Contractor's approval, to extend any annual contract for an additional period of not more than one year, subject to the same terms and conditions as enumerated in the invitation and instruction to Respondents and at a price or prices not to exceed the prices quoted.
17. It is anticipated that the contract will be awarded within 90 days after the solicitation deadline to the Respondent whose proposal, conforming to the invitation for competitive sealed proposals, offers the best value to SAWS. SAWS reserves the right to take whichever action as may, in the judgment of the SAWS, to be in its best interest as follows:
 - (1) Reject all offers.
 - (2) Award the contract to the Offeror that offers the best value based on the selection criteria.
 - (3) Reserve the right to negotiate with the selected Offeror.

Respondents are advised that the awarding of contracts is a matter solely within the jurisdiction of the Board of Trustees. SAWS reserves the right to accept any items or groups of items in this RFCSP.

18. San Antonio Water System Contracting Office may reject the Proposal when: (a) the Respondent misstates or conceals any material fact in the proposal, or if (b) the proposal does not strictly conform with the law or the requirements of this RFCSP, or if (c) the proposal is conditional, or if (d) the price proposal is unbalanced, or if (e) the Respondent fails to acknowledge in the final price of the price proposal any and all addendums issued on the bid proposal prior to the solicitation deadline, or if (f) the Respondent fails to follow the restriction from communication outlined in the Instructions to Respondents.

It will be the full responsibility of each Respondent to visit the SAWS website to verify the existence of and acknowledge with their proposal, any and all addendums issued by the San Antonio Water System. The San Antonio Water System Contracting Office reserves the right to reject any and all proposals, to accept any proposals, or parts thereof, considered by the San Antonio Water System to be in its best interest, and to waive formalities or irregularities.

19. Before submitting a proposal, the Respondent should carefully examine the Price Proposal, Plans, Specifications, Special Conditions, General Conditions, and the form of the contract to be entered into for the work contemplated. Respondents shall examine the site of the work and satisfy themselves as to the conditions that will be encountered relating to the character, quality and quantity of work to be performed and materials to be furnished. Such examinations shall include the arrangement and condition of existing structures and facilities, the procedure necessary for maintenance of uninterrupted operation of existing facilities, the availability and cost of labor, and facilities for transportation, handling and storage of materials and equipment.

The submission of a proposal by the Respondent shall be conclusive evidence that he has complied with these requirements. The borings, profiles, existing underground utilities, and water elevations shown on the plans were obtained for the use of the San Antonio Water System in the preparation of the plans, and the Respondent is hereby cautioned that the San Antonio Water System neither assumes nor implies any responsibility for the accuracy of this data.

20. The Respondent in preparing their offer, shall take cognizance of the difficulty of distinguishing between boulders and ledge rock, the difficulty of accurately classifying all material encountered in making the subsurface investigations, the possible erosion of stream channels and banks after survey data has been obtained, and the unreliability of water elevations other than those for the date recorded. Claims for additional compensation due to variations between conditions actually encountered in a construction and as indicated in the plans will not be allowed.
21. All contracts in excess of \$10,000 with contractors or suppliers having 15 or more employees will include the clauses listed below:
 - (a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, national origin, political belief or affiliation, age, disability or genetic information. The Contractor will assure that employees or applicants for employment are treated in a fair and equitable manner in such actions which 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 will post in conspicuous places for the benefit of the employee and applicants for employment notices setting forth the provisions of this nondiscrimination clause. Upon request, the Contractor will furnish to the San Antonio Water System all information and reports and will permit access to the books, records, and accounts for the purposes of an investigation to ascertain compliance with rules and regulations set forth by this organization.
 - (b) If a Contractor is found not to be in compliance with the nondiscrimination clause of this contract, the contract may be canceled, terminated, or suspended in all or in part and the Contractor may be debarred from further contracts with the San Antonio Water System.
 - (c) All Respondents or prospective Contractors or Subcontractors will be required to submit a statement in writing signed by an authorized official or agent in behalf of the company to the effect that the signer's practices and policies do not discriminate on the grounds of race, color, religion, sex, or national origin.

The Contractor shall comply with all provisions of Executive Order 11246, Equal Employment Opportunity, dated 24 September 1965 or as amended and with Section 3 of the Housing and Urban Development Act of 1968 covering opportunities for business and lower financed HUD assisted projects.

Statement on President's Executive Orders

Has your firm previously performed work subject to the President's Executive Orders Numbers 11246 and 11375 or any preceding similar executive orders (Numbers 10925 and 11114)? ☐ Yes ☐ No

Contractors/Consultants/Vendors on work paid by federal funds will be required to comply with the president's executive order no. 11246, "Equal Employment Opportunity," as amended by executive order no. 11375, "amending executive order 11246 relating to equal employment opportunity," and as supplemented by regulations at 41 CFR part 60, Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department Of Labor.

22. Approval of Plans and/or Specifications by an employee of SAWS shall not constitute an assumption of liability by the San Antonio Water System or such employee for any inaccuracy of computation or deficiency of design therein.
23. Bidder shall not offer, confer, or agree to confer any benefit or gift to any San Antonio Water System Employee, Officer, or Trustee of the Board of the San Antonio Water System and Water System employees are prohibited from soliciting, accepting or agreeing to accept any gifts from outside sources; please see Section M. – Gifts or Benefits of the Water System's Code of Ethical Standards. Section M of the Water System's Code of Ethical Standards regarding Gifts or Benefits is available on the SAWS Business Center website.
24. In 2015, and made effective as of January 1, 2016, the Texas Legislature adopted House Bill 1295, which added section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties (Form 1295) to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The Texas Ethics Commission has adopted rules requiring the business entity to file Form 1295 electronically with the Commission. The online filing application is available on the Texas Ethics Commission (TEC)'s website. A copy of the completed form, which will include a certification of filing that with a unique certification number, will be required with the signed contract. For additional information, Bidders may go to the Texas Ethics Commission website at the following link:
- https://ethics.state.tx.us/whatsnew/elf_info_form1295.htm
25. For information only, the following "WORKERS COMPENSATION INSURANCE COVERAGE REQUIREMENTS", has been added at the end of this section. Refer to Section 5.7 CONTRACTOR'S INSURANCE REQUIREMENTS of the General Conditions for further clarification.

SUPPLEMENTARY INSTRUCTIONS TO RESPONDENTS

The San Antonio Water System (SAWS) Board of Trustees and/or its designated representative have determined that the Competitive Sealed Proposals method of procurement will provide the best value for SAWS for this project. This procurement shall conform to Section 2269 of the Texas Government Code.

This document provides general information about the requirements and evaluation for this Request for Competitive Sealed Proposals (RFCSP).

A. EVALUATION OF PROPOSALS

1. SAWS will conduct a comprehensive, fair and impartial evaluation of all Competitive Sealed Proposals received in response to this request within 45 days of receipt of the proposals. SAWS will appoint a selection committee to perform the evaluation. SAWS will evaluate and rank each proposal in relation to the following selection criteria:

Team Qualifications and Experience	20%
Quality, Reputation, and Ability to Deliver Projects on Schedule and within Budget	25%
Project Approach, Schedule, and Availability	15%
Price	30%
Small, Minority, and Women-owned Business Participation	<u>10%</u>
Total:	100%

2. During the evaluation and ranking of Respondents' proposals, SAWS reserves the right to consider the following:
 - a. Whether the Respondent can perform the contract within the specified time. In making this determination SAWS may take into account Respondent's existing commitments and whether in SAWS' sole discretion those commitments will adversely impact Respondent's ability to complete the work in the scheduled time.
 - b. The quality and punctuality of performance on any current or previous contracts.
 - c. SAWS may contact references provided by the Respondent, as well as any other references to verify qualifications, experience and performance. In making this determination, SAWS may take into account work performed by the Respondent on any project, including but not limited to SAWS' projects, projects that the Respondent provides as references and any other projects that SAWS has knowledge of.
 - d. Respondent's previous and existing compliance with the applicable laws, ordinances, permits, and regulations.
 - e. Respondent's financial resources and ability to perform the contract.

3. If Respondent fails to provide a response to each of the Evaluation Criteria identified within this RFCSP, points may be deducted or the proposal may be considered non-responsive and ineligible for consideration.

B. SUMMARY OF WORK

This Summary of Work is included as part of this Solicitation to provide a general basis for Respondents to determine what is reasonably comparable. The work consists of the following:

1. **Pipeline Segment 2C:** Installation of approximately 14,950 LF of 48-inch steel water transmission main by open cut and trenchless methods.
2. **Pipeline Segment 3:** Installation of approximately 70,200 LF of 48-inch steel water transmission main by open cut and trenchless methods.

Respondents should reference the Contract Documents prior to submitting a proposal for this RFCSP to fully understand the entire scope of work for this Project.

The decision of “comparability” when evaluating the Respondent’s proposal is at the complete discretion of SAWS.

C. REQUIRED EXPERIENCE

Respondents submitting a proposal for this RFCSP should clearly demonstrate, completely and sufficiently, that installing large diameter water mains via open cut and trenchless is a primary business focus and service, and such services have been successfully provided for at least five (5) continuous years.

D. DEFINITIONS

1. Personnel for the purpose of this RFCSP is defined as employees of the Prime Contractor, or any subcontractor(s), affiliates, joint venture partners, or team members, and consultants engaged by any of those entities.
2. The personnel specified below are considered by SAWS to be essential to the work being performed under this Contract, and as such are defined as Key Personnel. Key Personnel include the Project Manager, Project Open Cut Superintendent, Project Trenchless Superintendent, Project Scheduler, Quality Control (QC) Manager, and Safety Coordinator. Key Personnel shall be dedicated exclusively to this Project and shall be assigned as full-time employees for the duration of the Project.
3. Subcontractor is defined in Article I, Contract Definitions of the General Conditions of the Contract Documents. Respondents should reference this definition prior to submitting a proposal in response to this RFCSP.
4. Key Subcontractors for the purpose of this RFCSP are defined as subcontractors that are responsible for executing a significant portion of the work, and as such are deemed

to be essential to the work being performed under this Contract. The Key Subcontractor roles include tunneling, carrier pipe installation and grouting, and tunnel shaft construction.

E. RESPONSE FORMAT

1. Team Qualifications and Experience (20 Points)

a. Organizational Structure and Information of the Prime Contractor

- i. Provide current business organizational structure, type of business structure, and stability of organization.
- ii. Provide total number of employees and annual company revenues as of December 31, 2019.
- iii. Provide Debarment history for the company for the last ten (10) years.
- iv. Provide any litigation, arbitration, and claims history for the last three (3) years and any litigation, arbitration, and claims history with SAWS regardless of the year they occurred.
- v. Indicate the number of years performing contracting/construction work under current legal business name and/or previous legal business name(s).
- vi. Provide a financial statement prepared within the last twelve (12) months by an independent Certified Public Accountant.
 - Respondent must clearly indicate the entity being proposed to enter into the Contract. In order to supplement the financial strength of the entity being proposed to enter into the Contract, the Respondent may, but is not required to, propose a guarantor who will guaranty the Contractor's obligations under the Contract through a separately executed guaranty Contract in favor of SAWS. Only the financial information of (1) the entity being proposed to enter into the Contract, and (2) a guarantor, if proposed, will be considered in the financial evaluation of the RFCSP.
 - SAWS in its sole discretion may reject any Respondent that does not possess the financial strength and capacity to undertake this project and the obligations and liabilities thereof. Subject to the complete review and finding of acceptability of the submitted financial information, Respondents demonstrating an ability to provide the required performance and payment bonds and the ability to maintain a minimum aggregate net worth sufficient to undertake this project, as measured by either the Respondent or a proposed Guarantor, shall be deemed to have the financial strength and capacity to undertake the project.
 - The Respondent shall submit the financial information set forth below for the entity being proposed to enter into the Contract and any proposed guarantor. If Respondent is not a public company and believes any of its financial information is exempt from disclosure to third parties under the Texas Public Information Act in Chapter 552 of the Texas Government Code, the Respondent must clearly label the specific portions sought to be kept confidential and specify the exemption that the Respondent is relying upon. However, SAWS does not represent or guarantee in any way that Respondent's financial statements will be protected from disclosure, even if identified by Respondent as confidential or proprietary, in the event of a Public Information Request under Texas Government Code Chapter 552. SAWS will notify the Respondent of any public information

requests relating to financial information marked as confidential by the Respondent, and the Respondent shall be responsible for defending its basis for exemption from disclosure in accordance with the Act.

- If Respondent is organized as a corporation, partnership, LLP, LLC or joint venture, submit complete financial statements, including a Balance Sheet, Income Statement and Statement of Cash Flows, prepared in accordance with generally accepted accounting principles, for the current fiscal year-to-date, and the most recent three complete fiscal years. Footnote disclosures must accompany the submitted year to date financial statements. If available, financial statements audited or certified by an independent certified public accountant should be submitted; otherwise, a notarized statement certifying the accuracy of the financial information and signed by an officer of the proposing entity must accompany the financial information. If any entity has been in existence less than three (3) years, the information shall be provided for the period of existence.
- If Respondent intends to organize as a partnership, LLP, LLC, or joint venture, then the above- referenced financial information of each partner, LLC/LLP member or joint-venture member must be submitted.
- SAWS reserves the right to obtain a Dun and Bradstreet financial report, or other credit report, at its own cost, and all members of your Team, responding to this RFCSP agrees to allow SAWS to obtain such report(s) on your Team members and all partners, affiliates and sub-consultants, if any, to facilitate SAWS' financial evaluation of the Respondent.

b. Proposed Team Structure and Key Personnel Roles and Responsibilities

- i. Provide a 1-page organizational chart that describes the composition of the team for this project. The chart shall include proposed Key Personnel for the Prime Contractor and Key Subcontractor(s). The chart shall also include percent availability (as percentage of total individual's workload) for Key Personnel (Prime and Key Subcontractor(s)) and their proposed role for the duration of the Project.
- ii. Provide a clear description of the proposed team identifying Key Subcontractor(s), their role on the project, and teaming history. If the Prime Contractor has not worked previously with proposed Key Subcontractor(s), describe the proposed approach for ensuring successful completion of the project in accordance with Contract Documents.
- iii. Provide a clear description of the proposed team's Key Personnel roles and responsibilities, including Key Personnel from Key Subcontractor(s).

c. Qualifications and Experience of Key Personnel Proposed for this Project

- i. On separate 8 ½" x 11" sheets, provide resumes, one per person and not to exceed one (1) page, for Key Personnel for the Prime Contractor and Key Subcontractor(s) identified on the organizational chart with the Project Manager's resume being first. Key Personnel resumes should include the following information:
 - Name, job title, education
 - Number of years of total professional experience
 - Number of years/months with current company
 - Number of years/months of experience in proposed role for this project
 - Description of professional qualifications (to include degrees, licenses, certifications, and associations)
 - Brief overview of professional experience
 - Detailed description of capabilities and experience relevant to this project
 - List of all other active projects the team member is assigned to for the duration of the Project, to include the phase and percentage of time allocated to each of the other projects. For each project included in each resume, please clearly identify whether the project is with current firm or part of the person's past professional experience.

2. Quality, Reputation, and Ability to Deliver Projects on Schedule and within Budget (25 Points)

a. Prime Contractor On-time Completion on Similar Projects in the Past Fifteen (15) Years

- i. List and describe five (5) completed projects within the last fifteen (15) years of similar size, scope, and complexity to the work described in the Contract Documents for this Project. Respondents should provide references with contact information to include a valid, recently verified email and telephone number for each project listed.

Each project should include the following information:

- Project name.
- Utility/Owner name and contact information (phone number and email address) for Utility/Owner's Project Manager.
- Role served by the proposed Key Personnel on the project.
- Original (bid/price) and final construction in place costs.
- Project description and why it is comparable to the size, scope, and complexity of the project part of this RFCSP.
- Total costs of change orders, as well as explanation regarding the reason for specific change orders.
- Date of Notice to Proceed.
- Identify whether the project was completed on-time and within budget.
- Original Contract Time (State Calendar Days or Working Days).
- Original Contract Substantial Completion Date and Actual Substantial Completion Date.
- Original Contract Completion Date and Actual Completion Date.
- Actual number of days beyond the original contract.

- Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.
- The recovery schedule/plan and implementation of such, if it was required. If a recovery schedule/plan was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.
- ii. Key Personnel must have participated in a minimum of three (3) of the five (5) projects listed. The proposed Project Manager must have participated in a minimum of two (2) of the five (5) projects listed. Proposed Project Open Cut Superintendent must have participated in a minimum of one (1) of the five (5) projects listed. Proposed Project Trenchless Superintendent must have participated in a minimum of one (1) of the five (5) projects listed. Proposed QC Manager must have participated in a minimum of one (1) of the five (5) projects listed. Key Personnel's role on project reference must have been the same as the role proposed for this Project.
 - If Respondent has SAWS experience, at a minimum, one (1) SAWS project of similar size, scope, and complexity must be included in the list of five (5) projects provided, and
- iii. The Respondent shall also list all current and recently completed large diameter water pipeline projects performed in the last five (5) years for all Utility Owners in the State of Texas. Respondent shall provide the following information for each project:
 - Project name.
 - Utility/Owner name.
 - Date of Notice to Proceed.
 - Original Contract Time (State Calendar Days or Working Days).
 - Original Contract Completion Date and Actual Completion Date. If project is not complete at the time of submission, Respondent shall provide the current % Complete based on contract time.
 - Original (bid/price) and final construction in place costs. If project is not complete at the time of submission, Respondent shall provide the current % Complete based on contract value as of the most recent application for payment.
 - Identify whether the project was completed on-time and within budget, as applicable.
- iv. The Respondent shall provide a list of all projects currently under construction in which Key Personnel are involved, as identified in the organizational chart provided in the response for this RFCSP, and the expected completion date that demonstrates Respondent's ability to start and complete the work required by the project.

b. Key Subcontractor(s) Performance on Similar Projects in the Past Five (5) Years

- i. Provide a list of three (3) projects that the identified Key Subcontractors' Project Manager and Project Superintendent participated in that were of

- similar size, scope, and complexity to the work described in the Contract Documents that have been completed in the State of Texas within the last five (5) years. Describe the role served by the proposed staff on those projects.
- ii. If Prime Contractor is planning to self-perform the Work in accordance with the Contract Documents and no Key Subcontractor(s) have been identified in the Response, Respondent shall provide a list of three (3) additional projects that were of similar scope to the Work that would have been performed by a Key Subcontractor and that have been completed in the State of Texas within the last ten (10) years. Prime Contractor's Key Personnel shall have participated in at least two (2) of the three (3) projects listed. Describe the role served by the proposed staff on those projects.

Each project should include the following information:

- Project name.
- Utility/Owner name and contact information (phone number and email address) for Utility/Owner's Project Manager.
- Role served by the proposed Key Personnel on the project.
- Project description and why it is comparable to the size, scope, and complexity of the project part of this RFCSP.
- Original (bid/price) and final construction in place costs.
- Total costs of change orders, as well as explanation regarding the reason for specific change orders.
- Date of Notice to Proceed.
- Identify whether the project was completed on-time and within budget.
- Original Contract Time (Specify Calendar Days or Working Days).
- Original Contract Substantial Completion Date and Actual Substantial Completion Date.
- Original Contract Completion Date and Actual Completion Date.
- Actual number of days beyond the original contract.
- Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Contractor's or Key Subcontractor's responsibilities, provide a short explanation of each.
- The recovery schedule/plan and implementation of such, if it was required. If a recovery schedule/plan was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.

If valid contact information is not provided, the project may not be considered and the Respondent's score for this criteria may be reduced and/or Respondent's proposal may be deemed non-responsive.

3. Project Approach, Schedule, and Availability (15 Points)

a. Project Approach

- i. Provide a narrative of the project approach describing how the Respondent will complete this project. Include key milestones, specific critical processes and critical path items, phases and/or sequencing, permits, approvals, coordination with stakeholders, and procurements anticipated to complete the

- project work. Identify potential risks and describe proposed mitigation measures to ensure on-time completion of the Project.
- ii. Explain how Respondent will contact and coordinate with key stakeholders throughout the Project. Describe how the Respondent will coordinate with property owners and business owners being impacted by the Project. Describe the Respondent's approach for securing permits (e.g., ROW, SWPPP, etc.) and/or complying with permit requirements for which the System is the permit holder (TCEQ, CPS Energy, Tree Permit, TxDOT, etc.).
 - iii. Provide a description of the approach specifically addressing the procurement of the following items: large diameter steel pipe and large diameter valves.
 - iv. Provide any innovative ideas for cost savings (due to method or duration) for this project.
 - v. Provide a quality management plan describing how the Prime Contractor will ensure that the necessary steps, safeguards, subcontractor oversight, QC processes, and document controls will be implemented in a rigorous manner as to ensure the completeness, workmanship, accuracy, and successful completion of the Project.

b. Project Schedule and Unforeseen Conditions

- i. Provide a critical path method (CPM) schedule in Primavera or Microsoft Project. The schedule shall include milestones, specific critical processes and critical path items, construction phases, permits, approvals, coordination with stakeholders, and procurements anticipated to complete the project work. The anticipated notice to proceed (NTP) for this Project is October 20, 2020. Respondent shall use this date for developing the proposed project schedule.
- ii. Explain how Respondent will complete the project within the schedule taking into account the existing commitments identified in 2.a.iv.
- iii. Identify long-lead time items and critical path shop drawing submittals.
- iv. Provide details for the procurement and delivery of steel pipe and large diameter valves.
- v. From past project experience, list and describe any previous instances in which the Contractor has encountered unforeseen conditions.
 - Identify whether a recovery plan was required.
 - Describe the nature of the issue and whether it was promptly resolved or resulted in the Respondent being asked to demobilize.
- vi. Describe the Respondent's approach towards mitigating and managing unforeseen conditions should they be encountered during the construction of this Project.

SAWS, in reviewing Respondents' proposals, is looking for Respondents that can meet all necessary milestones and complete the work within the Contract time given for completion. A Respondent's inability to meet milestones and complete the Work in the time provided may result in the Respondent's score for this criteria being reduced and/or Respondent's proposal deemed non- responsive.

c. Availability of Key Personnel and Equipment

- i. Describe availability of Key Personnel (Prime and Key Subcontractor(s)) that will be specifically utilized for this Project.
- ii. Describe availability of equipment and facilities that will be specifically utilized for this Project.
- iii. Corresponding with the organizational chart provided, list the available workforce for the various disciplines required for this project including the number of work crews, and number of personnel for each skill classification proposed to complete the work.

4. Safety Information for Prime Contractor and Key Subcontractor(s) (Pass/Fail)

- a. Provide records showing Total Recordable Incident Rate (TRIR) for each year for the past five (5) years for the Prime Contractor and Key Subcontractor(s).
- b. Provide records showing the company's Experience Modification Rate (EMR) for the past three (3) years for the Prime Contractor and Key Subcontractor(s).
- c. List any fatalities in the company's safety history for the Prime Contractor and Key Subcontractor(s).

5. Price (30 Points)

The Proposal with the lowest total price will receive thirty (30) points. Proposals will receive a percentage of the thirty (30) points based on a comparison with the lowest total price proposal as described below.

Computation Steps:

- i. Step 1. Determine lowest total price and award 30 points for price.
- ii. Step 2. Calculate the ratio between the lowest total price and each proposal. Multiply the ratio by 30 to obtain the points earned.

Proposal	Price	Calculation	Points Earned
A	\$54,295,855	$(36,250,100/54,295,855) \times 30$	20.03
B	\$41,890,450	$(36,250,100/41,890,450) \times 30$	25.96
C	\$36,250,100	$(36,250,100/36,250,100) \times 30$	30.00
D	\$46,790,900	$(36,250,100/46,790,900) \times 30$	23.24
E	\$49,265,750	$(36,250,100/49,265,750) \times 30$	22.07

6. Small, Minority, Woman, and Veteran-Owned Business Participation (10 Points)

- a. Equal Employment Opportunity Requirements - SAWS highly encourages Respondents to implement Affirmative Action practices in their employment programs. This means Respondents should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, national origin, political belief or affiliation, age, disability or genetic information.

The SAWS Board of Trustees has adopted a Small, Minority, Woman, and Veteran-owned Business (SMWVB) Policy to establish and oversee a program that will support the inclusion of local small, minority, woman, and veteran-owned

businesses (SMWVB). It is the policy of SAWS that it will ensure that local small, minority, woman, and veteran-owned businesses have an equal opportunity to compete for, receive and participate in SAWS contracts. It is our policy to:

- Ensure nondiscrimination in the award and administration of SAWS contracts;
- Create a level playing field on which SMWBs can compete fairly for SAWS contracts;
- Ensure that only firms that attempt to meet small, minority, and woman-owned business good faith efforts are considered for contract awards.

Respondent's commitment to SAWS SMWB policy will be based on meeting or exceeding the minimum aspirational SMWB goal of 20%. The minimum goal is based on the total contract value. Points will be awarded based on the following tiered scales.

Please note that as of 1/1/2017, an updated SMWVB Policy and scoring methodology are being implemented by San Antonio Water System. Veteran-owned Business Enterprises (VEs), are tracked for statistical purposes, but are not eligible for points. **The maximum number of Small, Minority, and Woman- owned Business (SMWB) points to be earned is 10 points.** Self-performance and subconsulting may be used to achieve the aspirational goals and earn points. **SMWB Respondents and/or subconsultants must be certified by the South Central Texas Regional Certification Agency. Eligible firms (including MBEs and WBEs) must also be certified as a Small Business Enterprise (SBE), must perform a commercially-useful function on the project, and must have a local presence in the San Antonio Metropolitan Statistical Area in order to be counted for SMWB points.** Please see the Good Faith Effort Plan for definitions of terms. All Respondents, whether SMWB or not, may earn the **maximum number of SMWB points (10)** by adhering to any combination of the following point structures when attempting to meet the aspirational goals:

A. M/WBE Scoring Method: Up to 10 Points (By percentage). 20.00% M/WBE Goal:
• MBE Participation Percentage between 1% and 4.99%: 1 Point
• MBE Participation Percentage between 5% and 9.99%: 2 Points
• MBE Participation Percentage between 10% and 14.99%: 4 Points
• MBE Participation Percentage between 15% and 16.99%: 5 Points
• MBE Participation Percentage between 17% and 19.99%: 8 Points
• MBE Participation Percentage meeting or exceeding 20.00%: 10 Points
B. SBE (Non-M/WBE) Scoring Method (for participation of firms whose sole certification is "SBE"): Up to 5 Points (By percentage). 5% SBE Participation:
• SBE Participation Percentage between 1% and 1.99%: 1 Point
• SBE Participation Percentage between 2% and 2.99%: 2 Points
• SBE Participation Percentage between 3% and 3.99%: 3 Points

• SBE Participation Percentage between 4% and 4.99%: 4 Points
• SBE Participation Percentage meeting or exceeding 5.00%: 5 Points
C. Optional: Prior subcontractors/supplier utilization compliance averages for the past 2 years may be considered when totaling the SMWB score, based upon data from the Subcontractor Payment & Utilization Reporting (SPUR) System. This applies to SMWB and Non-SMWB Prime Contractors' utilization of their SMWB subcontractors/suppliers. Up to 3 points may be deducted from the SMWB score for discrepancies between the pledged SMWB goal, and the current/ongoing actual utilization of SMWB subcontractors/suppliers on recent SAWS projects. This option does not apply to work order/unspecified contracts.
• Total SMWB Subconsultant compliance discrepancy between 3% - 4%: Deduct 1 Point
• Total SMWB Subconsultant compliance discrepancy between 4% - 5%: Deduct 2 Points
• Total SMWB Subconsultant compliance discrepancy greater than 5%: Deduct 3 Points

- b. All firms submitted as SMWVB must provide a copy of their current certification certificate.
- c. The SMWB goal is expressed as a percentage of the total dollar amount of the contract going to SMWBs for those areas which the Respondent has subcontracted or anticipates to subcontract, including any future change orders. The goal shall also apply to change orders that require work beyond the scope of services originally required to accomplish the project.
- d. The Respondent agrees to employ good faith efforts to carry out this policy through award of subcontracts to SMWVBs to the fullest extent possible.
- e. The SAWS Good Faith Effort Plan (GFEP) will be used for scoring purposes based upon SMWB participation. However, **all subcontractors and/or suppliers, whether SMWVB-certified or not, must be listed in the GFEP**, because the information provided in the GFEP will be utilized in the development of the final contract/agreement. The GFEP format is attached as Exhibit "B." This form is required and considered part of the response to the RFCSP. Should the Good Faith Effort Plan not be submitted, the proposal may be considered non-responsive.
- f. The S.P.U.R. System is accessed through a link on SAWS' "Business Center" web page. The Respondent and all subcontractors will be provided a unique login credential and password to access the SAWS subcontractor payment reporting system. The link may be accessed through the following internet address: <https://saws.smwbe.com/>.

Training on the use of the system will be provided by SAWS. After the Respondent receives payment from SAWS, electronic submittals will require data entry of the

amount paid to each subcontractor listed on the Contractor's Good Faith Effort Plan.

- g. Please contact the SMWVB program manager, Marisol V. Robles, at 210-233-3420 or marisol.robles@saws.org for any questions pertaining to the Good Faith Effort Plan or the SMWVB Program.

F. FORMAT OF PROPOSALS

1. Proposals shall be prepared simply and economically, providing a straightforward, concise description of the Respondent's ability to meet the requirements of this RFCSP. Emphasis shall be on the quality, completeness, clarity of content, responsiveness to the requirements, responsiveness to the evaluation criteria, and an understanding of SAWS needs.
2. Respondents shall utilize the fillable forms provided by the System to prepare the response to this RFCSP. The cover, table of contents, divider sheets, proposal checklist, financial statement, Good Faith Effort Plan, Price Proposal, and any other required documents will not count as printed pages.
3. Proposals shall be submitted in three (3) separate envelopes (or box and envelopes):

Envelope 1 (or box): Signed price proposal, acknowledgement of addenda, signed proposal certification page, and bid bond / cashier's check in a separate and sealed envelope.

Envelope 2 (or box): Original proposal, proposal checklist, thumb drive (excluding price proposal), Statement of President's executive orders, GFEP, CoI, financial statement, W-9, Proof of insurability, respondent questionnaire, team qualifications and experience, quality, reputation, and ability to deliver on schedule, and project approach including delivery schedule.

Envelope 3 (or box): Proposal packet copies, 7 copies, excluding the price proposals.

4. Respondents shall carefully read the information contained in this RFCSP and submit a complete response to all requirements and questions as directed. Incomplete Proposals will be considered non-responsive and subject to rejection.
5. Proposals and any other information submitted by Respondents in response to this RFCSP shall become the property of SAWS.
6. Proposals shall be printed on letter-size 8-1/2" x 11" paper and assembled with spiral-type bindings or staples. The project schedule can be printed using tabloid-size 11" x 17" paper. DO NOT USE METAL-RING HARD COVER BINDERS.
7. Respondents shall utilize the Respondent's Proposal Checklist provided in this RFCSP

- and must provide page numbers for each part of the Qualifications portion of the submittal.
8. Separate and identify each evaluation criteria response of this RFCSP by use of a divider sheet with an integral tab for ready reference in the order indicated within the Respondent's Proposal Checklist.
 9. Respondents shall include one (1) copy of the complete proposal on a thumb drive in portable document format (.pdf) in addition to the required number of hard copies. The thumb drive shall contain the entire proposal package as submitted, excluding the financial statement, Good Faith Effort Plan, and Price Proposal, and should be encased in a paper envelope, clearly marked with the pertinent solicitation information.

Workers' Compensation Insurance Coverage

A. Definitions:

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

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

Persons providing services on the project ("subcontractor" in §406.096) - includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

- B. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.
- C. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.
- D. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.
- E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

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

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

RESPONDENT'S PROPOSAL CHECKLIST

Project Name: Water Resources Integration Program (WRIP) Phase 2 - Pipeline Segments 2C and 3
Project
SAWS Job No.
SAWS Solicitation Number: CO-00336

ELECTRONIC SUBMITTAL FILE #1

*****TITLE FILE – CO-00336 - PRICE PROPOSAL*****

- ☐ Signed Price Proposal/Acknowledgement of Addendums
 - ☐ Signed Proposal Certification Page (PC-1)
 - ☐ Bid Bond/Cashier's Check
-

ELECTRONIC SUBMITTAL FILE #2

*****TITLE FILE – CO-00336 – ORIGINAL PROPOSAL*****

- ☐ Signed Price Proposal/Acknowledgement of Addendums
 - ☐ Signed Proposal Certification Page (PC-1)
 - ☐ Bid Bond/Cashier's Check
 - ☐ Proposal Checklist
 - ☐ Statement on President's Executive Orders
 - ☐ Good Faith Effort Plan
 - ☐ Conflict of Interest Questionnaire – Form CIQ (Rev. 11/30/2015)
 - ☐ W-9
 - ☐ Proof of Insurability (Letter from Insurer or Sample Certificate of Insurance)
 - ☐ Respondent Questionnaire
 - ☐ Background, Experience, and Past Performance narrative
 - ☐ Project Experience, Safety
 - ☐ Schedule
 - ☐ SAWS Past Performance
 - ☐ Project Approach / Team Experience (*including, but not limited to:*)
 - ☐ Project Approach
 - ☐ Team Experience
-

ELECTRONIC SUBMITTAL FILE #3

(Exclude the Price Proposal and Financial Statement)

*****TITLE FILE – CO-00336 – COPY PROPOSAL*****

- ☐ Proposal Checklist
- ☐ Statement on President's Executive Orders
- ☐ Good Faith Effort Plan
- ☐ Conflict of Interest Questionnaire – Form CIQ (Rev. 11/30/2015)
- ☐ W-9
- ☐ Proof of Insurability (Letter from Insurer or Sample Certificate of Insurance)
- ☐ Respondent Questionnaire
- ☐ Background, Experience, and Past Performance narrative



RESPONDENT QUESTIONNAIRE

PROJECT NAME: Water Resources Integration Program Phase 2 - Pipeline Segments 2C and 3

Instructions: The Respondent Questionnaire is a required questionnaire. Complete the questionnaire by inserting the requested information. Do not modify or delete the questions.

GENERAL INFORMATION

1. **Respondent Information:** Provide the following information regarding the Respondent.
(NOTE: Co-Respondents are two or more entities proposing as a team or joint venture with each signing the contract, if awarded. Sub-contractors are not Co-Respondents and should not be identified here. If this proposal includes Co-Respondents, provide the required information in this Item #1 for each Co-Respondent by copying and inserting an additional block(s) before Item #2.)

Respondent Name: _____

(NOTE: Give exact legal name as it will appear on the contract, if awarded.)

Principal Address: _____

City: _____ State: _____ Zip Code: _____

Telephone No. _____ Fax No: _____

Social Security Number or Federal Employer Identification Number: _____

2. **Contact Information:** List the one person who SAWS may contact concerning your proposal or setting dates for meetings.

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone No. _____ Fax No: _____

Email: _____

3. Identify the principal contact person authorized to commit the Respondent to a contractual agreement.

4. Does Respondent anticipate any mergers, transfer of organization ownership, management reorganization, or departure of key personnel within the next twelve (12) months?

Yes ☐ No ☐

5. Is Respondent authorized and/or licensed to do business in Texas?

Yes ☐ No ☐ If "Yes", list authorizations/licenses.

6. **Debarment/Suspension Information:** Has the Respondent or any of its principals been debarred or suspended from contracting with any public entity?

Yes ☐ No ☐ If "Yes", identify the public entity and the name and current phone number of a representative of the public entity familiar with the debarment or suspension, and state the reason for or circumstances surrounding the debarment or suspension, including but not limited to the period of time for such debarment or suspension.

7. **Bankruptcy Information:** Has the Respondent ever been declared bankrupt or filed for protection from creditors under state or federal proceedings?

Yes ☐ No ☐ If "Yes", state the date, court, jurisdiction, cause number, amount of liabilities and amount of assets.

8. Provide any other names under which Respondent has operated within the last 10 years.

9. **Litigation Disclosure:** Respond to each of the questions below by checking the appropriate box. Failure to fully and truthfully disclose the information required in the Litigation Disclosure questions may result in the disqualification of your proposal from consideration or termination of the contract, once awarded.

a. Have you or any member of your Firm or Team to be assigned to this project ever been indicted or convicted of a felony or misdemeanor greater than a Class C in the last five (5) years?

Yes ☐ No ☐

b. Have you or any member of your Firm or Team to be assigned to this project been terminated (for cause or otherwise) from any work being performed for the San Antonio Water System or any other Federal, State or Local Government, or Private Entity?

Yes ☐ No ☐

- c. Have you or any member of your Firm or Team to be assigned to this project been involved in any claim or litigation with the San Antonio Water System or any other Federal, State or Local Government, or Private Entity during the last ten (10) years?

Yes ☐ No ☐

If you have answered "Yes" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your proposal.

11. **Security Procedures:** Respondent acknowledges having read the security procedures and understands the requirements. Respondent is prepared to perform at their own expense background security checks on their employees, or the employees of their consultants or sub-consultants if requested by SAWS.

Yes ☐ No ☐

12. **Addendums:** Each Respondent is required to acknowledge receipt of all addendums.

None ☐ Yes ☐ If "Yes", Identify.

The information provided above is true and accurate to the best of my knowledge. Furthermore, we understand that failure to complete the Respondent Questionnaire may subject this firm to elimination from the selection process.

Signature

Date

Printed Name

Title

PRICE PROPOSAL

PROPOSAL OF _____, a corporation
a partnership consisting of _____
an individual doing business as _____

THE SAN ANTONIO WATER SYSTEM:

Pursuant to Instructions and Invitation for Competitive Sealed Proposals, the undersigned proposes to furnish all labor and materials as specified and perform the work required for the project as specified, in accordance with the Plans and Specifications for the following prices in the bid proposal to wit:

PLEASE SEE ATTACHED LIST OF BID ITEMS.

RESPONDENT'S SIGNATURE & TITLE

FIRM'S NAME (TYPE OR PRINT)

FIRM'S ADDRESS

FIRM'S PHONE NO. /FAX NO.

FIRM'S EMAIL ADDRESS

The Contractor herein acknowledges receipt of the following:
Addendum Nos. _____

OWNER RESERVES THE RIGHT TO ACCEPT THE OVERALL MOST RESPONSIBLE PROPOSAL.

The Respondent offers to construct the Project in accordance with the Contract Documents for the contract price, and to complete the Project within **720** calendar days after the start date, as set forth in the Authorization to Proceed. **The Respondent understands and accepts the provisions of the contract Documents relating to liquidated damages of the project if not completed on time.**

Complete the additional requirements of the Proposal which are included on the following pages.

Statement on President's Executive Orders

Has your firm previously performed work subject to the President's Executive Orders Numbers 11246 and 11375 or any preceding similar executive orders (Numbers 10925 and 11114)?

Yes ☐ No ☐

**PRICE PROPOSAL - WATER RESOURCES INTEGRATION PROGRAM PHASE 2
PIPELINE SEGMENTS 2C AND 3 PROJECT**

LINE NO.	ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT PRICE	TOTAL PRICE
SEGMENT 2C LINE ITEMS						
1	200	6" Base Material Driveways	SY	215	\$	\$
2	202	Prime Coat	GAL	26	\$	\$
3	203	Tack Coat	GAL	13	\$	\$
4	205.2	Hot Mix Asphaltic Pavement Type B - 12" Thick	SY	110	\$	\$
5	205.3	Hot Mix Asphaltic Pavement Type C - 3" Thick	SY	123	\$	\$
6	299	Flowable Fill	CY	220	\$	\$
7	410	Gravel Subgrade Filler and Filter Fabric	CY	1,073	\$	\$
8	508	Relocating Wire Fence	LF	990	\$	\$
9	520A	Revegetation	LF	14,484	\$	\$
10	550	Trench Excavation Safety Protection	LF	14,626	\$	\$
11	840A	48" Water Tie-In Connection	EA	2	\$	\$
12	840	Tie-In and Testing w/ Existing Bulkhead and Bulkhead Removal	EA	1	\$	\$
13	841A	Hydrostatic Testing Operations	LF	14,888	\$	\$
14	844	12" Pipe Flush Assembly	EA	3	\$	\$
15	844	12" Pipe Drain Assembly & Structure	EA	2	\$	\$
16	844	Install Type 1 Gate	EA	15	\$	\$
17	845	Pipeline Markers	EA	30	\$	\$
18	845	Temporary Chain Link Construction Fencing	LF	29,777	\$	\$
19	847A	Disinfection	LF	14,888	\$	\$
20	858	Concrete Encasement, Cradles, Saddles and Collars	CY	41	\$	\$
21	02271	Rock Rip Rap	SY	210	\$	\$
22	02400	Steel Casing Pipe By Open Cut - (66")	LF	142	\$	\$
23	02400	Jacking, Boring or Tunneling - (66") Inclusive of Casing	LF	263	\$	\$
24	02400	Removal of Obstructions from Tunnels	EA	2	\$	\$
25	02571	Internal Test Bulkhead Assembly (48" Diameter)	EA	1	\$	\$
26	02571	48" Steel Water Main (Open Cut, Welded) 300 PSI	LF	14,484	\$	\$
27	02571	48" Steel Water Main (Carrier Pipe, Welded) 300 PSI	LF	404	\$	\$
28	13110	Cathodic Protection Test Station	EA	19	\$	\$
29	15103	48" Butterfly Valve - 300 PSI	EA	3	\$	\$
30	15117	6" Combination Air Valve & Assembly - 300 PSI	EA	5	\$	\$
31	GAS	Gas Vent	EA	2	\$	\$
SUBTOTAL A =						

PRICE PROPOSAL - WATER RESOURCES INTEGRATION PROGRAM PHASE 2
PIPELINE SEGMENTS 2C AND 3 PROJECT

LINE NO.	ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT PRICE	TOTAL PRICE
SEGMENT 3 LINE ITEMS						
32	202	Prime Coat	GAL	60	\$	\$
33	203	Tack Coat	GAL	30	\$	\$
34	205.2	Hot Mix Asphaltic Pavement Type B - 12" Thick	SY	301	\$	\$
35	205.3	Hot Mix Asphaltic Pavement Type C - 3" Thick	SY	301	\$	\$
36	299	Flowable Fill	CY	681	\$	\$
37	410	Gravel Subgrade Filler and Filter Fabric	CY	1,200	\$	\$
38	503.5	Roadway Repair (Crushed Stone)	SY	4,840	\$	\$
39	508	Relocating Wire Fence	LF	7,316	\$	\$
40	520A	Revegetation	LF	66,756	\$	\$
41	544	Soil Retention Blanket	SY	12,427	\$	\$
42	550	Trench Excavation Safety Protection	LF	66,756	\$	\$
43	804C	Trench Dam	EA	24	\$	\$
44	840A	48" Water Tie-In Connection	EA	1	\$	\$
45	841A	Hydrostatic Testing Operations	LF	69,881	\$	\$
46	844	Temporary Blow-off Assemblies	EA	1	\$	\$
47	844	12" Pipe Drain Assembly & Structure	EA	35	\$	\$
48	844	Install Type 1 Gate	EA	49	\$	\$
49	845	Pipeline Markers	EA	81	\$	\$
50	845	Temporary Chain Link Construction Fencing	LF	139,762	\$	\$
51	845	Chain Link Security Fencing	LF	80	\$	\$
52	847A	Disinfection	LF	69,881	\$	\$
53	02271	Rock Rip Rap	SY	1,846	\$	\$
54	02273	Concrete Cable Mat	SY	2,881	\$	\$
55	02400	Steel Casing Pipe By Open Cut - (66")	LF	229	\$	\$
56	02400	Jacking, Boring or Tunneling - (66") Inclusive of Casing	LF	3,125	\$	\$
57	02400	Removal of Obstructions from Tunnels	EA	4	\$	\$
58	02571	Internal Test Bulkhead Assembly (48" Diameter)	EA	9	\$	\$
59	02571	48" Steel Water Main (Open Cut, Welded) 300 PSI	LF	2,175	\$	\$
60	02571	48" Steel Water Main (Open Cut, Welded) 250 PSI	LF	10,208	\$	\$
61	02571	48" Steel Water Main (Open Cut, Welded) 200 PSI	LF	54,144	\$	\$
62	02571	48" Steel Water Main (Carrier Pipe, Welded) 250 PSI	LF	307	\$	\$
63	02571	48" Steel Water Main (Carrier Pipe, Welded) 200 PSI	LF	3,047	\$	\$
64	13110	Rectifier Installation w/ Electrical Enclosure	EA	2	\$	\$
65	13110	Cathodic Protection Test Station	EA	165	\$	\$
66	15103	48" Butterfly Valve - 250 PSI	EA	1	\$	\$
67	15103	48" Butterfly Valve - 200 PSI	EA	5	\$	\$
68	15103	24" Butterfly Valve - 200 PSI	EA	1	\$	\$
69	15117	6" Combination Air Valve & Assembly - 250 PSI	EA	3	\$	\$
70	15117	6" Combination Air Valve & Assembly - 200 PSI	EA	37	\$	\$
SUBTOTAL B =						\$

**PRICE PROPOSAL - WATER RESOURCES INTEGRATION PROGRAM PHASE 2
PIPELINE SEGMENTS 2C AND 3 PROJECT**

LINE NO.	ITEM NO.	ITEM DESCRIPTION	UNITS	QTY	UNIT PRICE	TOTAL PRICE
GENERAL LINE ITEMS						
71	101.2	Tree Protection	LS	1	\$	\$
72	530.1	Barricades, Signs and Traffic Handling	LS	1	\$	\$
73	540A	Temporary Erosion Sedimentation and Water Pollution Prevention and Control	LS	1	\$	\$
74	SC1	Cathodic Allowance for CPS Energy	LS	1	\$30,000	\$30,000
75	SC2	Allowance for Power Pole Bracing or Relocation	EA	8	\$8,000	\$64,000
76	100.2	Intermediate Demobilization and Remobilization (Open Cut)	EA	2	\$	\$
77	100.3	Intermediate Demobilization and Remobilization (Trenchless)	EA	2	\$	\$
78	100.1	Mobilization (Max 8% Line Nos. 1-73)	LS	1	\$	\$
79	101.1	Preparing Right-Of-Way (Max 4% of Line Nos. 1-73)	LS	1	\$	\$
SUBTOTAL C =						\$

Mobilization shall be limited to a maximum of 8% of the subtotal for items 1-73. In the event of a discrepancy between the written percentage and dollar amount shown for mobilization bid item, the written percentage will govern. If the percentage exceeds the allowable maximum stated for mobilization, SAWS reserves the right to cap the amount at the percentages shown and adjust the extensions of the bid items accordingly.

TOTAL PRICE PROPOSAL (SUBTOTAL A + SUBTOTAL B + SUBTOTAL C) = _____

PROPOSAL CERTIFICATION

Accompanying this proposal is a Bid Bond or Certified or Cashier's Check payable to the Order of the San Antonio Water System for _____ dollars (\$_____), which amount represents five percent (5%) of the total bid price. Said bond or check is to be returned to the bidder unless the proposal is accepted and the bidder fails to execute and file a contract within **10** calendar days after the award of the Contract, in which case the check shall become the property of said San Antonio Water System, and shall be considered as payment for damages due to delay and other inconveniences suffered by said San Antonio Water System due to the failure of the bidder to execute the contract. The San Antonio Water System reserves the right to reject any and all bids.

It is anticipated that the Owner will act on this proposal within **90** calendar days after the bid opening. Upon acceptance and award of the contract to the undersigned by the Owner, the undersigned shall execute standard San Antonio Water System Contract Documents and make Performance and Payment Bonds for the full amount of the contract within **10** calendar days after the award of the Contract to secure proper compliance with the terms and provisions of the contract, to insure and guarantee the work until final completion and acceptance, and the guarantee period stipulated, and to guarantee payment of all lawful claims for labor performed and materials furnished in the fulfillment of the contract.

It is anticipated that the Owner will provide written Authorization to Proceed within **30** days after the award of the Contract.

The work called for in this Contract shall commence on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the work commence prior to the date provided for in the SAWS issued, written Authorization to Proceed. Work shall be completed in full within 720 consecutive calendar days.

The undersigned further acknowledges compliance with "Wage and Labor Standard Provisions" of this contract and the use of the Blue Book rental rates for establishment of equipment rental rates whether owned or leased during the course of this Contract.

In completing the work contained in this proposal the undersigned certifies that bidder's practices and policies do not discriminate on the grounds of race, color, religion, sex or national origin and that the bidder will affirmatively cooperate in the implementation of these policies and practices.

Signed: _____
Company Representative

Company Name

Address

Please return bidder's check to:

Company Name

Address

Evaluation Criteria Form

The intent of this document is to provide Respondents a structure for their responses. While there are page limits for this solicitation, there are no character limitations.

Respondents should provide answers to the questions below in the order and spaces provided to ensure continuity between Respondent's submissions.

When responding to the questions below, Respondents should use the space provided in this form, unless otherwise indicated.

If all fields are not completed, the proposal may be deemed non-responsive.

1. Team Qualifications and Experience (20 Points)

a. Organizational Structure and Information of the Prime Contractor

- i. Provide current business organizational structure, type of business structure, and stability of organization.
- ii. Provide total number of employees and annual company revenues as of December 31, 2019.
- iii. Provide Debarment history for the company for the last ten (10) years.
- iv. Provide any litigation, arbitration, and claims history for the last three (3) years and any litigation, arbitration, and claims history with SAWS regardless of the year they occurred.
- v. Indicate the number of years performing contracting/construction work under current legal business name and/or previous legal business name(s).
- vi. Provide a financial statement prepared within the last twelve (12) months by an independent Certified Public Accountant.

b. Proposed Team Structure and Key Personnel Roles and Responsibilities

Prior to responding to this section, refer to the Supplementary Instructions to Respondents for definitions and other requirements.

- i. Provide a 1-page organizational chart that describes the composition of the team for

this project. The chart shall include proposed Key Personnel for the Prime Contractor and Key Subcontractor(s). The chart shall also include percent availability (as percentage of total individual's workload) for Key Personnel (Prime and Key Subcontractor(s)) and their proposed role for the duration of the Project.

- ii. Provide a clear description of the proposed team identifying Key Subcontractor(s), their role on the project, and teaming history. If the Prime Contractor has not worked previously with proposed Key Subcontractor(s), describe the proposed approach for ensuring successful completion of the project in accordance with Contract Documents.

Team Member	Company Name	Proposed Role	Worked with in the Past
Prime Contractor			
Key Subcontractor #1			☐ Yes ☐ No
Key Subcontractor #2			☐ Yes ☐ No
Key Subcontractor #3			☐ Yes ☐ No
Key Subcontractor #4			☐ Yes ☐ No
Key Subcontractor #5			☐ Yes ☐ No

Describe teaming history between Prime Contractor and proposed Key Subcontractor(s):

Proposed approach for managing Subcontractor(s), including Key Subcontractor(s):

- iii. Provide a clear description of the proposed team's Key Personnel roles and responsibilities, including Key Personnel from Key Subcontractor(s).

Team Member	Proposed Key Personnel Role	Name of Key Personnel	Included in Org Chart?
Prime Contractor	Project Manager		☐ Yes ☐ No
	Project Superintendent		☐ Yes ☐ No
	QC Manager		☐ Yes ☐ No
	Project Scheduler		☐ Yes ☐ No
	Safety Coordinator		☐ Yes ☐ No
	Other:		☐ Yes ☐ No
	Other:		☐ Yes ☐ No
Key Subcontractor #1	Project Manager		☐ Yes ☐ No
	Project Superintendent		☐ Yes ☐ No
	Other:		☐ Yes ☐ No
Key Subcontractor #2	Project Manager		☐ Yes ☐ No
	Project Superintendent		☐ Yes ☐ No
	Other:		☐ Yes ☐ No

	Other:		☐ Yes ☐ No
Key Subcontractor #3	Project Manager		☐ Yes ☐ No
	Project Superintendent		☐ Yes ☐ No
	Other:		☐ Yes ☐ No

c. Qualifications and Experience of Key Personnel Proposed for this Project

- i. *Using separate 8 ½" x 11" sheet(s), titled "Team Qualifications and Experience – Resume" inserted immediately following this Section:*

Provide resumes for Key Personnel for the Prime Contractor and Key Subcontractor(s) identified on the organizational chart, one per person, not to exceed one (1) page each with the Project Manager's resume being first.

As part of this criteria, use the check boxes below as a checklist to help ensure the information above is understood and information provided follows the guidelines listed above.

- ☐ Project Manager's resume is first
- ☐ Resumes for all Key Personnel for the Prime Contractor have been included
- ☐ Resumes for all Key Personnel for the Prime Contractor have been identified on the organizational chart
- ☐ Resumes for all Key Personnel for the Prime Contractor do not exceed one (1) page each
- ☐ Resumes for all Key Personnel for the Key Subcontractor(s) have been included
- ☐ Resumes for all Key Personnel for the Key Subcontractor(s) have been identified on the organizational chart
- ☐ Resumes for all Key Personnel for the Key Subcontractor(s) do not exceed one (1) page each
- ☐ All resumes provided include the following information:
 - Name, job title, education
 - Number of years of total professional experience
 - Number of years/months with current firm
 - Number of years/months of experience in proposed role for this project
 - Description of professional qualifications to include degrees, licenses, certifications, and associations
 - Brief overview of professional experience
 - Detailed description of capabilities and experience relevant to this project
 - List of all other active projects the team member is assigned to for the duration of the Project, to include the phase and percentage of time allocated to each of the other projects. For each project included in each resume, please clearly identify whether the project is with current firm or part of the person's past professional experience.

END OF TEAM QUALIFICATIONS AND EXPERIENCE CRITERIA

2. Quality, Reputation, and Ability to Deliver Projects on Schedule and within Budget (25 Points)

a. Prime Contractor On-Time Completion on Similar Projects in the Past Fifteen (15) Years

i. Using the tables provided:

List and describe five (5) completed projects within the last fifteen (15) years of similar size, scope, and complexity to the work described in the Contract Documents for this Project. Respondents should provide references with contact information to include a valid, recently verified, email and telephone number for each project listed.

ii. A minimum of three (3) of the five (5) projects listed above must have been performed by the proposed Key Personnel for this Project. The proposed Project Manager must have participated in a minimum of two (2) of the five (5) projects listed. Proposed Project Open Cut Superintendent must have participated in a minimum of one (1) of the five (5) projects listed. Proposed Project Trenchless Superintendent must have participated in a minimum of one (1) of the five (5) projects listed. Proposed QC Manager must have participated in a minimum of one (1) of the five (5) projects listed. Key Personnel's role on project reference must have been the same as the role proposed for this Project.

- If Respondent has SAWS experience, at a minimum, one (1) SAWS project of similar size, scope, and complexity must be included in the list of five (5) projects provided, and

If valid contact information is not provided, the project will not be considered and the Respondent's score for this criteria may be reduced and/or Respondent's proposal may be deemed non-responsive.

Project #1

Project Name:	
Utility/Owner name:	
Utility/Owner Project Manager's name and contact information to include a valid, recently verified email and telephone number:	
Proposed Contractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (15) years:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to the size, scope and/or complexity for this item:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the project was completed on-time and within budget:	On-time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	
Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required.	

If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Project #2

Project Name:	
Utility/Owner name:	
Utility/Owner Project Manager's name and contact information to include a valid, recently verified email and telephone number:	
Proposed Contractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (15) years:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to the size, scope and/or complexity for this item:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the project was completed on-time and within budget:	On-time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	
Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required.	

If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Project #3

Project Name:	
Utility/Owner name:	
Utility/Owner Project Manager's name and contact information to include a valid, recently verified email and telephone number:	
Proposed Contractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (15) years:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to the size, scope and/or complexity for this item:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the project was completed on-time and within budget:	On-time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	
Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required.	

If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Project #4

Project Name:	
Utility/Owner name:	
Utility/Owner Project Manager's name and contact information to include a valid, recently verified email and telephone number:	
Proposed Contractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (15) years:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to the size, scope and/or complexity for this item:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the project was completed on-time and within budget:	On-time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	
Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required.	

If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Project #5

Project Name:	
Utility/Owner name:	
Utility/Owner Project Manager's name and contact information to include a valid, recently verified email and telephone number:	
Proposed Contractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (15) years:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to the size, scope and/or complexity for this item:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the project was completed on-time and within budget:	On-time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	
Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Prime Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required.	

If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

- iii. *The Respondent shall also list all current and recently completed large diameter water pipeline projects performed in the last five (5) years for all Utility Owners in the State of Texas. Respondent shall provide the following information for each project:*

Project #1

Project Name:	
Utility / Owner Name:	
Date of Notice to Proceed:	
Original Contract Time (calendar days or working days):	
Original Contract Completion Date:	
Actual Contract Completion Date (if not complete, provide % complete based on Contract Time):	
Original Bid Price / Price Proposal:	
Final Construction In-Place Cost (if not complete, provide % complete based on Contract Value and most recent application for payment):	
Was the project completed on-time?	☐ Yes ☐ No
Was the project completed within budget?	

Project #2

Project Name:	
Utility / Owner Name:	
Date of Notice to Proceed:	
Original Contract Time (calendar days or working days):	
Original Contract Completion Date:	
Actual Contract Completion Date (if not complete, provide % complete based on Contract Time):	
Original Bid Price / Price Proposal:	
Final Construction In-Place Cost (if not complete, provide % complete based on Contract Value and most recent application for payment):	
Was the project completed on-time?	☐ Yes ☐ No
Was the project completed within budget?	

Project #3

Project Name:	
Utility / Owner Name:	
Date of Notice to Proceed:	
Original Contract Time (calendar days or	

working days):	
Original Contract Completion Date:	
Actual Contract Completion Date (if not complete, provide % complete based on Contract Time):	
Original Bid Price / Price Proposal:	
Final Construction In-Place Cost (if not complete, provide % complete based on Contract Value and most recent application for payment):	
Was the project completed on-time?	☐ Yes ☐ No
Was the project completed within budget?	

Project #4

Project Name:	
Utility / Owner Name:	
Date of Notice to Proceed:	
Original Contract Time (calendar days or working days):	
Original Contract Completion Date:	
Actual Contract Completion Date (if not complete, provide % complete based on Contract Time):	
Original Bid Price / Price Proposal:	
Final Construction In-Place Cost (if not complete, provide % complete based on Contract Value and most recent application for payment):	
Was the project completed on-time?	☐ Yes ☐ No
Was the project completed within budget?	

Project #5

Project Name:	
Utility / Owner Name:	
Date of Notice to Proceed:	
Original Contract Time (calendar days or working days):	
Original Contract Completion Date:	
Actual Contract Completion Date (if not complete, provide % complete based on Contract Time):	
Original Bid Price / Price Proposal:	
Final Construction In-Place Cost (if not complete, provide % complete based on Contract Value and most recent	

application for payment):	
Was the project completed on-time?	☐ Yes ☐ No
Was the project completed within budget?	

- iv. The Respondent shall provide a list of all projects currently under construction in which Key Personnel are involved, as identified in the organizational chart provided in the response for this RFCSP, and the expected completion date that demonstrates Respondent's ability to start and complete the work required by the project.*

Key Personnel Name	Company Affiliation	Project Name	% Time Allocated	Project Completion Date

b. Key Subcontractors Performance on Similar Projects in the Past Five (5) Years

Using the tables provided below:

- i. Provide a list of three (3) projects that the identified Key Subcontractors' Project Manager and Project Superintendent participated in that were of similar size, scope, and complexity to the work described in the Contract Documents that have been completed in the State of Texas within the last five (5) years. Describe the role served by the proposed staff on those projects.
- ii. If Prime Contractor is planning to self-perform the Work in accordance with the Contract Documents and no Key Subcontractor(s) have been identified in the Response, Respondent shall provide a list of three (3) additional projects that were of similar scope to the Work that would have been performed by a Key Subcontractor and that have been completed in the State of Texas within the last ten (10) years. Prime Contractor's Key Personnel shall have participated in at least two (2) of the three (3) projects listed. Describe the role served by the proposed staff on those projects.

If valid contact information is not provided, the project will not be considered and the Respondent's score for this criteria may be reduced and/or Respondent's proposal may be deemed non-responsive.

Key Sub-Contractor Performance Project #1

Project Name:	
Identify if the Project was performed by Sub-Contractor or if Prime Contractor Self-Performed	
Utility/Owner name:	
Utility/Owner Project Manager's name: and contact information to include a valid, recently verified email and telephone number:	
Proposed Key Subcontractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (10) years:	☐ Yes ☐ No
Key Sub-Contractor's Key Personnel involved in this Project were identified on the organizational chart:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to proposed Key Subcontractor's role on the Project:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the Project was completed on-time and within budget:	On time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	

Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Key Sub-Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required. If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Key Sub-Contractor Performance Project #2

Project Name:	
Identify if the Project was performed by Sub-Contractor or if Prime Contractor Self-Performed	
Utility/Owner name:	
Utility/Owner Project Manager's name: and contact information to include a valid, recently verified email and telephone number:	
Proposed Key Subcontractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (10) years:	☐ Yes ☐ No
Key Sub-Contractor's Key Personnel involved in this Project were identified on the organizational chart:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to proposed Key Subcontractor's role on the Project:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the Project was completed on-time and within budget:	On time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	

Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Key Sub-Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required. If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

Key Sub-Contractor Performance Project #3

Project Name:	
Identify if the Project was performed by Sub-Contractor or if Prime Contractor Self-Performed	
Utility/Owner name:	
Utility/Owner Project Manager's name: and contact information to include a valid, recently verified email and telephone number:	
Proposed Key Subcontractor's Key Personnel who participated on this project:	
Key Personnel's role on this project:	
Project is within the last ten (10) years:	☐ Yes ☐ No
Key Sub-Contractor's Key Personnel involved in this Project were identified on the organizational chart:	☐ Yes ☐ No
Project has similar size, scope, and complexity to the work described in the Contract Documents:	☐ Yes ☐ No
Detailed project description and explanation for why it is comparable to proposed Key Subcontractor's role on the Project:	
Original bid/price and final construction in place costs:	
Total costs for all change orders, as well as an explanation regarding the reason for specific change orders:	
Construction Contract Notice to Proceed (NTP) Date:	
Identify whether the Project was completed on-time and within budget:	On time: ☐ Yes ☐ No Within budget: ☐ Yes ☐ No
Original Contract Time (specify Calendar Days or Working Days):	
Original Contract Substantial Completion Date and Actual Substantial Completion Date:	
Original Contract Completion Date and Actual Completion Date:	
Actual number of days beyond the original contract:	

Actual number of days added through change orders. If Contract time extensions were added to the contract as a result of Key Sub-Contractor's responsibilities, provide a short explanation of each.	
The recovery schedule/plan and implementation of such, if it was required. If a recovery/plan schedule was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.	

***END OF QUALITY, REPUTATION, AND ABILITY TO DELIVER PROJECTS ON
SCHEDULE AND WITHIN BUDGET CRITERIA***

3. Project Approach, Schedule, and Availability (15 Points)

a. Project Approach

- i. Provide a narrative of the project approach describing how the Respondent will complete this project. Include key milestones, specific critical processes and critical path items, phases and/or sequencing, permits, approvals, coordination with stakeholders, and procurements anticipated to complete the project work. Identify potential risks and describe proposed mitigation measures to ensure on-time completion of the Project.
- ii. Explain how Respondent will contact and coordinate with key stakeholders throughout the Project. Describe how the Respondent will coordinate with property owners and business owners being impacted by the Project. Describe the Respondent's approach for securing permits (e.g., ROW, SWPPP, etc.) and/or complying with permit requirements for which the System is the permit holder (TCEQ, CPS Energy, Tree Permit, etc.).
- iii. Provide a description of the approach specifically addressing the procurement of the following items: steel pipe and large diameter valves.
- iv. Provide any innovative ideas for cost savings (due to method or duration) for this project.
- v. Provide a quality management plan (QMP) describing how the Prime Contractor will ensure that the necessary steps, safeguards, subcontractor oversight, QC processes, and document controls will be implemented in a rigorous manner as to ensure the completeness, workmanship, accuracy, and successful completion of the Project.

b. Project Schedule and Unforeseen Conditions

Prior to responding to this section, refer to the Supplementary Instructions to Respondents for definitions and other requirements.

- i. Provide a critical path method (CPM) schedule in Primavera or Microsoft Project. The schedule shall include milestones, specific critical processes and critical path items, construction phases, permits, approvals, coordination with stakeholders, and procurements anticipated to complete the project work. The anticipated notice to proceed (NTP) for this Project is **October 20, 2020**. Respondent shall use this date for developing the proposed project schedule.

Use separate sheet(s), title “Project Approach including Delivery Schedule – CPM Milestone Schedule” inserted immediately following this Section. 11” x 17” paper is permitted.

- ii. Explain how Respondent will complete the project within the schedule taking into account the existing commitments identified in 2.a.iv.
- iii. Identify long-lead items and critical path shop drawing submittals.
- iv. Provide details for procurement and delivery of steel pipe and large diameter valves.
- v. From past project experience, list and describe any previous instances in which the Contractor has encountered unforeseen conditions.

As part of the criteria, use the check boxes below as a checklist to help ensure guidelines are met.

Was a recovery plan required?

☐ Yes ☐ No

Describe the nature of the issue and whether it was promptly resolved or resulted in the Respondent being asked to demobilize.

- vi. Describe the Respondent’s approach towards mitigating and managing unforeseen conditions should they be encountered during the construction of this Project.

c. Availability of Key Personnel and Equipment

- i. Describe availability of Key Personnel (Prime and Key Subcontractor(s)) that will be specifically utilized for this Project.
- ii. Describe availability of equipment and facilities that will be specifically utilized for this Project.
- iii. Corresponding with the organizational chart provided, list the available workforce for the various disciplines required for this project including the number of work crews, and number of personnel for each skill classification proposed to complete the work.

END OF PROJECT APPROACH, SCHEDULE, AND AVAILABILITY CRITERIA



Good Faith Effort Plan for Construction SUBCONTRACTS for:

NAME OF PROJECT: Water Resources Integration Program Phase 2 - Pipeline Segments 2C and 3

SECTION A - PRIME CONTRACTOR INFORMATION

Legal Name of Firm, including "doing business as" if applicable: _____

Address of Office to Perform Project Work: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____

Contact Person: _____

Email Address: _____

Is your firm
Certified as an SMWVB? Yes: _____ No: _____

If "Yes", was your firm certified by the South Central Texas Regional Certification Agency (SCTRCA) or the Texas Comptroller's Office (HUB)?
Only SCTRCA or HUB certifications granted to "local" firms are recognized. Please see the Good Faith Effort Plan Definition for "Local":

Yes: _____ No: _____

Type/s of Certification: SBE: _____ MBE: _____ VBE: _____ WBE: _____

Prime Contractor's Percentage of Participation: (Ex: 100% is the total value of the contract.) _____%

Describe your firm's participation to be performed on this Project: _____

1. List **ALL** SUBCONTRACTORS/SUPPLIERS that will be utilized on this project/contract. (SMWVB **AND** Non-SMWVB)

	Legal Name of Subcontractor/Supplier (including "doing business as", if applicable).	Address of Office Location to Perform Project Work or Provide Supplies. (Only Local firms will be counted for SMWVB credit):	Scope of Work/Supplies to be Performed/Provided by Firm:	Estimated Contract (dollar) Amount on this Project:	Certification Type & Agency. (Only SCTRCA or HUB certifications are recognized):
1					
2					
3					
4					
5					

SECTION B. – SMWB COMMITMENTS

The SMWVB goal on this project is 20%

1. The undersigned proposer has satisfied the requirements of the BID specification in the following manner (please check the appropriate space):

_____ The proposer is committed to a minimum of 20 % SMWVB utilization on this contract.

The proposer, (if unable to meet the SMWVB goal of 20%), is committed to a minimum of _____% SMWVB utilization on this contract. (If unable to meet the goal, please fill out Section C and submit documentation demonstrating _____ good faith efforts).

2. Name and phone number of person appointed to coordinate and administer the SMWVB requirements on this project.

Name:

Title:

Phone Number:

Email Address:

IF THE SMWB GOAL WAS MET, PROCEED TO AFFIRMATION AND SIGN THE GFEP. IF GOAL WAS NOT MET, PROCEED TO SECTION C.

SECTION C – GOOD FAITH EFFORTS (Fill out only if the SMWVB goal was not achieved).

1. On a separate sheet of paper, list and attach to this Good Faith Effort Plan written, posted, or published notification to all firms you contacted with subcontracting/supply opportunities for this project that will not be utilized for the contract by choice of the proposer, subcontractor, or supplier. Notices to firms contacted by the proposer for specific scopes of work identified for subcontracting/supply opportunities must be provided to subcontractor/supplier **not less than five (5) business days prior to bid/proposal due date**. This information is required for all firms that were contacted of subcontracting/supply opportunities.

Copies of said notices must be provided to the SMWVB Program Manager at the time the response is due. Such notices shall include information on the plans, specifications, and scope of work.

2. Did you attend the pre-bid conference scheduled for this project? _____Yes_____No

3. List all SMWVB listings or directories, contractor associations, and/or any other associations utilized to solicit SMWB Subcontractors/suppliers:

4. Discuss efforts made to identify elements of the work to be performed by SMWVBs in order to increase the likelihood of achieving the goal:

5. Indicate advertisement mediums used for soliciting bids from SMWVBs. (Please attach a copy of the advertisement(s):

AFFIRMATION

I hereby affirm that the above information is true and complete to the best of my knowledge. I further understand and agree that, this document shall be attached thereto and become a binding part of the contract.

Name and Title of Authorized Official:

Name:

Title:

Signature:

Date:

NOTE:

This Good Faith Effort Plan is reviewed by SAWS Contracting Department. For questions and/or clarifications, please contact Marisol V. Robles, SMWVB Program Manager, at 210-233-3420.

DEFINITIONS

Note: To be eligible for participation in the SAWS Small, Minority, Woman, and Veteran-owned Business Program, a firm must be local, and must be certified as a Small Business Enterprise (SBE). This includes firms certified as Minority and/or Woman-owned Business Enterprises (MBEs and WBEs). SAWS tracks Veteran-owned Business Enterprises (VBEs) for statistical purposes, but does not award points for VBE participation.

Local: A business located in the San Antonio Metropolitan Statistical Area (SAMSA) , which includes the counties of Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde and Wilson. A business's presence in the SAMSA that consists solely of a P.O. box, a mail drop, or a telephone message center does not count as being local.

Prime Consultant/Contractor: Any person, firm partnership, corporation, association or joint venture which has been awarded a San Antonio Water System contract.

Subconsultants/contractor: Any named person, firm partnership, corporation, association or joint venture identified as providing work, labor, services, supplies, equipment, materials or any combination of the foregoing under contract with a prime consultant/contractor on a San Antonio Water System contract.

Small, Minority and Woman Business (SMWB): All business structures Certified by the Texas Comptroller's Office (HUB), or the South Central Texas Regional Certification Agency that are 51% owned, operated, and controlled by a Small Business Enterprise, a Minority Business Enterprise, or a Woman-owned Business Enterprise.

Small Business Enterprise (SBE): A business structure that is Certified by the Texas Comptroller's Office (HUB), or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by someone who is legally residing in or a citizen of the United States, and the business structure meets the U.S. Small Business Administration's (SBA) size standard for a small business within the appropriate industry category.

Minority Business Enterprise (MBE): A business structure that is Certified by the Texas Comptroller's Office (HUB) or the South Central Texas Regional Certification Agency as being 51% owned, operated, and controlled by an ethnic minority group member(s) who is legally residing in or a citizen of the United States. For purposes of the SMWB program, the following are recognized as minority groups:

- a. **African American** – Persons having origins in any of the black racial groups of Africa.
- b. **Hispanic American** – Persons of Mexican, Puerto Rican, Cuban, Spanish or Central or South American origin.
- c. **Asian-Pacific American** – Persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent or the Pacific Islands.
- d. **Asian-Indian American** – Persons whose origins are from India, Pakistan, Bangladesh or Sri Lanka.
- e. **American Indian/Native American** – Persons having no less than 1/16 percentage origin in any of the American Indian Tribes, as recognized by the U.S. Department of the Interior's Bureau of Indian Affairs and as demonstrated by possession of personal tribal role documents.

Women Business Enterprise (WBE): A business structure that is Certified by the Texas Comptroller's Office (HUB), or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by a woman or women who are legally residing in or citizens of the United States.

African American Business Enterprise (AABE): A business structure that is Certified by the Texas Comptroller's Office (HUB), or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by African American minority group member(s) who are legally residing in or are citizens of the United States.

Joint Venture: A limited association of two or more persons to carry out a single business enterprise for profit, for which purpose they combine their property, money, efforts, skills and knowledge.

Veteran-Owned Business Enterprise (VBE): A business structure that is at least 51% owned, operated and controlled by an individual who served in the United States Armed Forces, and who was discharged or released under conditions other than dishonorable. Please note: This certification type should not be confused with the Service Disabled Veteran designation available through the Small Business Administration.

Web Submittal of Subcontractor Payment Reports:

The Contractor will be required to electronically report the actual payments to all subcontractors, utilizing the Subcontractor Payment and Utilization Reporting (S.P.U.R.) System, beginning with the first SAWS payment for services under the contract, and with every payment thereafter (for the duration of the contract). Electronic submittal of monthly subcontractor payment information will be accessed through a link on SAWS' "Business Center" web page. This information will be utilized for subcontractor participation tracking purposes. Any unjustified failure to comply with the committed SMWB levels may be considered breach of contract.

The Contractor and all subcontractors will be provided a unique log-in credential and password to access the SAWS subcontractor payment reporting system. The link may also be accessed through the following internet address: <https://saws.smwbe.com/>

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

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

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

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

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

OFFICE USE ONLY

Date Received

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

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

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

Name of Officer

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

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

☐ Yes ☐ No

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

☐ Yes ☐ No

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

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

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

- (a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

- (2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed;
or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

- (a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

- (a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

- (1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

- (2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

"General Decision Number: TX20200007 01/03/2020

Superseded General Decision Number: TX20190007

State: Texas

Construction Types: Heavy and Highway

Counties: Atascosa, Bandera, Bastrop, Bell, Bexar, Brazos, Burleson, Caldwell, Comal, Coryell, Guadalupe, Hays, Kendall, Lampasas, McLennan, Medina, Robertson, Travis, Williamson and Wilson Counties in Texas.

HEAVY (excluding tunnels and dams, not to be used for work on Sewage or Water Treatment Plants or Lift / Pump Stations in Bell, Coryell, McClellon and Williamson Counties) and HIGHWAY Construction Projects

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a

classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

* SUTX2011-006 08/03/2011

	Rates	Fringes
CEMENT MASON/CONCRETE		
FINISHER (Paving and		
Structures).....	\$ 12.56	
ELECTRICIAN.....	\$ 26.35	
FORM BUILDER/FORM SETTER		
Paving & Curb.....	\$ 12.94	
Structures.....	\$ 12.87	
LABORER		

Asphalt Raker.....\$ 12.12
Flagger.....\$ 9.45
Laborer, Common.....\$ 10.50
Laborer, Utility.....\$ 12.27
Pipelayer.....\$ 12.79
Work Zone Barricade
Servicer.....\$ 11.85

PAINTER (Structures).....\$ 18.34

POWER EQUIPMENT OPERATOR:

Agricultural Tractor.....\$ 12.69
Asphalt Distributor.....\$ 15.55
Asphalt Paving Machine.....\$ 14.36
Boom Truck.....\$ 18.36
Broom or Sweeper.....\$ 11.04
Concrete Pavement
Finishing Machine.....\$ 15.48
Crane, Hydraulic 80 tons
or less.....\$ 18.36
Crane, Lattice Boom 80
tons or less.....\$ 15.87
Crane, Lattice Boom over
80 tons.....\$ 19.38
Crawler Tractor.....\$ 15.67
Directional Drilling
Locator.....\$ 11.67
Directional Drilling
Operator.....\$ 17.24
Excavator 50,000 lbs or
Less.....\$ 12.88
Excavator over 50,000 lbs...\$ 17.71
Foundation Drill, Truck
Mounted.....\$ 16.93
Front End Loader, 3 CY or
Less.....\$ 13.04
Front End Loader, Over 3 CY.\$ 13.21

Loader/Backhoe.....\$ 14.12
Mechanic.....\$ 17.10
Milling Machine.....\$ 14.18
Motor Grader, Fine Grade....\$ 18.51
Motor Grader, Rough.....\$ 14.63
Pavement Marking Machine....\$ 19.17
Reclaimer/Pulverizer.....\$ 12.88
Roller, Asphalt.....\$ 12.78
Roller, Other.....\$ 10.50
Scraper.....\$ 12.27
Spreader Box.....\$ 14.04
Trenching Machine, Heavy....\$ 18.48

Servicer.....\$ 14.51

Steel Worker

Reinforcing.....\$ 14.00
Structural.....\$ 19.29

TRAFFIC SIGNAL INSTALLER

Traffic Signal/Light Pole
Worker.....\$ 16.00

TRUCK DRIVER

Lowboy-Float.....\$ 15.66
Off Road Hauler.....\$ 11.88
Single Axle.....\$ 11.79
Single or Tandem Axle Dump
Truck.....\$ 11.68
Tandem Axle Tractor w/Semi
Trailer.....\$ 12.81

WELDER.....\$ 15.97

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

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

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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(weighted union average rate).

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

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

date for the classifications and rates under that identifier.

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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END OF GENERAL DECISION

"

"General Decision Number: TX20200055 01/03/2020

Superseded General Decision Number: TX20190055

State: Texas

Construction Type: Heavy Tunnel

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

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

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar

year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

* SUTX1992-010 01/15/1992

	Rates	Fringes
CARPENTER (Including Form		
Setting - Wood Forms ONLY).....\$ 10.67		.92
ELECTRICIAN.....\$ 12.21		.92
IRONWORKER, REINFORCING		
(Shaft Collar & Surface ONLY)....\$ 12.03		4.09
Laborers:		
Miner.....\$ 11.77		1.28

Surface.....\$ 7.53
 Tunnel.....\$ 9.24

MECHANIC (Maintenance and
 repair on trucks and power

equipment).....\$ 11.77 .92

Oiler (Services trucks and

power equipment).....\$ 9.69 1.50

Power equipment operators:

Backhoe Operator (1 1/2 CY
 or more).....\$ 11.40 1.50

Backhoe Operator (Less
 than 1 1/2 CY).....\$ 10.68

Bulldozer.....\$ 13.00

Crane (1 1/2 CY or more)....\$ 12.82 1.50

Crane (Less than 1 1/2 CY)..\$ 11.89

Front End Loader (2 1/2 CY
 or more).....\$ 12.17

Front End Loader (less
 than 2 1/2 CY).....\$ 10.16

Locomotive Operator.....\$ 9.00 1.50

Road Head Operator.....\$ 14.12 1.21

Tunnel/Boring Machine
 Operator.....\$ 13.61

Truck drivers:

Semi.....\$ 7.25 1.05

Single Axle, Light.....\$ 7.55

WELDER.....\$ 11.58

LABORER CLASSIFICATIONS

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

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

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

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

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

violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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200 Constitution Avenue, N.W.
Washington, DC 20210

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END OF GENERAL DECISION

"

"General Decision Number: TX20200033 01/03/2020

Superseded General Decision Number: TX20190033

State: Texas

Construction Types: Heavy

PIPELINE - ON-SHORE PIPELINE CONSTRUCTION:

Counties: Texas Statewide.

PIPELINE - ON-SHORE CONSTRUCTION

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum

wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

SUTX1997-002 01/01/1997

	Rates	Fringes
Laborers:		
Drillers.....	\$ 16.08	2.01
Hot Pay.....	\$ 15.58	2.01
Jackhammermen.....	\$ 15.58	2.01
Loaders.....	\$ 16.08	2.01
Powderman, blasters & shooters.....	\$ 16.58	2.01
Unskilled.....	\$ 15.08	2.01
Pipefitter.....	\$ 36.49	7.45
Power equipment operators:		
Group 1.....	\$ 22.95	6.05
Group 2.....	\$ 17.54	4.80
Group 3.....	\$ 12.37	3.55
Truck drivers:		

Group 1.....	\$ 18.82	a
Group 2.....	\$ 18.82	a
Group 3.....	\$ 16.81	a
Group 4.....	\$ 16.04	a
Group 5.....	\$ 15.71	a

FOOTNOTE

a - \$2.52 PER HOUR PLUS \$41.00 PER WEEK

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

TRUCK DRIVER CLASSIFICATIONS

GROUP 1 - Truck Mechanics

GROUP 2 - Lowboy, rollagon or similar type equipment

GROUP 3 - A-Frame, Gin pole, Tandem float (4 & 5 axle) , rubber- tired tractor, fork lift, winch truck, track truck equipment, stringing truck

GROUP 4 - Single axle float (3 axle), flat bed truck (3 axle) dump truck (3 axle), skid truck (3 axle), hot pass (2 axle), Flat bed truck (2 axle) dump truck (2 axle), skid truck (2 axle) water truck (2 axle), pick up, bus jeep, staion wagon, swamp buggy or similar type equipment.

GROUP 5 - Stringer bead & hot pass (2 axle, flat bed truck (2 axle), dump truck (2 axle), skid truck (2 axle), water truck (2 axle), pick-up, bus jeep, station wagon, swamp buggy or similar type equipment.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1 - Backhoe, dragline, clam, crane, ditching machine, side booms (except those in

GROUP 2), mechanic, operator on dredges, bulldozer, cleaning machine, coating machine, back filler, motor grader, end loader (3 yd. & over), blending machine, wate-kote machine, equipment welder, track tractor

GROUP 2 - Pipe dream, gin truck or winch truck with poles when used for hoisting, side boom (cradling rock drill), tow tractor,, farm tractor, road boring machine, end loader (under 3 y.d), fork lift (industrial type), pot fireman (power agitated); straightening machine, boring machine, bombardier (track or tow rig), mobile lubrication & service engineer, hydrostatic testing operator, rollagon or similar type equipment

GROUP 3 Fuel man, oiler or swamper (on trenching machine or shovel- type equipment)

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END OF GENERAL DECISION

"

SAN ANTONIO WATER SYSTEM

**GENERAL CONDITIONS
(Revised June 2015)**

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SAN ANTONIO WATER SYSTEM

GENERAL CONDITIONS

ARTICLE I. CONTRACT DEFINITIONS:

Wherever in these General Conditions or in other parts of the Contract Documents, the following terms, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

1. ACPA - American Concrete Pipe Association.
2. ANSI - American National Standards Institute.
3. ASTM - American Society for Testing Materials.
4. AUTHORIZATION TO PROCEED - (Work Project Authorization) A written notice given by Owner to Contractor establishing the date on which the Contract Time will commence to run and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.
5. AWWA - American Water Works Association.
6. BIDDER - An individual, partnership, corporation, joint venture, etc., submitting a proposal.
7. BOARD – Board of Trustees of the San Antonio Water System.
8. CHANGE ORDER - A written order issued by the Owner to the Contractor authorizing additions, deletions, or revisions to the Work to be performed by the Contractor within the scope of construction services outlined in the Contract Documents. This includes changes in price and/or changes in time.
9. CITY- The City of San Antonio, Texas (COSA)
10. CITY COUNCIL - The duly elected members of the council of the City of San Antonio, Texas.
11. CLAIM – A written demand seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract.
12. COMPETENT PERSON – Employee of prime Contractor who has the industry knowledge of construction safety practices and is well versed with construction practices and procedures.
13. CONDITIONAL LETTER OF ACCEPTANCE - The date certified in writing by the Owner when the Construction of the entire Project or any completed portions thereof as defined by SAWS is completed in accordance with the Contract Documents.
14. CONSTRUCTION OBSERVER/INSPECTOR (COI) - The Owners assigned authorized representative who observes, inspects, and may accept any or all parts of the Project and the materials to be used therein.
15. CONSULTANT - A person registered as a professional engineer pursuant to Texas Occupations Code, Title 6, Chapter 1001, employed to provide professional engineering services and having overall responsibility for the design of a project or a significant portion thereof, together with administrative supervision of any subconsultants the Consultant may retain. The term "Consultant", unless the context clearly indicates otherwise, means an engineer in private practice retained for a specific project under a contractual agreement with the Owner.
16. CONTRACT - The signatory Agreement (Standard Form) between the SAWS and the Contractor governing the furnishing of material and performance of the Work. The Contract will include all Contract Documents.

17. CONTRACT DOCUMENTS - The Contract Documents consist of Bidding or Proposal Documents (Invitation to Bidder's or Invitation for Competitive Sealed Proposals, the Instructions to Bidders or the Instructions to Respondents, the Supplementary Instructions to Respondents, the Contractor's completed Bid Proposal or Price Proposal form, the Addenda), the Contract, the Conditions of the Contract (General, Supplemental and Special Conditions), the Standard Drawings, the Construction Specifications, the Change Orders, the Payment and Performance Bonds, and the Good Faith Effort Plan. The Contract Documents form the complete CONTRACT, which represents the entire and integrated agreement between the Owner and the Contractor and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between:
- (1) Design Consultant and Contractor;
 - (2) Owner and Subcontractor or Subcontractor; or
 - (3) Any person or entities other than Owner and Contractor.
18. CONTRACTOR - The individual, partnership, corporation, joint venture, or other entity contracting with the SAWS to complete the Work. The Contractor is directly responsible for the Subcontractors and Vendors that they select to complete the Work.
19. CONTRACT SUM - The total compensation payable to the Contractor for performing the Work as originally contracted or as subsequently adjusted by Change Orders.
20. CONTRACT TIME - The total time allowed the Contractor for completion of the Work. Contract Time will commence as per Article 8.1 and shall include the number of days set forth in the Contract plus any extended days granted under the provisions of Article 6.
21. ENGINEER - A Professional Engineer licensed by the State of Texas and duly authorized as a representative of the San Antonio Water System to provide professional engineering services on public works projects. Equivalent terms may include Engineer of Record, Program Engineer, Project Engineer, and/or Design Engineer.
22. FORCE ACCOUNT - a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as specifically provided for in Section 6.5.3 herein.
23. HAZARDOUS MATERIAL(s)/SUBSTANCE - Pursuant to Section 26.263 of the Water Code hazardous material means any substance or material designated as such by the administrator of the Environmental Protection Agency pursuant to the Comprehensive Environmental Response Compensation and Liability Act (42 U.S.C. Sec. 9601 et seq.), regulated pursuant to Section 311 of the Federal Clean Water Act (33 U.S.C. Sec. 1321 et seq.), or designated by the Commission and shall also include but not be limited to:
- (1) any substance that, whether by its nature or its use, is subject to regulation or requires environmental investigation, monitoring, or remediation under any federal, state, or local environmental laws, rules, or regulations;
 - (2) any underground storage tanks, as defined in 42 U.S.C. Section 6991(1)(A)(I) (including those defined by Section 9001(1) of the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq.;
 - (3) the Texas Water Code Annotated Section 26.344; and Title 30 of the Texas Administrative Code Sections 334.3 and 334.4), whether empty, filled or partially filled with any substance; and
 - (4) any other hazardous material, hazardous waste, hazardous substance, solid waste, and toxic substance as those or similar terms are defined under any federal, state, or local environmental laws, rules, or regulations.
24. INSTRUCTIONS TO BIDDERS - Owner Instructions of a general nature outlining the duties and responsibilities of a prospective bidder.

25. LABORATORY - The testing laboratories of the Owner or any other testing laboratory that may be designated or approved in writing by the Owner.
26. LABOR BURDEN – The cost paid by an employer for employing individuals above the salary actually paid and reflected in their payroll. These are limited to the following:
- Payroll Taxes – both Federal and State (FICA, FUTA, SUTA)
 - Paid Holidays, Vacation Leave and Sick Leave
 - Retirement/Pension Costs (401K, etc.)
 - Health Care
 - Life/AD&D Insurance
 - Workers Compensation Insurance
 - Long-Term Disability Insurance
 - Short-Term Disability Insurance
 - Bonuses, if paid to all employees regardless of company's financial performance
 - Safety Training and Personal Protective Equipment (PPE) given to all employees
27. LUMP SUM – Price of an entire group of services, where no breakdown is given for individual items.
28. MAJOR BID ITEM - Any individual bid item submitted by Contractor whose total cost, as determined by multiplying the bid schedule line item quantity for that bid item by the Contract unit price also provided in that bid schedule line item, is equal to or greater than 5 percent of the original contract total amount. The preceding criteria notwithstanding, the Owner and Consultant **reserve the right** to identify or exclude specific bid items as being "Major" in the Special Conditions for each Project.
29. MINORITY BUSINESS ENTERPRISE - A business structure that is certified by the Small Business Administration, Texas State Comptroller's Office or the South Central Texas Regional Certification Agency as being 51% owned, operated, and controlled by an ethnic minority group member(s) who is legally residing in or a citizen of the United States. The ethnic minority group members recognized by SAWS are African Americans, Hispanic Americans, Asian Americans, and Native Americans.
30. MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) - A conveyance or system of conveyances (including roads with drainage systems, municipal streets catch basins, curbs, gutters, ditches, man-made channels or storm drains:
- .1 Owned or operated by a State, City, town, borough, county, district association or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial waters, storm water or other wastes including special districts under State law such as a sewer district, flood control district or drainage district or similar entity or a designated and approved management agency under Section 208 of the Clean Water Act that discharges to water of the United States;
 - .2 Designated or used for collection or conveying storm water.
 - .3 That is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.
31. NEMA - National Electrical Manufacturers Association.
32. NFPA - National Fire Protection Association.
33. NON-HAZARDOUS MATERIAL(s)/SUBSTANCES - Any material(s)/substance(s) which is not designated as hazardous pursuant to Article I. 23 herein and the continued presence of such on the site is determined by the Owner's representative not to be detrimental to the completion of the Project.
34. NOTICE OF NON COMPLIANCE – Neglect of compliance; failure to comply.
35. OWNER - The San Antonio Water System (SAWS).
36. OWNER'S REPRESENTATIVE - The Owner's duly authorized representative of the System.

37. PAYMENT BOND – In accordance with Chapter 2253 of the Texas Government Code as amended, the security furnished by the Contractor through the Surety in the full amount of the Contract Sum for the protection of all persons supplying labor and material in the prosecution of the Work who properly follow statutory requirements for perfecting claims against such security. If the Contract amount does not exceed \$25,000, a Payment Bond may not be required.
38. PERFORMANCE BOND - In accordance with Chapter 2253 of the Texas Government Code as amended, the security furnished by the Contractor through the Surety in the full amount of the Contract Sum as a guaranty that the Work will be faithfully performed and completed and that the Owner will be saved harmless from all costs and damages which the Owner may suffer by reason of the Contractor's default or failure to perform the Work. If the Contract amount does not exceed \$25,000, a Performance Bond may not be required.
39. PIPELINE PROJECT - Work site and Work elements related to a sanitary sewer, water, or recycle water pipeline with all appurtenances and construction to be performed thereon under the Contract.
40. PLANS - The Plans, drawings, details and supplemental drawings, or reproductions thereof, produced and sealed by the Consultant and/or Engineer and approved by the Owner, showing the location, character, dimensions and details of the Work and which are a part of the Contract. Plans include standard details issued and sealed by the Consultant and/or Engineer or his representative.
41. PROJECT – The total design and construction of Work performed under the Contract Documents and may be the whole or a part of the Project and which may include construction by Owner or by separate Contractors. All references in these General Conditions to or concerning the Work or the Site of the Work will use and or related to the term “Project,”(including Pipeline Projects) notwithstanding that the Work only may be a part of the Project.
42. PROPOSAL - The offer of the bidder, made out on the prescribed forms, giving prices for performing the work described in the Plans and Specifications.
43. PUNCH LIST – List of Work remaining to be completed before final acceptance of the Project.
44. REQUEST FOR INFORMATION (RFI) – Document submitted by Contractor requesting clarification on a particular bid item, scope of work or intent of the Contract.
45. REQUEST FOR PROPOSAL (RFP) - Document submitted by Contractor to SAWS or document submitted by SAWS to Contractor requesting changes to the Contract Document.
46. SAMPLES - Physical examples furnished by the Contractor to Owner to illustrate intended or anticipated materials, equipment or workmanship, and to assist Owner and Consultant in the establishment of workmanship and quality standards by which the Work will be judged.
47. SAN ANTONIO WATER SYSTEM - San Antonio Water System (SAWS) shall mean the San Antonio Water System Board of Trustees as established pursuant to Article 1115, Texas Revised Civil Statutes Annotated, and City of San Antonio Ordinance No. 75686. Whenever used in this Contract the term SAWS or Owner shall be, unless indicated otherwise, understood to mean the San Antonio Water System Board of Trustees, or its successors or any person or persons acting lawfully in an official capacity on behalf of the SAWS at such time and within the power and authority specifically delegated to him or them by this Contract.
48. SEQUENCE OF CONSTRUCTION - The logical and proper order in which the Contractor shall accomplish the Work as provided by Article 5.14 as directed by the Owner in stages and phases, as shown in the Contract Documents, unless Owner orders otherwise by a properly executed Change Order as provided herein.
49. SHOP DRAWINGS - Drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are furnished by the Contractor and prepared by Contractor, first-tier or sub-tier subcontractors, manufacturer, supplier or distributor, and which illustrates and details some portion of the Work. Shop Drawings shall be furnished to the Owner as submittals.

50. SMALL BUSINESS ENTERPRISE – A business structure that is Certified by the Small Business Administration, Texas State Comptroller’s Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by someone who is legally residing in or a citizen of the United States, and the business structure meets the U.S. Small Business Administration’s (SBA) size standard for a small business within the appropriate industry category.
51. SMALL, MINORITY, AND WOMAN-OWNED BUSINESS - Hereinafter referred to as “SMWB”, includes all business structures Certified by the Small Business Administration, Texas State Comptroller’s Office, or the South Central Texas Regional Certification Agency that are 51% owned, operated, and controlled by a SMALL BUSINESS ENTERPRISE, a MINORITY BUSINESS ENTERPRISE, or WOMAN-OWNED BUSINESS ENTERPRISE
52. SPECIAL CONDITIONS – The part of the Contract Documents which add special requirements that apply to a specific project as defined in Article XI herein.
53. SPECIFICATIONS - The specific instructions to the Contractor that are provided in the Contract Document as to the requirements for materials, equipment, certain construction procedures, standards and quality of workmanship for the Work and performance of related services and other technical requirements and forming a part of the Contract.
54. SUBCONTRACTOR - The individual, firm, equipment vendor, or corporation, having a first tier subcontract with the prime or general Contractor, subject to the review of qualifications by the Consultant and the Owner's Representative, for the performance of a part of the Work. Sub-tier subcontractors must be identified by the subcontractors and be similarly subject to the review of qualifications by the Consultant and the Owner's Representative for the performance of a part of the Work.
55. SUBSTANTIAL COMPLETION - When construction of the project or a specified part thereof is sufficiently completed in accordance with the Contract Documents so that the Project, or specified part thereof could be utilized for the Owner's purposes for which it is intended.
56. SUPERINTENDENT - The Contractor’s onsite project representative whom the Contractor has authorized to communicate with the SAWS COI, pursuant to the terms of the Contract and as provided for in Section 5.4 herein.
57. SUPPLEMENTARY CONDITIONS - Shall be as defined in Article XI herein.
58. SURETY - The corporate body licensed to conduct business in the State of Texas that provides assurance that the Contractor, or his substitute will faithfully perform the Work covered by the Contract and make payment of any due, unpaid, eligible labor and supply claims arising there under and is in compliance with the provisions contained in Articles 3.4 and 3.5 herein.
59. UNDERGROUND FACILITIES - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and appurtenances thereto, and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, sewage and drainage removal, traffic or other control systems.
60. UNIT PRICE WORK - Work to be paid for by Owner on the basis of Contractor quoted unit prices in the Bid Proposal based upon Owner estimated quantities.
61. WOMAN BUSINESS ENTERPRISE – A business structure that is Certified by the Small Business Administration, Texas State Comptroller’s Office or the South Central Texas Regional Certification Agency as being 51% owned, operated and controlled by a woman or women who are legally residing in or citizens of the United States

62. WORK - The entire completed construction or the various separately identifiable parts thereof required necessary, proper or incidental and required or reasonably inferable, to produce, construct and fully complete the construction project in strict accordance with the requirements of the Contract Documents. Work is the result of Contractor performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.
63. WORK CHANGE DIRECTIVE – Shall be as defined in Article VI herein. Document utilized to memorialize minor changes in work as described in 6.2.2.
64. WRITTEN NOTICE – Any notice, payment, statement or demand required or permitted to be given under this Contract by either party to the other may be effected by personal delivery in writing or by facsimile transmission, email or by mail, postage prepaid, or by overnight delivery to an officer, management level employee or other designated representative of either party. Mailed or email notices shall be addressed to the parties at an address designated by each party, but each party may change its address by written notice in accordance with this section. Mailed notices shall be deemed received as of three (3) calendar days after mailing.

ARTICLE II. LEGAL RELATIONSHIPS AND RESPONSIBILITIES:

- 2.1 LEGAL RESPONSIBILITIES - The Contractor in the performance of the Work shall comply with all pertinent Ordinances of the City of San Antonio (COSA), Regulations of the San Antonio Water System (SAWS), Laws of the State of Texas, and of the United States, including but not limited to Rules and Regulations of the United States Department of Labor, pertaining to Occupational Safety and Health Administration standards as presently existing or as may hereinafter be modified or amended.
- .1 Where construction projects cross or run along state highways, the Contractor shall at a minimum comply with governing Texas Department of Transportation Regulations as outlined in State Permits for each crossing. In cases where State Regulations do not apply, City Regulations shall be binding.
- .2 Where construction projects cross or run along county roads, the Contractor shall at a minimum comply with governing Bexar County Public Works Regulations as outlined in the County Permit for each crossing.
- 2.2 GENERAL UNDERSTANDING - Contractor at his own cost and expense shall furnish all supervision, tools, implements, machinery, labor, materials and accessories, such as are necessary and proper for the purpose, and secure all required permits and licenses, and shall at his own cost and expense construct, build and complete, in a good, first class, substantial and workmanlike manner, the structures, work and improvements herein described and/or referred to in the Contract Documents.
- 2.3 INDEMNIFICATION - Contractor shall protect the public, SAWS, and COSA fully by taking reasonable precaution to safeguard persons from death or bodily injury and to safeguard property of any nature whatsoever from damage. Where any dangerous condition or nuisance exists in and around construction sites, equipment and supply storage areas and other areas in any way connected with the performance of this contract, the Contractor shall provide and maintain reasonable warning of such danger or nuisance. The Contractor shall not create an excavation, obstruction, or any dangerous condition or nuisance of any nature whatsoever in connection with the performance of this Contract unless necessary to its performance, and in that event the Contractor shall provide and maintain at all times any and all reasonable means of warning of any danger or nuisance created. The duties of the Contractor in this section shall be nondelegable, and the Contractor's compliance with the specific recommendations and requirements of the San Antonio Water System or the City of San Antonio as to the means of warning shall not excuse the Contractor from the faithful performance of these duties should such recommendations and requirements not be adequate or reasonable under the circumstances.

In order to protect SAWS and COSA the Contractor's failure to perform any of the foregoing duties or any of the terms of this Contract, the Contractor shall indemnify and save harmless SAWS, COSA and their agents and employees from all losses, damages, judgments, decrees, and expenses, liens, claims, demands, causes of action, or costs of any nature whatsoever, and/or any other liability, damage, fine or penalty (except where reimbursement for fines or penalties is prohibited by law), including all costs of

defense, attorneys fees, and settlement arising out of or in any way connected with any claims or actions at law or in equity, brought against SAWS, COSA and their agents and employees for the death or injury to persons or for damage to property caused, or allegedly caused, by any willful acts, negligence, nuisance, or breach of any term or condition of this Contract in connection with work to be performed pursuant to said Contract, by the Contractor, his agents, subcontractors, or employees. The Contractor shall furthermore indemnify and save harmless SAWS and COSA and their agents and employees from all demands of subcontractors, workmen, material men, or suppliers of machinery and parts thereof, equipment, power tools, and supplies incurred in connection with work to be performed under this Contract. Property of any description, including but not limited to property of SAWS and COSA, which shall be damaged in the performance of this Contract by the Contractor, his agents, employees, subcontractors or their employees and subcontractors shall be restored to its condition prior to damage by the Contractor at the Contractor's expense.

SUCH INDEMNITY SHALL APPLY WHERE THE CLAIMS, LOSSES, DAMAGES, CAUSES OF ACTION, SUITS, JUDGEMENTS, DECREES, OR LIABILITY ARISE IN PART FROM THE NEGLIGENCE OF SAWS OR COSA. IT IS THE EXPRESSED INTENTION OF THE CONTRACTOR, SAWS AND COSA THAT THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH IS INDEMNITY BY CONTRACTOR, TO INDEMNIFY AND PROTECT SAWS AND COSA FROM THE CONSEQUENCES OF THEIR OWN NEGLIGENCE, WHERE THE NEGLIGENCE IS A CONCURRING CAUSE OF THE INJURY, DEATH, OR DAMAGE. FURTHERMORE, THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH SHALL HAVE NO APPLICATION TO ANY CLAIM, LOSS, DEATH OR DAMAGE RESULTS FROM THE SOLE NEGLIGENCE OF SAWS AND COSA UNMIXED WITH THE FAULT OF ANY PERSON OR ENTITY. The obligations of Contractor hereunder shall survive termination of this Contract for any reason. The foregoing notwithstanding, it is agreed that with respect to any statutory restrictions affecting the validity or enforceability of the indemnification obligation herein, it shall be subject to such restrictions, and the indemnification obligation herein shall be deemed to be amended to the minimum extent necessary to conform therewith, and shall otherwise continue in full force and effect.

In any claims against SAWS or COSA or their agents or employees by Contractor, any employee of Contractor, any subcontractor, anyone directly or indirectly employed by Contractor, or any subcontractor or anyone for whose acts any of them may be liable, the indemnification obligation under this Article shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under workers' compensation acts, disability benefit acts of other employer's benefit acts.

- 2.4 ROYALTIES AND PATENTS - The Contractor shall pay all royalties and license fees, and defend all suits or claim for infringement of any patent rights and shall indemnify and as provided under Article 2.3 save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such royalties and license fees and loss when a particular design or process, or the product of a particular manufacturer or manufacturers is specified by Owners Contract Document; provided, however, if the Contractor has reason to believe the design, process or product specified constitutes an infringement of a patent, he shall be responsible for such royalties, license fees and loss unless he promptly gives such information to the Owner.
- 2.5 NO WAIVER OF SAWS RIGHTS - Unless specifically and unambiguously set out in the Contract Documents at the time of bid or proposal opening, no observation/inspection or approval by said Owner or any COI, officer or employee of the Owner, or any order, measurement or certificate by said Owner, or any estimate or payment by the Owner for any part of said Work, or material or method or equipment, or any extension of time, or any possession of the Work, at any time shall operate as a waiver of any provision or obligation of this Contract or any right or power herein given or reserved to said Owner, or of any right to claim any indemnity or damages for patent or latent defects in the work or otherwise as herein provided for; nor shall any Owner waiver of any Contractor breach of this Contract be deemed as a waiver of any other or subsequent Contractor breach; and every Owner right or remedy under the Contract Documents shall be cumulative, and in addition to all other Owner rights and remedies.
- 2.6 INTEREST IN SAWS CONTRACT PROHIBITED - No officer or employee of the Owner shall have a financial interest, direct or indirect, in any Contract with the SAWS, or shall be financially interested, directly, in the sale to the SAWS of any land, materials, supplies or service, except on behalf of the SAWS as an officer or employee. This prohibition extends to the City Public Service Board, City of San

Antonio, and City boards and commissions other than those, which are purely advisory.

- 2.7 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS/NONDISCRIMINATION CLAUSE The San Antonio Water System highly encourages Contractors to implement Affirmative Action practices in their employment programs. This means Contractor should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information.
- 2.8 SMALL, MINORITY, AND WOMEN BUSINESS PROGRAM (SMWBP) REQUIREMENTS -The San Antonio Water System highly encourages contractors to form joint ventures and/or provide subcontracting opportunities to small, minority and woman-owned business (SMWB) firms. The San Antonio Water System's Good Faith Effort Plan (GFEP) is **required and must be submitted** as part of the bid package to report all small, minority, and woman-owned firm participation for this project. The GFEP must reflect all information requested as part of the total construction Contract Documents.
- 2.9 STATE SALES TAX - The Owner qualifies for exemption from state and local sales tax and will upon request by the Contractor, furnish the Contractor with a tax exemption certificate. It is the Contractor's responsibility to claim exemption from payment of applicable state and local sales taxes by complying with such procedures as may be prescribed by the State Comptroller of Public Accounts. The Contract separates the cost of materials and tangible equipment from skill, labor and other associated costs of construction. This is in accordance with the Texas Tax Code to allow tax exemption on the Contract price for materials. Certain construction equipment that is owned or rented by the CONTRACTOR may be subject to State and Local Sales Tax. The Contractor will not include in the Contract Sum or any modification thereto any amount for sales, use or similar taxes for which Owner is exempt.
- 2.10 PREVAILING WAGE RATE AND LABOR STANDARD PROVISIONS. The Provisions of Chapter 2258 of the Texas Government Code, and the "Wage and Labor Standard Provisions" amended in City of San Antonio Ordinance 2008-11-20-1045, expressly are made a part of this Contract and are incorporated herein by reference (the "PWRLSP"). In accordance therewith, a schedule of the general prevailing rate of per diem wages in this locality for each craft or type of worker needed to perform this Contract is included as part of the Bidding Document that are part of the Contract Documents. In accordance with the PWRLSP, the Contractor shall forfeit, as a penalty to Owner, sixty dollars (**\$60.00**) for each laborer, workman or mechanic employed for each calendar day, or portion thereof, in which such laborer, workman or mechanic is paid less than the stipulated prevailing wage rates for any work done under this Contract by the Contractor or any Subcontractor employed on the project. The establishment of prevailing wage rates, pursuant to Chapter 2258 of the Texas Government Code, shall not be construed to relieve Contractor from its obligation under any federal or state law, regarding the wages to be paid to or hours worked by laborers, workmen or mechanics, insofar as applicable to the work to be performed hereunder. Contractor, in the execution of this Project, agrees it shall not discriminate in its employment practices against any person because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information. Contractor agrees it will not engage in employment practices which have the effect of discriminating against employees or prospective employees because race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information. This Contract provision shall be included in its entirety in all Subcontractor agreement(s) entered into by the Contractor or any Subcontractor employed on the project.
- .1 LCP Tracker - Each contractor and every lower-tier subcontractor will be required to submit certified payrolls and labor compliance documentation electronically utilizing the LCP Tracker web-based application as of the first Certified Payroll Report (CPR) and with every CPR thereafter. Electronic submittal of CPRs will be accessed through a link on SAWS' "Business Center" web page. Each contractor and subcontractor will be provided a Logon identification and password to access the SAWS LCP Tracker reporting system. Electronic submittals will require data entry of weekly payroll information including: employee identification, labor classification, total hours worked and hours worked on this project, and wage and benefit rates paid. This electronic submission requirement also applies to every lower-tier subcontractor required to provide labor compliance documentation.

Additional information on the LCP Tracker System can be found on: www.lcptracker.com.

- 2.11 ETHICS. To report suspected ethics violations impacting The San Antonio Water System, please call 1-800-687-1918.

ARTICLE III. CONTRACT DOCUMENTS & BONDS:

- 3.1 PLANS AND SPECIFICATIONS - The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated and intended results. In cases of discrepancy between any drawing and the dimension figures written thereon, the dimension figures shall govern over scaled dimensions; Detailed Drawings and accompanying notations shall govern over general Drawings; Specifications shall govern over Drawings and Special Conditions shall govern over Supplemental Conditions, Specifications, Drawings and these General Conditions.

- .1 For the purposes of clarification, the most recently issued Document takes precedence over previous issues of the same document. The order of precedence for the Contract Document is as follows with the highest authority listed as "1."

1. Contract Modifications signed by Contractor and Owner.
2. Addenda, with those of later date having precedence over those of earlier date.
3. Special Conditions
4. Supplementary Conditions.
5. General Conditions
6. Specifications
7. Drawings

- 3.2 INTENT OF THE CONTRACT DOCUMENTS is to describe a functionally complete Project (or integral component part thereof) to be constructed in accordance with the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied by Contractor whether or not specifically called for by SAWS or its Consultant. When words which have a well-known technical or trade meaning are used to describe work, materials or equipment such words shall be interpreted in accordance with that meaning. Where phrases such as "directed by", "ordered by" or "to the satisfaction of", "the Consultant", "the SAWS COI" or "the Owner's Representative" occur, it is to be understood that the directions, orders, or instructions to which they relate are within the scope of, and authorized by the Contract Documents. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids except as may be otherwise specifically stated in writing.

DISCREPANCY IN CONTRACT DOCUMENTS - If, during the performance of the Work, Contractor finds a conflict, error or discrepancy in the Contract Documents, Contractor shall so report to Consultant or Owner in writing immediately and before proceeding with the Work affected thereby and shall obtain a prompt written interpretation or clarification from SAWS or Consultant; however, Contractor shall not be liable to SAWS or Consultant for failure to report any conflict, error or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof or should reasonably have known thereof.

- 3.3 PLANS AND SPECIFICATIONS AT THE WORK SITE - The Contractor shall maintain at the Work site at least one copy of the most recent and complete set of Contract Documents to include, but not limited to, Plans, Specifications, Addenda, approved Shop Drawings and Change Orders, in good order and marked to record all changes to the Plans and/or existing physical conditions made during construction.

- .1 RECORD DRAWINGS - Each month as the Work progresses the Consultant shall formally submit to SAWS, along with the monthly payment application, a set of red line drawings noting work completed during that period. Red Line drawings should also reflect any and all variations to the Plans and reflect all actual dimensions necessary for the development of as built drawings. As a condition precedent to any progress payment of final payment the Contractor shall have a

duty to submit, and coordinate with Consultant, Contractor's properly marked drawings. Prior to final payment to the Contractor, the Contractor who has control of the Work and is in a position to know how the Project was constructed, shall formally submit to SAWS Consultant, at the final walk through the set of clearly marked red line drawings and related documents noting work completed and any variations from the original plan and specifications for Consultant's use in preparing Owner's final "Record Drawings" for the SAWS permanent file.

- 3.4 PERFORMANCE BOND - CONTRACTOR shall furnish a Performance Bond in favor of SAWS in an amount equal to 100% of the total construction cost under this Contract. Total construction cost are defined as the entire cost of materials and their installation, and include, but are not limited to, the cost of labor, equipment, supplies, materials and additional construction costs. The Performance Bond shall: (1) guarantee the completion of the entire construction herein identified in conformity with the Plans and Specification approved by SAWS, and (2) guarantee the Work against defects in workmanship and materials for a period of twenty four (24) months after acceptance of the work by the San Antonio Water System. The bond shall be in accordance with Chapter 2253 of the Texas Government Code and Chapter 3503 of the Texas Insurance Code and shall have corporate Sureties that are licensed to conduct business in Texas. The Contractor agrees that the following shall apply to bonds provided by a Surety:

If any bond is in an amount in excess of ten (10%) percent of the Surety company's capital and surplus, the San Antonio Water System shall require, as a condition to accepting the bond, written certification that the surety company has reinsured the portion of the risk that exceeds ten (10%) percent of the surety company's capital and surplus with one or more reinsurers who are duly authorized, accredited, or trusted to do business in this state. The amount reinsured by any reinsurer may not exceed ten (10%) percent of the reinsurer's capital and surplus.

If the amount of the bond exceeds \$100,000, the surety must also:

- (1) hold a certificate of authority from the United States secretary of the treasury to qualify as a surety on obligations permitted or required under federal law; or
- (2) have obtained reinsurance for any liability in excess of \$100,000 from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority from the United States secretary of the treasury to qualify as a surety or reinsurer on obligations permitted or required under federal law.

If the Surety on any bond furnished by the Contractor to the Board is declared bankrupt or becomes insolvent, or has its right to do business revoked in the State of Texas, then the CONTRACTOR will have ten (10) days to substitute another bond and surety there for which shall be acceptable to SAWS and which shall be at the expense of the Contractor.

- 3.5 PAYMENT BOND - Contractor shall furnish Payment Bond in favor of SAWS in an amount equal to 100% of the total construction cost under this Contract. Total construction costs are defined as the entire cost of materials and their installation, and include, but are not limited to, the cost of labor, equipment, supplies, materials and additional construction costs. The Payment Bond shall be security for the payment of all persons supplying labor and material in the prosecution of the Work provided for in the Contract Documents. The Contractor agrees that the following shall apply to Bonds provided by a Surety:

If any Bond is in an amount in excess of ten (10%) percent of the Surety company's capital and surplus, the San Antonio Water System shall require, as a condition to accepting the Bond, written certification that the surety company has reinsured the portion of the risk that exceeds ten (10%) percent of the surety company's capital and surplus with one or more reinsurers who are duly authorized, accredited, or trusted to do business in this state. The amount reinsured by any reinsurer may not exceed ten (10%) percent of the reinsurer's capital and surplus.

If the amount of the bond exceeds \$100,000, the Surety must also:

- (1) hold a certificate of authority from the United States secretary of the treasury to qualify as a surety on obligations permitted or required under federal law; or
- (2) have obtained reinsurance for any liability in excess of \$100,000 from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority

from the United States secretary of the treasury to qualify as a surety or reinsurer on obligations permitted or required under federal law.

The bonds shall have corporate Sureties that are licensed to conduct business in Texas. If the Surety on any Bond furnished by the Contractor to the Board is declared bankrupt or becomes insolvent, or has its right to do business revoked in the State of Texas, then the CONTRACTOR will have ten (10) days to substitute another Bond and Surety therefore which shall be acceptable to SAWS and which shall be at the expense of the Contractor.

- 3.6 CONTRACTOR AND SURETIES STILL BOUND - No assignment, transfer or subletting, without the written consent of SAWS, and no order of SAWS for or approval of any alterations or modifications in said Specifications, Plans, or Work, and no change in the requirements or order for extra work made by the SAWS as provided in this Contract, shall ever in any manner release or diminish the responsibility of Contractor or any Surety on any bond of Contractor, but on the contrary, such responsibility shall extend to and comprehend all such changes and other matters. If any Surety upon any bond furnished in connection with the Contract becomes insolvent, or otherwise not authorized to do business in this State, the Contractor shall within ten (10) days furnish equivalent substitute forms of security while seeking substitute bonding, to protect the interests of the SAWS and of persons supplying labor or materials in the prosecution of the Work contemplated by the Contract, or may be liable for breach of Contract and default termination.
- 3.7 CONTRACTS LESS THAN \$25,000 - If the Contract Sum is less than or equal to \$25,000, Owner and Contractor may agree (at Owner's discretion) to Contractor not providing Performance and Payment Bonds; provided that in such event, no money will be paid by Owner to Contractor until Final Completion and acceptance of all Work by the Owner. If Contractor elects to provide Performance and Payment Bonds, the Contract Sum shall be payable to Contractor through progress payments in accordance with these General Conditions.

ARTICLE IV. CONTRACT ADMINISTRATION:

4.1 GENERAL ADMINISTRATION

- .1 PLANS AND SPECIFICATIONS BY CONSULTANT -The Consultant will provide general administration of the Contract during construction in accordance with the Consultant's scope of work as defined in the Consultant's Contract with the SAWS.
- .1 The Consultant has the authority to act on behalf of the Owner to the extent provided in the Construction Contract Documents. The Consultant will advise and consult with the Owner. The Owner's instruction to the Contractor may be issued through the Consultant but the Owner reserves the right to issue instructions directly to the Contractor through other designated SAWS representatives. Contractor understands that SAWS may modify the authority of such Consultant as provided in the terms of its contract relationship with the Consultant, and the Owner shall, in such event, be vested with powers formerly exercised by such Consultant, provided written notice of such modification shall be immediately served on the Contractor. Nothing herein shall authorize independent agreements between Contractor and such Consultant, nor shall the Consultant be deemed to have a legal relationship with the Contractor.
- .2 Any and all oral instructions shall be confirmed expeditiously in writing with copies furnished to the Consultant, the Owner's designated representatives, and the Contractor by the party issuing the oral instruction.
- .3 Upon the Consultant's written recommendation, the Owner's Representative shall have the final authority to reject Work performed by the Contractor which does not meet the requirements of the Contract, and to order such Work repaired, removed, or replaced in accordance with Article 5.10. Rejected Work will be documented and all payments related to the rejected Work will be suspended until the Work is accepted by the Owner.

.2 PLANS AND SPECIFICATIONS BY SAWS ENGINEER

- .1 The Engineer shall confirm all oral instructions to the Contractor expeditiously in writing.

- .2 Any other provision contained herein notwithstanding, the Engineer shall have the authority to reject Work performed by the Contractor which does not meet the requirements of the Contract, and to order such Work repaired, removed, or replaced in accordance with Article 5.10. Rejected Work will be documented and all payments related to the rejected Work will be suspended until the Work is accepted by the Owner.

4.2 ACCESS TO AND OBSERVATION/INSPECTION OF THE WORK

- .1 PLANS AND SPECIFICATIONS BY CONSULTANT - The Contractor shall provide sufficient, safe, and proper facilities at all reasonable times for the observation and/or inspection of the Work by any duly authorized representative of the Owner. The Consultant and the Owner will make visits to the site at intervals appropriate to the various stages of construction to observe the progress of the executed Work and to determine if the Work is proceeding in accordance with the Contract Documents.

- .1 On the basis of such visits and on-site observations as an experienced and qualified design professional, Consultant will keep Owner informed of the progress of the Work and will guard Owner against defects and deficiencies in the Work which are the responsibility of the Contractor to prevent and/or cure.

- .2 No approval of any phase of the construction Project by any of the Owner's representatives or observer/inspectors shall relieve the Contractor from full compliance with the Contract Documents regarding the ultimate Work product. Any additional cost, damages, or delays occasioned by patent or latent defects in the Work, and/or failure to meet the requirements of the Contract Documents, at any Project phase, shall be borne by the Contractor.

- .2 PLANS AND SPECIFICATIONS BY SAWS ENGINEER - The Contractor shall provide sufficient, safe and proper facilities at all reasonable times for the observation/inspection of the Work by the duly authorized representative of the Owner. The Engineer will make visits to the site at intervals appropriate to the various stages of construction to observe the progress of the executed Work and to determine if the Work is proceeding in accordance with the Contract Documents.

- .1 No approval of any phase of the construction Project by any of the Owner's observer and/or inspectors shall relieve the Contractor from full compliance with the Contract Documents regarding the ultimate Work product. Any additional cost, damages, or delays occasioned by patent or latent defects in the Work, and/or failure to meet the requirements of the Contract Documents, at any Project phase, shall be borne by the Contractor.

- 4.3 ASSIGNMENTS AND SUBLETTING - Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract, or any portion thereof, or any right, title or interest in, to or under the same, without the previous written consent of the Owner. Contractor shall not assign by power of attorney or otherwise any of the monies or other considerations to become due and payable by the Owner under this Contract, without the previous written consent of the Owner. The Contractor shall notify the Owner, by written notification by certified mail to the Owner, that such assignment, transfer, conveyance or subletting, or other disposition of this Contract or any portion thereof, or any right, title or interest, in, to or under the same, is contemplated. If the Contractor does not receive written approval of such contemplated action from the Owner within thirty days of receipt of such initial request by the Contractor, such contemplated assignment, transfer, conveyance or subletting, or other disposition of this contract or any portion thereof, or any right, title or interest in, to, or under the same, shall be deemed disapproved. In no event shall the Owner be liable in excess of the consideration of this Contract in the case of any such assignment, transfer, conveyance or subletting of the Work or performance which is subject hereof.

- .1 The Owner reserves the right to withhold any monthly payment hereafter provided for in the event of an assignment or subletting of a portion of the work without the previous consent and knowledge of the Owner and by reserving such right, the Owner shall not be deemed to have waived its right to declare a full breach of this Contract for Contractor's failure to comply with provisions hereof, such remedy being alternative only and exercisable at the option of the Owner.

4.4 SUBCONTRACTORS - The Contractor shall upon executing the Contract, notify the Owner in writing of the names of all proposed first tier Subcontractors for the Work. This should include the SMWBs identified in the Good Faith Effort Plan.

- .1 SUBCONTRACTUAL RELATIONS - By an appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner. Said agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this paragraph and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Documents available to his Sub-subcontractor.

4.5 SEPARATE CONTRACTS

- .1 The Owner reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his Work with their work.
- .2 When separate Contracts are awarded for different portions of the Project, "the Contractor" in the Contract Documents in each case shall be the Contractor who executes each separate Contract. This Contractor shall properly connect and coordinate his Work with the work of other Contractors. If any part of this Contractor's Work depends for proper execution or proper results on the work of any other separate Contractor, this Contractor shall inspect and promptly report in writing to the Consultant and SAWS COI any discrepancies or defects he may find in the work of any separate Contractor that render it unsuitable to achieve proper connection, execution and results. Failure of this Contractor to so inspect and report obvious discrepancies or defects shall constitute an acceptance of the other Contractor's work as fit and proper to receive this Contractor's Work, except as to defects which may develop in the other separate contractor's work after the execution of this Contractor's work.
- .3 Any other provision contained herein notwithstanding, should this Contractor negligently cause damage to the work or property of any separate Contractor on the Project, this Contractor shall, upon due notice, endeavor to settle with such other Contractor by agreement. A reciprocal clause shall be placed in the Contract Documents between the SAWS and the separate Contractor if involving other SAWS work. If such separate Contractor sues the SAWS and/or its agents on account of any damage alleged to have been so sustained, the SAWS and/or its agents shall notify this Contractor who shall defend the SAWS and/or its agents' interests and Contractor's own interests in such proceedings and pay all attorney fees, and costs in connection therewith, and if any judgment against the SAWS results there from, this Contractor shall pay or satisfy that judgment.

4.6 CONTRACT TERMINATION

- .1 TERMINATION BY CONTRACTOR - If the Work is stopped by SAWS for a period of ninety (90) consecutive days under an order of any court or other public authority having jurisdiction, or as a result of an act of a higher governmental authority, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a Contract with the Contractor, then the Contractor may upon ten (10) additional days written notice after first providing a complete and detailed written explanation of the event that constitutes an allowable termination under this provision to SAWS and the Consultant, at which

time SAWS will promptly provide a written determination whether in its sole discretion the event detailed by the Contractor constitutes an acceptable Contract termination event, pursuant to this provision; then the Contractor may terminate the Contract and recover from the Owner payment for all Work performed as of the date that Contractor gives written notice of termination pursuant to this paragraph. Owner shall not be liable for the payment of any lost or anticipated profit on Work not performed or for any consequential damages on termination of this Contract. If the Work is recommenced during the ten (10) day notice period, the Contractor may not terminate the Contract.

- .2 **TERMINATION BY OWNER** - If the Contractor is adjudged as bankrupt, or if he makes a general assignment for the benefit of his creditors, without the consent of the SAWS or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction pertaining to the Work, or otherwise is guilty of a substantial violation of a provision of the Contract Documents warranting Owner default of Contractor, then the Owner may, without prejudice to any right or remedy and after giving the Contractor and Contractor's Surety, if any, ten (10) days written notice, terminate the employment of the Contractor and/or take possession of the site and of all materials, and may upon order of a court of competent jurisdiction take possession of equipment, tools, construction equipment and machinery thereon owned by the Contractor. Should the Surety fail to pursue completion of the Work with reasonable speed, the Owner may arrange for completion of the Work and deduct the cost thereof from the unpaid Contract sum remaining, including the cost of additional Owner administration and Consultant services made necessary by such default or neglect, in which event no further payment shall then be made by the Owner until all Cost of completing the Work shall have been paid. If the unpaid balance of the Contract sum exceeds all the costs of finishing the Work, including direct and indirect consequential costs, attorney's fees and compensation for the Consultant's additional services made necessary thereby, such excess sum shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor or his surety shall pay the difference to the Owner. This obligation for payment shall survive the termination of the Contract
- .1 **TERMINATION FOR CONVENIENCE** - The right to terminate this Contract for the convenience of Owner (including, but not limited to, non-appropriation of funding) expressly is retained by Owner. In the event of a termination for convenience by Owner, Owner shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor's receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by Owner, in accordance with the terms and provisions of the Contract Documents, an amount not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the Project site or away from the Project site, as approved in writing by Owner but not yet paid for and which cannot be returned, and actual, reasonable and documented demobilization costs, if any, paid by Contractor and approved by Owner in connection with the Work in place which is completed as of the date of termination by Owner and that is in conformance with the Contract Documents, less all amounts previously paid for the Work. No amount ever shall be owed or paid to Contractor for lost or anticipated profits on any part of the Work not performed or for consequential damages of any kind.
- .2 In the event that Owner shall be prevented from completing performance of its obligations under this Contract by an act of God or other occurrence whatsoever which is beyond the control of Owner, then Owner shall be excused from any further performance of its obligation and undertakings.
- .3 Contractor may not recover from Owner any lost or anticipated profit on Work not performed or consequential damages of any kind on or for termination of this Contract by Owner or Contractor or for any breach of this Contract by Owner.

4.7 CONTRACTOR BID SUSPENSION POLICY

- .1 INTRODUCTION - SAWS through its Board of Trustees routinely contracts with private businesses to build, maintain and repair SAWS structures, vehicles, equipment, property and other assets. SAWS desires to receive quality service and performance at a fair price for each construction services, material, supply, and equipment Contract awarded under Section V of SAWS Purchasing and Contracting Policy.

On occasion, SAWS finds that the quality of service or performance required by the Contract Documents is not provided. Therefore SAWS requires a policy and a process to address nonperformance by contractors and, if necessary, to suspend certain contractors from further contract awards for a period of time.

The purpose of this policy is to establish a procedural framework to suspend a contractor from consideration for award of future Contracts with SAWS, based on a determination that the Contractor has not met the performance standards as outlined in Article 4.7.4, Reasons for Contractor Suspension.

Staff will implement procedures consistent with this Article 4.7 to address service quality and performance issues. These procedures will include adequate safeguards, reviews and appeals to insure that Contractors being considered for suspension are provided ample opportunity for discussion, communication, and corrective actions prior to being suspended.

The term "Contractor" as used in this Article herein means a construction Contractor, subcontractor, vendor, supplier, materialman and any other person or entity supplying labor and/or material to SAWS on a contract basis.

"SAWS Management Officials" means SAWS personnel who are at the Manager level or above and who are involved in the supervision, review or acceptance of services, work or materials provided by Contractors under Contract with SAWS.

Any provision contained herein notwithstanding, SAWS reserves the right to not award a Contract to any Contractor who SAWS determines has failed to perform work to the quality of satisfaction required by SAWS and is therefore not a responsible bidder. In cases where SAWS determines that a Contractor is not a responsible bidder on a Contract due to Contractor's failure to provide quality and satisfactory work, SAWS will first give notice to the Contractor, prior to making the ultimate determination as to Contractor being a non-responsive bidder, of the reasons for SAWS determination. The Contractor will then have an opportunity to respond to SAWS determination. At that time SAWS shall in its sole discretion make a final determination, as to whether Contractor is a responsible bidder on a given Contract.

- .2 CREATION OF CONTRACTING COMMITTEE - There shall be a standing Contracting Committee comprised of SAWS staff appointed by the President/Chief Executive Officer of SAWS. At least one Committee member will be a Vice President of SAWS and all other Committee members will be Managers or higher. The members of the Committee hearing the complaint will be SAWS Management Officials not directly involved with the Contractor being considered for bid suspension. If a standing Contracting Committee member has been involved in the day-to-day administration or supervision of a Contract with a Contractor being reviewed by the Committee, such Committee member will not serve on the Committee with regard to a complaint or appeal affecting that Contractor. The President/CEO may either appoint a substitute or the Committee may proceed with fewer members, but in no event will there be less than three members available at any Committee meeting to hear information presented.
- .3 ADMINISTRATIVE PROCEDURES - Subject to applicable laws, regulations and this policy, SAWS legal department will develop the Administrative and Operational Procedures for Contractor Bid Suspension Hearings and Appeals as outlined in "**Exhibit B**" of these General Conditions. The Contracting Committee may recommend changes to the Administrative and Operational Procedures. Changes to the Administrative and Operational Procedures must be approved by the President/CEO.

.4 REASONS FOR CONTRACTOR SUSPENSION:

The Contracting Committee may suspend a Contractor for any of the following reasons:

- .1 Contractor's failure to satisfy Contract obligations;
- .2 Contractor's unsatisfactory safety performance;
- .3 Contractor's failure to meet schedules or deadlines established in a Contract with SAWS;
- .4 Contractor's failure to meet specifications or plan requirements;
- .5 Contractor's failure to staff a project as specified in Contract Documents;
- .6 Contractor's provision of inaccurate information in bid documents;
- .7 Contractor's failure to provide change order documentation specified in Contract Documents;
- .8 Contractor's failure to comply with warranty obligations;
- .9 Contractor's failure to satisfy all Contract obligations to subcontractors, material men and laborers on SAWS projects as specified in Contract Documents;
- .10 Contractor's failure to correct valid customer or public complaints as provided for in the Contract specifications, city ordinance, or applicable law;
- .11 Conviction of a principal, owner, manager or corporate officer of the Contractor of a criminal offense;
- .12 Relevant documented information from other parties with whom a contractor has contracted which are negative in nature and reflective of any of the foregoing reasons.

.5 COMPLAINT AND HEARING PROCEDURES - A SAWS Management Official may submit a complaint to the Chief Operating Officer recommending that a particular Contractor be suspended from consideration for award of Contracts with SAWS. The Chief Operating Officer will determine whether the complaint is in accordance with the Administrative and Operating Procedures. Upon such a determination, the Chief Operating Officer will convene the Contracting Committee in a Hearing on Contractor Bid Suspension. The standing Contracting Committee will consider all relevant information and decide whether the Contractor will be suspended from bidding on SAWS Contracts.

.6 NOTICE OF SUSPENSION BY CONTRACTING COMMITTEE - If the Contracting Committee decides to suspend the Contractor, the Chief Operating Officer will send written notice as described in Article 4.7 Contractor Bid Suspension Policy. This notice will be sent by certified mail, return receipt requested.

.7 SUSPENSION PERIOD - If the Contractor has not been previously suspended pursuant to this policy, the term of the suspension will be for one (1) year from the date of issuance of the notice of suspension.

If the Contractor has been previously suspended pursuant to this policy, the term of the suspension will be for two (2) years from the date of issuance of the notice of suspension.

.8 APPEALS PROCESS - The Contractor may request review of the decision by the President/Chief Executive Officer of SAWS by filing a written request for review with the President/CEO within ten (10) days of the date of the notice of the result of the appeal hearing. The suspension will stay in effect throughout the appeal process.

.9 SEVERABILITY - Should any section, part, paragraph, sentence, phrase, clause or word of this policy, for any reason, be held illegal, inoperative or invalid, or if any exception to or limitation

upon any general provision herein contained be held to be unconstitutional or invalid or ineffective, the remainder shall, nevertheless, stand effective and valid as if it had been enacted without the portion held to be unconstitutional or invalid or ineffective.

- .10 ADMINISTRATIVE LIABILITY - No officer, attorney, agent or employee of SAWS renders himself or herself personally liable for any damage that may accrue to persons or property as a result of any act required or permitted and performed in good faith in the discharge of his or her duties under this policy so long as such officer, attorney, agent or employee is acting within the scope of his or her official capacity. Any suit brought against an officer, attorney, agent or employee of SAWS acting within his or her official capacity and scope, as a result of any act required or permitted and performed in good faith in the discharge of duties under this policy, will be defended by SAWS legal counsel until the final determination of the proceeding therein.

4.8 SUSPENSION OF WORK BY OWNER

- .1 The Owner may suspend said Work either partially or totally by his written order whenever in his opinion the interests of SAWS require the suspension of such Work. In the event that the Owner suspends Project Work, the Contractor hereby acknowledges and agrees that so long as the total suspension(s) is (are) for a period not to exceed ten (10) cumulative days accruing throughout the entire Contract Time, that the Contractor is not entitled to request a negotiated adjustment of the Contract Sum nor an extension of the Contract Time. Such right to suspend Project Work for periods not to exceed ten (10) cumulative days accruing throughout the entire Contract Time without compensation to the Contractor, is expressly reserved by SAWS.
- .2 Any total suspension of Project Work by the Owner that extends beyond ten (10) cumulative days accrued throughout the entire Contract Time, may entitle the Contractor to request either a negotiated adjustment of Contract Sum or an extension of Contract Time, or both, as directly attributable to such extended total suspension of Project Work, Provided:
- .1 Any equitable extension of the Contract Time shall not exceed the actual delay caused by the temporary suspension, as determined by Owner, and Engineer and or Consultant;
- .2 Any equitable adjustment to the Contract Sum shall be for the actual, necessary and reasonable costs of properly protecting any Work finished or partially finished during the period of the temporary suspension; provided, however, that no payment of profit and/or overhead shall be allowed on top of these costs; and
- .3 If it becomes necessary to move equipment from the Project and then return it to the Project when the Work is ordered to be resumed, an equitable adjustment to the Contract Sum for the actual, necessary and reasonable cost of these moves; provided, however, that no adjustment to the Contract Sum shall be due if said equipment is moved to another Project of Owner.
- .3 Any partial suspension of the Work by the Owner that extends beyond the mutually determined point in time when the ten (10) cumulative days accruing throughout the entire Contract Time, are effectively exceeded, may entitle the Contractor to request either a negotiated adjustment of Contract Sum or an extension of Contract Time, or both, as directly attributable to such extended partial suspension of Project Work.
- .1 In the event that the Owner partially suspends the Work in such a manner that some work is able to continue, the Contractor and SAWS hereby agree to discuss the impact of the partial suspensions upon dependent Contract Work, and to mutually determine when the ten (10) cumulative days accruing throughout the entire Contract Time and expressly reserved by the SAWS without compensation to the Contractor, would effectively be exceeded.
- .2 The SAWS COI shall have the right to stop the Work whenever such stoppage may be necessary to ensure proper execution of the Contract. Such temporary stoppage shall be followed by a Written Order as outlined in Article 4.8.1

- .4 The Owner and the SAWS COI shall at any time during the Contract Time have the right to suspend or stop the Work under Article 4.8.1 or Article 4.8.3.2 when the SAWS COI or any other authorized representative of the Owner reasonably believes that there exists any dangerous condition, nuisance or safety risk to workers, the general public or property on the site or on property adjacent thereto or otherwise violates a term or condition of the Contract Documents. Notwithstanding the foregoing provisions of Article 4.8, the Contractor shall not be entitled to any adjustment of the Contract Sum or extension of the Contract Time relating to any suspension of the Work by the Owner or the SAWS COI for any reasons under this Article 4.8.4. and the Owner shall have no other liability of any kind to the Contractor with respect to any suspension of the Work for reasons under this Article 4.8.4.
- .5 The Owner and the SAWS COI shall at any time during the Contract Time have the right to suspend or stop the Work under Article 4.8.1 or Article 4.8.3.2 when the SAWS COI or any other authorized representative of the Owner reasonably believes that there exists on the site any environmental condition which could reasonably be expected to result in any liability, costs or expense to the Owner or the Contractor arising under any laws, statutes, ordinances, rules and regulations of any governmental, quasi-governmental or regulatory authority which include but are not limited to the transportation, storage, placement, handling, treatment, discharge, generation, production, removal, or disposal (collectively, "Treatment") of any waste, petroleum product (including without limitation, gasoline and diesel fuel), waste products, or any other substance, the Treatment of which is regulated by any Laws (collectively, "Waste"), or any other environmental condition that would cause the Work to be in violation of any laws, statutes, ordinances, rules and regulations ("Laws") of any governmental, quasi-governmental or regulatory authority . Notwithstanding the foregoing provisions of Article 4.8, the Contractor shall not be entitled to any adjustment of the Contract Sum or extension of the Contract Time relating to any suspension of the Work by the Owner or the SAWS COI for environmental reasons under this Article 4.8.5., and the Owner shall have no other liability of any kind to the Contractor with respect to any suspension of the Work for environmental reasons under this Article 4.8.5. At all times during the performance of the work by the Contractor under this Contract, the Contractor will comply with all Laws. The Contractor agrees to (a) give notice to the owner immediately upon Contractor's acquiring knowledge of the existence of any Waste or other environmental condition on the site with a full description thereof, (b) promptly comply with any Laws applicable to the Contractor or the site requiring the removal, treatment or disposal of such Waste or proper treatment of the environmental condition as required by Law and provide Owner with satisfactory evidence with such compliance and (c) provide Owner within thirty (30) days after demand by Owner with a bond, letter of credit or similar financial assurance evidencing to the Owner's satisfaction that adequate funds are available to pay the costs of removing, treating and disposing of such Waste or proper treatment of the environmental condition as required by Law.
- 4.9 PROTECTION OF PRIVATE PROPERTY - The SAWS has secured right-of-way and easements, as shown on the plans, to be occupied by the finished construction, with only such additional temporary construction easements as shown for use by the Contractor in carrying out his Work. The Contractor shall take proper measures to protect all property within all construction easements, and adjacent or adjoining property which might be injured by any process of construction; and, in case of any injury or damage, he shall restore at his own expense the damaged property to a condition equal to or better than that existing before such injury or damage was done, or he shall make good such injury or damage in a manner acceptable to the owner and/or private or public owner.
- .1 The Contractor shall immediately correct customer complaints for such items as, but not limited to, driveway access, mailboxes, privacy fences, public safety hazards, public nuisances, water and sewer services as directed by the SAWS COI.
- .2 The Contractor shall not, except upon procuring written consent from proper private parties, enter or occupy with men, tools, materials, or equipment, any privately owned land except for those on easements provided herein by SAWS. Contractor must submit a copy of the easement agreement to SAWS.
- .3 No permit shall be removed outside the permanent easement, except where expressly authorized in writing by the Owner and City of San Antonio. Any tree not authorized for removal shall be adequately protected against damage from construction operations. Contractor shall be

responsible for any damage, destruction or other harm including but not limited to all costs, fees, or other expenses attributable thereto, caused to trees not authorized for removal that is due to or arise out of Contractor's Work at the Project.

ARTICLE V. CONTRACT RESPONSIBILITIES:

- 5.1 OWNER-CONTRACTOR OBLIGATIONS - The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. The Contractor shall not assign the Contract or sublet it as a whole without the prior written consent of the Owner, nor shall the Contractor assign any monies due or to become due to him hereunder, without the prior written consent of the Owner and in the manner established in Article 4.3 herein.
- 5.2 OWNER'S RESPONSIBILITY - Projects Contracted through other outside entities and containing utility work by SAWS shall be managed by the other entity with support by SAWS personnel. Contractor shall report directly to the other entity. Utility projects contracted through SAWS, which contain secondary street work, shall be managed by SAWS with support by other entity personnel. Contractor shall report directly to SAWS.
- .1 The design of this Project was performed by a professionally licensed Engineer who is an authorized representative of the Owner, who will exercise the authority and functions of the Owner as the project Consultant in the following respects:
- .1 Provide Contractor with benchmarks.
 - .2 Checking of shop drawings furnished by the Contractor in compliance with Article 5.12 herein.
 - .3 Consultation and advice during construction and rendering those decisions requiring interpretation of the Plans and Specifications.
 - .4 Make visits to the Site at intervals appropriate to the various stages of construction operations to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, and to endeavor to guard the Owner against defects and the Work.
 - .5 Assist in the Substantial Completion inspection.
 - .6 Assist in the final inspection.
 - .7 Assist in the preparation of the monthly and final quantity and pay estimates.
 - .8 Any terms and conditions of the consultant's Contract with the Owner shall be cumulative of the above.
- .2 Unless otherwise provided or ordered, all resident observation and inspection on all SAWS contracted projects will be performed by the SAWS COI, who will exercise the authority and functions of the Owner in the following respects:
- .1 Review laboratory, mill and shop tests of materials and equipment for general compliance with the Plans and Specifications.
 - .2 Observation and inspection of the authorized Work, and administration for the Owner, and review of all Work performed for general compliance with the Plans and Specifications.
 - .3 Stop the Work or any portion of the Work if Contractor fails to carry out the Work in accordance with the Contract, or fails to correct Work which is not in accordance with requirements of the Contract. However, the right of the SAWS to stop the Work as provided for in Article 4.8, will not give rise to a Claim for delay or to a duty on the part

of the SAWS to exercise this right for the benefit of Contractor or any other person or entity. SAWS will provide the Contractor with a written explanation and detail for the stoppage of work.

- .4 Review monthly and final quantity and pay estimates.
 - .5 Conduct substantial completion observation and inspection.
 - .6 Conduct final observation and inspection.
 - .7 Determine acceptability of the finally completed Work.
- .3 Quality Assurance Random sampling and testing of materials, inspection of laboratory testing processes and procedures for Quality Assurance purposes beyond those required to be performed at the expense of the Contractor under their Quality Control program in full compliance with 5.3 herein, may be performed by SAWS, at the expense of SAWS, in a certified commercial testing laboratory approved and designated by SAWS. The Contractor at their expense shall furnish assistance in obtaining and providing samples for SAWS Quality Assurance purposes.

5.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Quality Control - The Contractor agrees and understands that the Contractor is responsible for performing Quality Control inspection and testing services to assure Project compliance with Contract Documents. Sampling and testing of materials, laboratory inspection of materials and processes for quality control purposes shall be performed at the expense of the Contractor or Supplier by an independent commercial laboratory approved by the SAWS COI. All test reports and shop drawings shall be signed and sealed by a Texas Registered Professional Engineer and submitted to the SAWS COI. All structural members shall be marked or stamped individually with an identifying number for the purpose of cross-referencing all reports. All test reports and vendors' certifications for materials incorporated into the project shall be submitted in accordance to the latest revision of the International Building Code, as required by City Building Permit, with sufficient time in advance as to allow the Owner, Owner's representative, Consultant, Owner's Third Party Inspection Agency and City Building Officials to review and approve materials, installation and placement prior to next stage of the project. Approval does not constitute or relieve the Contractor's obligation under this contract to fully comply with the specifications and building permit requirements.
- .2 The Contractor shall supervise and direct the Work using the best skill and attention. Any provision contained herein notwithstanding, the Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for the implementation of safety precautions and for coordinating all portions of the Work under this Contract.
- .3 The Contractor shall give the SAWS COI reasonable advanced notice of the readiness of any Work for observation/inspection, and when practicable, twenty-four (24) hours notice. If any underground Work is performed without the proper prior notification to the COI, it shall be uncovered for observation/inspection and properly restored at the Contractor's expense.
- .4 If the Contractor, in the course of the Work, finds any discrepancies between the Plans and the physical conditions of the locality, or any errors or omissions in the Plans or the layout as given by survey points and instructions, he shall immediately inform the SAWS COI and Consultant, with a RFI, and the Consultant and/or Engineer shall promptly investigate the same. Any Work impacted by the discrepancy performed by Contractor after such discovery, until authorized, will be done at the Contractor's risk and/or expense.
- .5 Contractor's Risk and Inventory - Contractor shall be responsible for the complete, timely, performance of the Work under this Contract and compliance with the Contract Documents. Contractor shall be responsible for the safe storage and inventory control of all materials paid by SAWS as "materials on site", on the project site and/or within off site bonded/insured storage facilities either owned or leased by the Contractor. Contractor shall allow full access, seven days a week, 24 hours, to storage facilities, whether on site or off site, as requested by SAWS COI. Contractor shall protect materials and Work from all theft, loss, vandalism, or damage from any

cause whatsoever until final Project completion by Contractor and acceptance by Owner; and shall deliver said Work and improvements to the SAWS in a completed and acceptable condition in accordance with the Contract Documents.

- .6 It is the intention of the SAWS to be sensitive to the needs and concerns of the citizenry. It is the Contractor's responsibility to adhere to this policy to the best of his ability. The Contractor, subcontractor and his employees should, whenever possible, address citizen inquiries about the project, provide names and numbers of SAWS personnel, relay citizen complaints, and provide continuous access to the citizen's property.
- .7 Permits - Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, including review fees, inspections, and licenses. Owner shall reasonably assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay any and all charges, fees and costs necessary for obtaining permits for the prosecution of the Work. The contractor shall be responsible for all costs associated with registering with the City of San Antonio Right of Way Office (COSA ROW), applying and obtaining COSA ROW Street cut permit(s) as required for the project and shall keep the permit active during the course of the work. Contractor is also responsible for the initial permit, permit renewals, expedited permits and any and all costs inclusive of but not limited to COSA ROW inspection fees, penalties and/or any and all fees associated with the permit. To register the contractor should contact the COSA ROW office at 210-207-6949.
- .8 Project Sign – Each Project Specification will contain a detailed requirement for Project signage that identifies the site and Work to general citizenry.
- .9 Pre-Construction and Post-Construction Videos – The Contractor shall provide pre-construction videos prior to commencement of the project in accordance with standard specification for construction Item No. 1114, Pre-Construction Videos. The video shall identify the condition of all existing surface features within the project limits. The Contractor shall submit two copies of the completed video prior to request for mobilization. The Contractor shall also submit two copies of the completed post-construction video of all surface features within the project limits within ten (10) days following the date of substantial completion.
- .10 Large Water Main Shut Downs: Projects that include a Large Water Main (16-inches and larger), will require advance coordination from the Contractor with Owner, with a minimum of two weeks' notice to Owner prior to the desired shut down date. The Contractor is to have all material and equipment on site and have the necessary prep work done in order to minimize the shutdown period required for the tie in Work. Mains Larger than 16-inches that will be required to be shutdown throughout the year may (as solely determined by Owner) require a temporary water main, valves and other appurtenances to keep the water main in service. The size of the temporary water main will be determined by Owner and shown on the plans by the Consultant or as Directed by Owner.
- .11 Water and Sewer Service to Customers – the Contractor shall maintain uninterrupted service to SAWS customers at all times.
- .12 Contractor will abide by all applicable policies and regulations of Owner with respect to conduct, including smoking, parking of vehicles, security regulations and entry to adjacent facilities owned by the Owner.
- .13 Independent Contractor - In performing the Work under this Contract, the relationship between Owner and Contractor is that of an independent Contractor. Contractor shall exercise independent judgment in performing the Work and solely is responsible for setting working hours, scheduling and/or prioritizing the Work flow and determining the means and methods of performing the Work, subject only to the requirements of the Contract Documents. No term or provision of this Contract shall be construed as making Contractor an agent, servant or employee of Owner or making Contractor or any of Contractor's employees, agents or servants eligible for the fringe benefits, such as retirement, insurance and worker's compensation which Owner provides to its employees.

- 5.4 SUPERINTENDENT - The Contractor shall keep on-site for the Project during its progress a competent Superintendent, able to communicate fluently in English, and any necessary assistants, all satisfactory to the Owner. A Superintendent shall be identified in writing to the Owner at the pre-construction meeting. The Superintendent shall represent the Contractor and all directions given to the Superintendent shall be binding on the Contractor. Oral directions from the SAWS representatives involving critical situations or Work elements shall be immediately (as may be reasonable under the circumstances and in accordance with the Contract Documents), confirmed in writing by Owner to the Contractor. The Contractor's Superintendent shall provide full-time on-site supervision to any Work ongoing at the site by its own forces or subcontractors, using the best industry skill and attention. The Contractor's Superintendent shall not be replaced without first providing written notice to the Owner. The written notice provided to the Owner shall contain the credentials for their proposed replacement Superintendent. The Owner will review the credentials supplied and if in the Owners discretion they are appropriate for the work, approve the proposed replacement Superintendent. The Superintendent may not be employed on any other project prior to Final Completion of the Work, without the approval of the Owner, which approval will not be unreasonably withheld.
- 5.5 INCIDENTAL WORK, CONNECTIONS AND PASSAGEWAYS - The Contractor shall perform all incidental Work necessary to complete this Contract, including, but not by way of limitation, the following: Contractor shall make and provide all suitable reconnections with existing improvements as are necessarily incidental to the proper completion of the Project; Contractor shall provide passageways or leave open such thoroughfares in the Work area as may be reasonably required by SAWS and shall protect and guard same at Contractor's own risk, and shall continuously maintain the Work area in a clean, safe and workmanlike manner.
- 5.6 CONDITIONS AT SITE
- .1 Contractor declares that prior to the submission of the Bid Proposal on this Contract, the Contractor has thoroughly examined the location(s) of the Work to be performed, has become familiar through their own investigation with any and all conditions, including but not limited to typical local geophysical conditions at or near this Project, and has read and has thoroughly understood the "Contract Documents" and any other document made available prior to the bid opening, as they may relate to the physical conditions prevalent or likely to be encountered in the performance of the Work at such location(s). Any testing, boring, soil profiles and water elevations shown on Contract Documents, or otherwise provided, were obtained solely for the use of SAWS in the preparations of its plans and the Contractor is cautioned, and SAWS MAKES NO WARRANTY OR REPRESENTATION, AS REGARDING THE ACCURACY OF SUCH DATA AND THE CONTRACTOR SHOULD MAKE NO RELIANCE THEREON IN DETERMINING CONTRACTOR'S MEANS AND METHODS OF CONSTRUCTION. Contractor, by the performance of the above, hereby generally acknowledges that such "Contract Documents" are not obviously deficient and will enable the Contractor to accomplish the proper performance of the Work at the Project site.
- .2 The Contractor shall immediately, and before such discovered conditions and/or structures are disturbed, notify the Owner with a RFI of (1) subsurface or latent physical and/or structural conditions at the site differing materially from those indicated in the Plans, Specifications, and other Contract Documents or (2) newly discovered, unknown physical conditions at the site of an unusual nature differing materially from those geophysical conditions typically encountered in the type Work being performed and generally being recognized as not indigenous to the Texas environs and are not indicative of otherwise disclaimed in the plans, Specifications, and Contract Documents. The Owner, or designated representative, shall promptly investigate the reported physical and/or structural conditions, and shall determine whether or not the physical and/or structural conditions do materially so differ and whether they cause an increase or decrease in the Contractor's cost of, and/or the time required for performance of any part of the Work under this Contract. In the event that the Owner in its reasonable determination finds that the physical and/or structural conditions do materially so differ from the provisions of the Contract Documents, a negotiated, equitable, adjustment may be made to either the Contract Time or Contract Sum, or both as in the Owner's determination is reasonable, and a Contract Change Order shall be issued in writing accordingly.

- .1 No claim of the Contractor under this Article shall be allowed unless the Contractor has given the written notice called for above, prior to disturbing the discovered conditions and/or structures.
- .2 Any other provision contained herein notwithstanding, no claim by the Contractor for an equitable adjustment to the Contract Time or Contract Sum, or both, shall be allowed if claimed by the Contractor after Final Payment as defined in Article 7.3 herein has been made by the SAWS to the Contractor under the terms of this Contract.

5.7 CONTRACTOR'S STANDARD COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATE OF LIABILITY INSURANCE REQUIREMENTS

.1 Commercial Insurance Specifications ("Insurance Specifications"):

- .1 Commencing on the date of this Contract, the Contractor shall, at his own expense, purchase, maintain and keep in force such lines of insurance coverage as will protect him and the San Antonio Water System ("SAWS") and the City of San Antonio ("the City") and their employees and agents from claims, which may arise out of or result from his operations under this Contract, whether such operations are by himself, by any sub-contractor, supplier or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable, including, without limitation, the following lines of insurance coverage:

- .1 Workers' Compensation (WC) insurance that will protect the Contractor, SAWS and the City from claims under statutory Workers' Compensation laws, disability laws or such other employee benefit laws and that will fulfill the requirements of the jurisdiction in which the work is to be performed.

This line of insurance coverage shall be endorsed to provide a Waiver of Subrogation in favor of SAWS and the City of San Antonio with respect to both this insurance coverage and the Employers' Liability (EL) insurance (as specified immediately below in Article 1.1.2).

- .2 Employers' Liability (EL) insurance (Part 2 under the standard Workers' Compensation insurance policy) that will protect the Contractor, SAWS and the City for damages because of bodily injury, sickness, disease of vendor's employees apart from that imposed by Workers' Compensation laws.

The EL line of insurance coverage shall have minimum policy limits of liability of not less than:

\$1,000,000.00 Bodily Injury by Accident
\$1,000,000.00 Bodily Injury by Disease - Each Employee
\$1,000,000.00 Bodily Injury by Disease - Policy Limit

- .3 Commercial General Liability (CGL) insurance that will protect the Contractor, SAWS and the City from claims for damages because of bodily injury, personal injury, sickness, disease or death and insurance that will protect the Contractor, SAWS and the City from claims for damages to or destruction of tangible property of others, including loss of use thereof.

This line of insurance coverage shall:

- Cover independent Contractors;
- Not include any exclusions relating to blasting, explosion, collapse of buildings or damage to underground property;
- The GENERAL AGGREGATE limit shall apply per Project;

- Afford coverage for Products Liability and/or Completed Operations and, Contractual Liability.

The minimum policy limits of liability for this line of insurance coverage shall be:

\$1,000,000.00 Occurrence Limit
 \$2,000,000.00 General Aggregate
 \$2,000,000.00 Products/Completed Operations Aggregate
 \$1,000,000.00 Personal and Advertising Injury
 \$1,000,000.00 Contractual Liability

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial General Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured for both ongoing and completed operations, and
- Waiver of Subrogation - The Commercial General Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.

OR

- .4 Owner and Contractor Protective Liability (OCP) Insurance policy which insures SAWS and the CITY and their agents and employees with the same coverage specified in Article 5.7.1.1.3 above unless the CGL policy specified in Article 5.7.1.1.3 above includes the Endorsement CG2503 - per project general aggregate limit applies.
- .5 Commercial/Business Automobile Liability (AL) insurance that will protect the Contractor, SAWS and the City from claims for damages arising out of the maintenance, operation, or use of any owned, non-owned or hired vehicles.

Minimum policy limits of liability for this line of insurance coverage for bodily injury and property damage combined shall be not less than \$1,000,000.00 per each occurrence.

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial/Business Automobile Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured; and
 - Waiver of Subrogation - The Commercial/Business Automobile Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.
- .6 Excess/Umbrella Liability (UL) insurance shall have minimum policy limits of \$2,000,000 per occurrence and \$2,000,000 in the aggregate. This policy shall be of an "Occurrence" type and the limit of liability shall be concurrent with (following form) and in excess of the EL, CGL, and AL lines of insurance coverage as described in Articles 5.7.1.1.2, 5.7.1.1.3, and 5.7.1.1.5 listed above.

NOTE - For the Excess/Umbrella Liability policy, describe in the Description of Operations section of the Certificate of Liability Insurance ("Certificate"), the coverage form under which this line of coverage is written – either:

- Umbrella liability form; or

- Excess Liability form.

This line of insurance coverage shall be endorsed:

- Additional Insured - The Commercial General Liability policy shall be endorsed naming the SAWS and the City of San Antonio as an Additional Insured for both ongoing and completed operations.
- Waiver of Subrogation - The Commercial General Liability policy shall be endorsed with the Waiver of Subrogation in favor of SAWS and the City of San Antonio.

- .7 Contractor's Pollution Liability Insurance with limits of \$2,000,000 per claim/occurrence/\$2,000,000 in the aggregate.

The policy shall provide either a "claims made" or an "occurrence based" coverage for all claims, liabilities, damages, costs, fees, and expenses of any kind or character arising out of any Pollution Condition(s) (as defined below) that is in any way related to Contractor's operations, actions or inactions, and completed operations associated with any work performed by Contractor, its subcontractors, or any of their respective employees, agents, representatives, or officers under this Contract.

If the Policy is "claims made" based, coverage must be maintained for a minimum of twenty-four (24) months after the date that a Conditional Letter of Acceptance is issued, or if the Contract is terminated for any reason, for a minimum of twenty-four (24) months following the date of termination.

The "claims made" policy retroactive date will be no later than the Contract effective date or the project commencement date, whichever is earliest.

If the Policy is "occurrence based", no policy retroactive date is required and, the twenty-four (24) months extension of coverage after the date that a Certificate of Completion is issued, or if the Contract is terminated for any reason, is not required.

Any exceptions to the above cited coverage forms must be reviewed and approved by SAWS Risk Manager.

Pollution Condition(s) means the discharge, dispersal, release or escape of any solid, liquid, gaseous or thermal irritant or contaminant, including, but not limited to, smoke, sewage, vapors, soot, fumes, acids, alkalis, toxic chemicals, medical waste and waste materials into or upon land, the atmosphere or any watercourse or body of water, including groundwater, provided such conditions are not naturally present in the environment in the amounts or concentrations discovered.

The Contractor's Pollution Liability Insurance will pay on behalf of the Contractor, SAWS and the City all claims, demands, damages, liabilities, costs, fees, and expenses of any kind or character for bodily injury or death, property damage, environmental or natural resource damage, and any fines, fees, assessments or penalties of any kind assessed by any governmental department, agency or commission that result from or are related to a Pollution Condition(s). Coverage will include all subcontractors hired by Contractor to perform any work on the Project or under this Contract.

The policy shall also include the following coverage provisions:

- .1 Provide for bodily injury to include physical injury, sickness, disease, mental anguish and emotional distress sustained by any person, including death;

- .2 All costs that are related to or that arise out of or from the investigation or adjustment of any claim or in connection with any court, arbitration, mediation, state administrative hearing, or other proceeding of any kind, including attorneys fees, expert witness fees, costs, charges and expenses of any kind or character, that arise out of or that are related to a Pollution Condition(s);
- .3 Coverage shall be Primary and in addition to any other valid and collectible insurance carried by SAWS and the CITY as respects to this Contract;
- .4 Coverage for Natural Resource Damages and any fines, fees penalties or assessments by any governmental agency, commission or department related to any Pollution Condition(s);
- .5 Insured versus Insured exclusion, if found in the policy, shall not apply to a claim by an Insured who qualifies as a Client of the Named Insured under the policy;
- .6 If Non-Owned Disposal sites are used for disposal of wastes, these sites shall be specifically included under the Contractors Pollution Liability Insurance policy; and
- .7 Coverage for punitive, exemplary, and multiple damages.

Commercial/Business Automobile Liability policy of the CONTRACTOR hauling excavated spoil shall either be endorsed to provide coverage under the CA-9948 endorsement or the Contractor's Pollution Liability Insurance policy shall be endorsed to provide transportation coverage beyond the boundaries of the job site.

NOTE - For the Contractor's Pollution Liability, declare on the Certificate of Liability Insurance ("Certificate") the coverage form under which this line of insurance is written – either:

- Claims-made form - if the coverage form declared on the Certificate is the Claims-made form, also include on the Certificate the "Retroactive-date" when this line of coverage was first written or started, or the Contract date or the project commencement date, whichever is earliest; or
- Occurrence based form – no additional wording required.

- .8 All Risk Builders' Risk (*if applicable*) - In the event, the project contracted for herein requires the building of structures or facilities used for storage, housing equipment or the occupancy of personnel, the Contractor shall provide Physical Damage Insurance on Builder's Risk Form which insures SAWS and the City for damages to all Property Purchased for, or Assigned to, the Project commencing on the start date through completion. Policy limits shall be in an amount equal to the total construction cost contracted herewith. The policy form shall be an All Risk Builders' Risk form and shall include the flood and earthquake endorsements.
- .2 Contractor shall require all Sub-contractors to carry lines of insurance coverage appropriate to their Scope of Work performed.
- .3 Contractor agrees that with respect to the above required lines of insurance, all insurance policies are to contain or be endorsed to the extent, not inconsistent with the requirements of the issuing insurance carrier, to provide for an endorsement that the "other insurance" clause shall not apply where SAWS and the City are an Additional Insured shown on the policy if such endorsement is permitted by law and regulations.

- .4 Contractor shall, upon request of SAWS, provide copies of all insurance policies and endorsements required under Contract.
- .5 Contractor is responsible for the deductibles under all lines of insurance coverage required by these Insurance Specifications.
- .6 The stated policy limits of each line of insurance coverage required by these Specifications are MINIMUM ONLY and it shall be the Contractor's responsibility to determine what policy limits are adequate and the length of time each line of insurance coverage shall be maintained; insurance policy limits are not a limit of the Contractor's liability.
- .7 These minimum limits required of each line of insurance coverage may be either basic policy limits of the WC, EL, CGL and AL or any combination of basic limits or umbrella (Umbrella liability form) or excess (Excess Liability form) limits. SAWS acceptance of Certificate(s) that in any respect, do not comply with these Insurance Specifications, does not release the Contractor from compliance herewith.
- .8 Each line of insurance coverage that is required under these Insurance Specifications shall be so written so as to provide SAWS and the City thirty (30) calendar days advance written notice directly of any suspension, cancellation or non-renewal or material change in coverage, and not less than ten (10) calendar days advance written notice for nonpayment of premium.
- .9 Within five (5) calendar days of a suspension, cancellation or non-renewal of any required line of insurance coverage, the Contractor shall provide SAWS a replacement Certificate with all applicable endorsements included. SAWS shall have the option to suspend the Contractor's performance should there be a lapse in coverage at any time during this Contract.
- .10 Failure to provide and to maintain the required lines of insurance coverage shall constitute a material breach of this Contract.
- .11 In addition to any other remedies, SAWS may have, upon the Contractor's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required, SAWS shall have the right to order the Contractor to stop performing services hereunder and/or withhold any payment(s) which become due to the Contractor hereunder until the Contractor demonstrates compliance with the Insurance Specifications hereof.
- .12 Nothing herein contained shall be construed as limiting, in any way, the extent to which the Contractor may be held responsible for payments for damages to persons or property resulting from the Contractor 's or its sub-contractors' performance of the services covered under this Contract.
- .13 It is agreed that the Contractor's insurance shall be deemed primary and non-contributory with respect to any insurance or self insurance carried by SAWS, the City and their employees and agents for liability arising out of operations under this Contract.
- .14 Contractor agrees that all lines of insurance coverage required by these Insurance Specifications shall be with insurance companies, firms or entities that have an A.M. Best rating of "A- ("A"- minus)" and a Financial Size Category of a "VII" or better. All lines of insurance coverage shall be of an "Occurrence" type except for the Contractor's Pollution Liability line of insurance coverage.

SAWS will accept worker's compensation insurance coverage written by the Texas Workers Compensation Insurance Fund.

- .15 SAWS reserves the right to review the above stated Insurance Specifications during the effective period of this Contract and any extension or renewal hereof and to request modification of lines of insurance coverage and their respective liability limits when deemed necessary and prudent by SAWS' Risk Manager and Legal Department based upon changes

in statutory law, court decisions, or circumstances surrounding this Contract.

In no instance will SAWS and the City allow modification whereupon SAWS and the City may incur increased risk exposure.

.2 Certificate(s) of Liability Insurance (“Certificate”) Requirements

Prior to the commencement of any Services under this Contract and once notified by SAWS Contracting Official that your Company has been selected as the apparent successful Contractor pursuant to a competitive bid selection process, pending Board final approval, and, a request is made for you to submit your Company’s Certificate of Liability Insurance, that Certificate must meet all of the following requirements:

- .1 The Contractor shall have completed by its insurance agent(s), and submitted to SAWS Contracting Department within 5 business days, a Certificate(s) of Liability Insurance (“Certificate(s)”) providing evidence of the lines of insurance coverage pursuant to Articles 5.7.1.1 through 5.7.1.5 above.
- .2 The original Certificate(s) or form must include the agent's original signature, including the signer's company affiliation, mailing address, Office and FAX phone numbers, email address, and contact person’s name; and, be mailed, with copies of all applicable endorsements, directly from the insurer's authorized representative in strictly compliance with Articles 5.7.2.1.6 (Certificate Holder) and Articles 5.7.2.1.7 (Distribution of Completed Certificates) below.
- .3 SAWS will not accept Memorandum of Insurance or Binders as proof of insurance.
- .4 SAWS shall have no duty to pay or perform under this construction Contract until such certificate(s) and applicable endorsements have been received, reviewed and deemed 100% compliant with the CONTRACTOR’S STANDARD COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATE OF LIABILITY INSURANCE REQUIREMENTS as contained in the Bid Document by SAWS’ Risk Management/Contract Services Department. No one other than SAWS Risk Manager shall have authority to waive any part of these requirements.
- .5 The SAWS Project/Contract number(s) along with its Project Name must be included in the Description of Operations section located in the bottom half of the standard ACORD Certificate forms.
- .6 Certificate Holder - SAWS shall be shown as the Certificate Holder in the Certificate Holder section located in the bottom half of the standard ACORD Certificate forms and formatted as follows:

San Antonio Water System
c/o Ebix BPO
PO Box 100085-ZD
Ref. # (SAWS Contract/Project #)*
Duluth, GA 30096

**SAWS Contracting Official will include in the above address, the correct, complete Ref# in the written confirmation of your selection as a CONTRACTOR pending final Board approval.*

DO NOT BEGIN THE DISTRIBUTION OF ANY CERTIFICATE(S) BEFORE RECEIVING AND INSERTING THE COMPLETE REFERENCE NUMBER INTO THE CERTIFICATE HOLDER ADDRESS SHOWN ABOVE.

- .7 Distribution of Completed Certificates - Completed Certificates shall be distributed by the Contractor as follows:

.1 Send Original:

.1 By Mail:

San Antonio Water System
C/O Ebix BPO
P.O. Box 100085-ZD
Ref. # (SAWS Contract/Project #)
Duluth, GA 30096

.2 By Fax: 1-770-325-6502

.3 By E-Mail: saws@ebix.com

.2 Send Copy to:

San Antonio Water System
Attention: Contract Administration
P.O. Box 2449
San Antonio, TX 78298-2449

.8 Contractor shall be responsible for obtaining Certificates of Insurance from the first tier Sub-contractor, and upon request furnish copies to SAWS.

.3 SURVIVAL

Any and all representations, conditions and warranties made by Contractor under this Contract including, without limitation, the provisions of Articles 5.7.1.1.2, 5.7.1.1.3 and 5.7.1.1.4 of these COMMERCIAL INSURANCE SPECIFICATIONS AND CERTIFICATES OF LIABILITY INSURANCE REQUIREMENTS are of the essence of this Contract and shall survive the execution and delivery of it, and all statements contained in any document required by SAWS whether delivered at the time of the execution, or at a later date, shall constitute representations and warranties hereunder.

5.8 MATERIALS & WORKMANSHIP

- .1 MATERIALS - Unless otherwise specified, all materials incorporated in the permanent Work shall be new, and both workmanship and materials shall be of good quality in accordance with Specifications. The Contractor shall, if required, furnish satisfactory evidence as to the supply or manufacture, and quality of materials supplied. All materials that come in direct or indirect contact with potable water must conform to ANSI/NSF Standard 60 for direct additives and ANSI/NSF 61 for indirect additives and must be in full compliance with all current regulations of the TCEQ and any other applicable regulatory requirements.
- .2 USE OF MATERIALS WITHIN THE RIGHT-OF-WAY - The Contractor, with the approval of the SAWS COI, may use in the Work any suitable stone, gravel, or sand found in the excavation that otherwise meets or exceeds Contract Specifications. The Contractor shall not over excavate any material from within the right-of-way, which is not within the excavation limits as required under the plans and specifications. Any over excavation will be at the contractor expense. No recycled concrete shall be used.
- .3 SALVAGEABLE MATERIAL - Salvageable material, as stated by the Contract documents, shall remain the property of the Owner and shall be relocated and stored at the job site by the Contractor unless the Contract Document provide for storage elsewhere.
- .4 DISPOSAL OF NON-HAZARDOUS WASTE MATERIAL/SUBSTANCES - The Contractor shall be responsible for disposing of all Non-Hazardous Material as the term is defined in Article I herein including old concrete or any other non-hazardous material which is required to be removed from the project. Such material shall not be deposited in any sanitary sewer, creek, river, watercourse or MS4, (unless a written exception is approved by Owner) as the term is defined herein.

- .5 DISPOSAL OF HAZARDOUS MATERIAL/SUBSTANCES - The Contractor shall be responsible for disposing of all hazardous materials/substances, as that term is defined in Article I herein in accordance with all applicable Federal, State and local laws, rules, regulations or ordinances, and in accordance with any specific instructions set out in the Plans and Specification herein.
 - .6 RECLAMATION OF LOW AREAS - The Contractor may undertake the reclamation of low areas with the prior approval of the Owner.
 - .7 BLOCKAGE OF THE MS4 - The Contractor shall comply with the provisions of the appropriate City Ordinances. In no event shall the Contractor block any portion of the MS4 with fill. Should any blockage occur the Contractor shall remove such fill, at contractor's expense, as directed by the SAWS COI.
- 5.9 TESTING - The Owner or the Consultant may require special inspection, testing or approval of material or Work for determining compliance with the requirements of the Contract Documents. Upon Owner-authorized direction of the Consultant, the Contractor shall promptly arrange for such special testing, inspection or approval procedure. Should the material or Work fail to comply with the requirements of the Contract Documents, the Contractor shall bear all costs of the special testing, inspection or approval as well as the cost of replacement of any unsatisfactory material or Work as provided by Article 5.10, otherwise, should the Work prove not defective, the Owner shall bear such costs and an appropriate Change Order shall be issued.
- 5.10 REMOVAL OF DEFECTIVE WORK - If any materials furnished under this Contract fails to perform in the manner such material is expected to perform in accordance with intended usage, the Contractor shall proceed to remove from the Project at his sole expense all such materials, whether worked or unworked, and to remove all portions of the condemned Work.
- 5.11 EQUAL MATERIALS - It is not the intent of the Specifications to unreasonably limit materials to the product of any particular manufacturer or supplier. Where definite materials, equipment and/or fixtures have been specified by name, manufacturer or catalog number, it has been done so as to set a definite standard and/or a reference for comparison as to quality, application, physical conformity, and other characteristics. It is not the intention to discriminate against or prevent any dealer, jobber or manufacturer from furnishing materials, equipment, and/or fixtures that meet or exceed the characteristics of the specified items. Unless otherwise provided for in the Specifications, Contractor's substitution of materials, equipment and/or fixtures shall not be made without prior written approval from the Consultant, and the Owner Request for substitutions will not be accepted from anyone except the Contractor, and such requests will not be accepted (if appropriate) until after the Contract has been awarded.
- 5.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- .1 Shop Drawings, Product Data, Samples and similar submittals are not part of the Contract. The purpose of their submittal is to demonstrate, for those portions of the Work for which submittals are required by the Contract Documents, the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.
 - .2 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Engineer/Consultant Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor will be returned by the Engineer/Consultant without action. Contractor shall submit to Engineer/Consultant for review and approval or for other appropriate action, five (5) hard copies and/or electronic copies, if requested by COI, of all Shop Drawings, Product Data, Samples or similar submittals bearing a stamp or specific written indication that Contractor has satisfied the Contractor's responsibilities under the Contract Documents with respect to his review of his submission. All Shop Drawings, Product Data, Samples and similar submittals in regards to Pipeline Projects shall be provided to the Engineer/Consultant during pre-construction meeting.

- .1 By approving and submitting Shop Drawings, Product Data, Samples and similar Submittals, the Contractor represents that the Contractor has determined and verified materials, quantities, specified performance criteria, installation requirements, catalog numbers, field measurements and filed construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- .2 Contractor shall give Engineer/Consultant specific written notice of each variation that the Shop Drawings, Product Data, Samples and similar submittals may have from the requirements of the Contract Documents, and, in addition, shall cause a specific Contractor notation to be made on each Shop Drawing, Product Data, Sample and similar submittals submitted to Consultant for review, approval, or other appropriate action highlighting each such variation.
- .3 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Engineer/Consultant. The Engineer/Consultant will review and return such submittals within twenty (20) calendar days or within a reasonable period so as to not delay the project.
- .4 Engineer/Consultant's review, approval, or other appropriate action regarding Contractor's submissions will be only to check conformity with the design concept of the Project and for compliance with the information contained in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate component item will not indicate approval of the assembly into which the item is functionally integrated. Contractor shall make corrections required by Engineer/Consultant, and shall return the required number of corrected copies of Shop Drawings, Product Data, Samples or similar submittals to the Contractor. Contractor may be required to resubmit as required revised Shop Drawings, Product Data, Samples or similar submittals for further review and approval. Contractor shall direct specific attention in writing to any new revisions not specified by Contractor on previous Contractor submissions.
- .3 The Work shall be in accordance with approved submittals, except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer/Consultant's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer/Consultant in writing of such deviation at the time of submittal and (1) the Engineer/Consultant has given written approval regarding the specific deviation as a minor change in the Work, or (2) a Change Order or Field Work Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer/Consultant's approval thereof.
- .4 Where Engineer/Consultant requires by written request an approved Contractor Shop Drawing, Product Data, Sample, or similar submittals any related Work performed by Contractor prior to Consultant's review and approval of the affected submission will be at the sole risk of Contractor.
- .5 The Contractor shall not be required to provide professional services which constitute the practice of architecture or Engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Engineer/Consultant will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal

shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Engineer/Consultant. The Owner and the Engineer/Consultant shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and Engineer/Consultant have specified to the Contractor all performance and design criteria that such services must satisfy. The Engineer/Consultant will review, approve or take other appropriate action on submittals only for the limited purpose of checking of conformance with information given and the design concept expressed in the Contract Documents.

5.13 CONTRACTOR'S WORK PROGRESS SCHEDULE

- .1 The "Work Progress Schedule" and successive updates or revisions thereof are for the Contractor's use in managing the Work. The Work Progress Schedule is for the information of the Owner and to demonstrate that the Contractor has complied with requirements for planning the Work. The Owner's acceptance of a schedule and schedule updates or revisions constitutes the Owner's agreement to coordinate its own activities with the Contractor's activities as shown on the schedule. The Contractor shall provide a Work Progress Schedule to the Owner within ten (10) calendar days after receipt of the Authorization to Proceed.
 - .1 Acceptance of the Work Progress Schedule, or update and/or revision thereto, does not indicate any approval of the Contractor's proposed sequences and duration.
 - .2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute the Owner's consent to any changes, alter the terms of the Contract, waive either the Contractor's responsibility for timely completion, or waive the Owner's right to damages for the Contractor's failure to do so.
- .2 The Contractor's scheduled dates for completion of any activity or of the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the completion date(s) and Contract Times.
- .3 Submittal of a schedule, schedule revision or schedule update constitutes the Contractor's representation to the Owner, as of the date of the submittal; of the accurate depiction of all progress to date and that the Contractor will follow the schedule as submitted in performing the Work.
- .4 The Contractor shall provide a Work Progress Schedule to the Owner within ten (10) calendar days after receipt of the Authorization to Proceed. The schedule shall show the order in which the Contractor proposes to carry out the Work and the anticipated start and completion dates of each phase of the Work.
- .5 The Work Progress Schedule must indicate the times (number of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents or "Hold Points" designated by the Owner during the review process, identify the "Critical Path" for completing the Work, identify when all Subcontractors will be utilized, and take into consideration any limitations on Working Hours. This Work Progress Schedule, a copy of which shall be made available at the job site(s), must contain sufficient detail to indicate that the Contractor has properly identified required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractors, has provided sufficient resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed within the Contract time. Contractor's submitted Work schedule shall be in a detailed, precedence-style critical path management Microsoft Project or Primavera format, satisfactory to the Owner and the Engineer/Consultant.
- .6 Schedule Updates - The Work Progress Schedule and the Submittal Schedule shall be updated monthly, as a minimum, to reflect progress to date and current plans for completing the Work. A paper and an electronic copy of the update shall be submitted to the Engineer/Consultant as directed. The Owner has no duty to make progress payments unless accompanied by the updated

Work Progress Schedule. The anticipated date of Substantial Completion shall show all extensions of time granted through Change Order(s) as of the date of the update. The Contractor, after coordination and consultation with the Owner, may revise the Work Progress Schedule logic only with the Owner's concurrence, which will not be unreasonably withheld, when, in the Contractor's judgment, it becomes necessary for the management of the Work. The Contractor shall identify all proposed changes to schedule logic to Owner and to the Engineer/Consultant via an Executive Summary accompanying the updated schedule for review prior to implementation of any revisions. If the Contractor's operations are materially affected by changes in the Plans or in the amount of Work, or if he has failed to comply with the anticipated progress, the Contractor shall submit a revised schedule reflecting the change in progress, within five (5) calendar days of the occurrence of such event. The schedule may also be revised by the Contractor in response to the reasonable request of the Owner.

- .1 Each schedule shall segregate the Work into a sufficient number of activities to facilitate the efficient use of critical path method scheduling by the Contractor, Owner, and Engineer/Consultant. Each schedule activity shall be assigned a cost value consistent with the Schedule of Values so as to allow the Owner and Contractor to project cash flow for the Project.
- .2 Each schedule shall include activities representing manufacturing, fabrication, or ordering lead time for materials, equipment, or other items for which the Engineer/Consultant is required to review submittals, shop drawings, product data, or samples.
- .3 Each schedule, other than the initial schedule, shall indicate the activities, or portions thereof, which have been completed; shall reflect the actual time for completion of such activities; and shall reflect any changes to the sequence or planned duration of all activities.
- .4 If any updated schedule exceeds the time limits set forth in the Contract Documents for Substantial Completion of the Work, the Contractor shall include with the updated schedule a statement of the reasons for the anticipated delay in Substantial Completion of the Work and the Contractor's planned course of action for completing the Work within the time limits set forth in the Contract Documents. If the Contractor asserts that the failure of the Owner or the Engineer/Consultant to provide information to the Contractor is the reason for anticipated delay in completion, the Contractor shall also specify what information is required from the Owner or Engineer/Consultant.
- .5 Neither the Owner nor the Contractor shall have exclusive ownership of float time in the schedule, and all float time (if any) shall inure to the benefit of the project. The Contractor agrees to use its best efforts not to sequence the Work or assign activity duration so as to produce a schedule in which more than one-fourth of the remaining activities have no float time.
- .7 Submission of any schedule under this Contract constitutes a representation by the Contractor that as of the date of the submittal: (1) the schedule represents the sequence in which the Contractor intends to prosecute the remaining Work; (2) the schedule represents the actual sequence and duration used to prosecute the completed Work; (3) that to the best of its knowledge and belief the Contractor is able to complete the remaining Work in the sequence and time indicated; and, (4) that the Contractor intends to complete the remaining work in the sequence and time indicated.
- .8 The Contractor shall submit in conjunction with his monthly request for payment, a copy of the current adjusted Work Progress Schedule showing the progress of the Work to date. If it is determined by Owner that the Contractor is not maintaining his anticipated progress, then the Owner may withhold approval of the monthly progress payment as provided in Article 7.2.

5.14 SEQUENCE OF CONSTRUCTION

- .1 PHASES OF CONSTRUCTION - The Contractor shall perform the Work as provided in the "Special Conditions" or as shown on the Contract Documents. The Contractor may submit to Owner a revised Contractor Phasing Plan prior to start of construction for review and approval by the Owner. If the Owner determines that the revised Contractor's Phasing Plan is not acceptable

as being in the best interest of the Owner, then the Contractor shall proceed with the Work in accordance with the Owner's Phasing Plan at no additional cost to the Owner.

- .2 DETOUR ROUTES - A detour route for through traffic (the means and methods of which as to be determined by the Contractor) must be provided by the contractor where the proposed construction is located within the limits of a street designated as "Collector", "Secondary" or Primary". The detour route must be approved by the ROW owner, such approval to be obtained by Contractor prior to construction. The Contractor shall not begin construction of the Project or close any streets until adequate barricades, detour signs and electronic message boards (if needed) have been provided, erected and maintained in accordance with the detour route and details shown on the Plans or as shown on the approved traffic control plan. The Contractor shall notify the SAWS COI forty-eight (48) hours in advance of closing any street to through traffic. Local traffic shall be permitted the use of streets under construction where feasible.

5.15 CONSTRUCTION STAKES - The Contractor shall hire a licensed surveyor, at his expense, for field staking and any other surveying requirements pertinent to the project.

5.16 PUBLIC UTILITIES

.1 Owner's Responsibility:

1. The Owner shall cause to be sent a set of Plans to utilities listed on the plans. The Owner shall request that the utilities review such Plans and Specifications to determine and/or verify the location of any utilities within the project site. The utility shall further be requested to communicate in writing the results of such review to the Contractor.

.2 Contractor's Responsibility:

- .1 The Contractor is hereby required to become familiar with all the existing utility structures, lines and mains that are known to exist and may be encountered within and/or adjacent to the limits of the work covered by the Contract. While the existence and location of underground utilities indicated on the Plans are taken from the most current utility records available to the Consultant and/or Engineer, the Contractor understands and acknowledges that the notation of such underground utilities on the Plans does not constitute a warranty, representation or guarantee by the Owner or Consultant regarding those Underground Facilities. In addition, Contractor further understands and acknowledges that Owner and Consultant are under no obligation to indicate the location of any private service lines on the Plans.
- .2 The Contractor shall go to the Project site, locate, and verify depth of any utilities indicated on the Plans prior to the Commencement of Work. The Contractor shall further investigate the possible location of any private service lines prior to the Commencement of Work as defined under Article 8. To facilitate this obligation on the part of Contractor, the Contractor shall communicate with the utilities listed on the plans, call for locations and subsequently visit the project site with a qualified utility representative of each utility listed on the plans, prior to the Commencement of Work. The information resulting from such on-site investigations shall govern over the information notated on the Plans, when and if a conflict between such information arises. In the event such investigations on the part of Contractor result in a utility location adjustment, Contractor shall not commence work until the completion of such adjustment has been completed.
- .3 The Contractor acknowledges and agrees that maintaining continuity of utility service to utility customers is critical, including but not limited to the need for temporary water services.
- .4 The Contractor shall be responsible for protecting the integrity of all utilities (public or private) either shown on the Plans or discovered during the Contractor investigations required in Article 5.16.2.2 herein. Such method of protection shall first be reviewed and approved by the affected utility.
- .5 The Contractor shall be responsible for any damages to any utilities (public or private)

either shown on the Plans or discovered during Contractor investigations acquired in Article 5.16.2.2 herein. Any existing utilities shown on the plans or discovered during Contractor investigations set out herein which cannot be relocated shall be protected by the Contractor as part of the original Bid Proposal Price submitted by Contractor. The Contractor shall pay for temporary relocation of utilities for the Contractor's convenience.

- .6 Contractor shall be responsible for damage to utilities not shown on the Plans and not discovered during Contractor's investigations required in Article 5.16.2.2 herein when the existence of such a utility or the suspected existence of such a utility should have been anticipated and investigated by the Contractor, based upon certain physical manifestations observed during the course of construction or other tangible evidence which constitutes common knowledge in the construction industry of the probable existence of a utility. A Contractor shall not be responsible for damages to utilities not shown on the Plans and not discovered during Contractor's investigation required herein when in accordance with the common knowledge in the construction industry; the existence of such utility could not reasonably be anticipated.
 - .3 Temporary clearance of high voltage (600 volts and above) and overhead electrical lines is required prior to the operation of equipment within 10 feet of such lines (Texas Health and Safety Code, sections 752.003 and 752.006). The Contractor shall bear the expense to obtain the necessary temporary clearance from the high voltage line operator or utility company. Temporary clearance shall be a temporary barrier separating and preventing contact of material, equipment, persons, communications with high voltage electrical lines, or temporary de-energization and grounding or temporary relocation, or raising of the lines; as approved by the utility company.
 - .4 In the case of sewer, water, gas, electric, telephone, cablevision cable, or any other utility shown on the Plans and/or discovered during the Contractor's investigations required in Article 5.16.2.2 herein, the Contractor will use care in excavating over, under and around such lines and will provide all necessary temporary bridging during construction so as to maintain continuous service of the utility line. The Contractor shall backfill around the main and complete his construction operations in such a manner as to leave the utility line firmly and securely bedded in its original position without damage to any protective coatings.
 - .5 In instances where gas or water mains are exposed during construction, the utility company owning or operating the service shall be given at least a twenty-four (24) hour notice by the Contractor prior to backfilling in order that the protective coating on the mains may be inspected and/or repaired by utility company.
 - .6 BRACING AND SUPPORTING - In areas where utilities are known to be near the Project site, and could be damaged by soil movement, slips or cave-ins, the Contractor shall take all precautions necessary to protect such utilities from damage and shall pay for the repair of any such damages caused by Contractor's failure to properly protect the utility.
- 5.17 SUBSURFACE CONDITIONS - Reports of explorations and tests of subsurface conditions at the construction site, where applicable, may be available for review. These reports if available were procured by SAWS in order to generally forecast soil conditions at various depths to assist the Consultant in designing the Project. The logs and descriptive data are NOT PART OF THE CONTRACT DOCUMENTS but are made available for the general information of bidders and SAWS SPECIFICALLY DISCLAIMS ANY AND ALL WARRANTY (INCLUDING WITHOUT LIMITATION AND IMPLIED WARRANTIES OF MERCHANTABILITY) OR GUARANTEE AS TO SUITABILITY OF FITNESS OF THE REPORTS, DATA OR INFORMATION FOR ANY PARTICULAR PURPOSE and neither the SAWS nor the Consultant assumes any obligation or responsibility, either specific or implied, for the accuracy or completeness of any information contained therein. Sub-surface conditions along and across the Project site may vary significantly from those shown on the test reports. All excavations shall be unclassified (as provided in the specifications) and shall include all materials encountered regardless of their nature or the manner in which they are removed.

- 5.18 WORKING HOURS - No Work, with the exception of such items as curing of concrete, maintenance of barricades, etc., will be allowed by the Owner between the hours of 5:00 p.m. and 8:00 a.m. of the following day, unless directed by Owner or requested in writing by Contractor and approved by Owner and the ROW Owner. In addition to no work being permitted on Sundays or holidays, no work shall occur on Saturdays without specific, written permission of the Owner's representative forty-eight (48) hours in advance of intent to perform Work.
- 5.19 USE OF STREETS RIGHT OF WAY - The Contractor shall confine the movements of all steel tracked equipment to the limits of the Project and any such equipment will not be allowed to use City, Public or Private streets unless being transported on pneumatic tired vehicles. Any damage to existing City streets caused by the Contractor's equipment shall be repaired by Contractor at his own expense upon direction, and in the manner prescribed by City's or other appropriate entities specifications and the SAWS COI.
- 5.20 DAMAGES TO STREETS caused by the Contractor, within the limits of the Project but not within the current phase being constructed, shall be repaired by the Contractor at his own expense upon direction by the SAWS COI.
- 5.21 DUST CONTROL - The Contractor will apply appropriate amounts of water (or other appropriate substance), to the area under construction and on detours as required to maintain sufficient moisture content in the surface layer for dust control.
- 5.22 SANITARY PROVISIONS - The Contractor shall provide and maintain in a neat, sanitary condition, rest room facilities for the use of his employees and authorized on-site visitors as may be necessary to comply with the requirements and regulations of the City Health Department and of the State Department of Health.
- 5.23 USE OF EXPLOSIVES - the use of explosives of any kind for this project is strictly prohibited.
- 5.24 WATER - the responsibility shall be upon the Contractor to provide and maintain an adequate supply of water for construction and on-site domestic consumption. Any connections and piping that the Contractor deems necessary for providing and maintaining an adequate water supply to the jobsite shall be installed at his expense and at locations approved by the SAWS COI. A fire hydrant meter is required. Before final Project acceptance, all temporary connections and piping installed by the Contractor in accordance with this paragraph shall be removed in a manner satisfactory to the SAWS COI.
- 5.25 ELECTRICITY - All electric current required by the Contractor at the jobsite shall be procured by Contractor. All necessary meters, switches, connections and wiring shall be installed at locations approved by the SAWS COI. Before final acceptance, all meters, switches, connections and wiring installed by the Contractor pursuant to this paragraph shall be removed in a manner satisfactory to the SAWS COI.
- 5.26 CLEANING
- .1 The Contractor shall at all times keep the Project premises safe and free from accumulation of waste materials or rubbish caused by the Work under this Contract. This includes the maintenance of grass, shrubbery, and trees within the ROW.
 - .2 Upon completion of the Work, and prior to the Owner's final inspection, the Contractor shall present the premises in a neat and clean condition, prepared for acceptance by Owner.
 - .3 Prior to final acceptance of the Work, Contractor shall reasonably restore the Project site to its pre-project condition (accounting for such restoration concerns as cosmetic appearance, landscaping, drainage gradients, accessibility, etc.) to the extent permitted by the Project improvements. All of this incidental Work to be performed by Contractor to the satisfaction of the SAWS COI.
- 5.27 ACCESS REQUIREMENTS - The Contractor shall provide access to residents and businesses affected by the construction of this Project to the greatest extent possible.
- 5.28 SAFETY PRECAUTIONS AND PROGRAMS
- .1 In the performance of this Contract the Contractor shall protect the public, SAWS and the City of

San Antonio by taking reasonable precaution to safeguard persons from death or bodily injury and to safeguard property of any nature whatsoever from damage. Where any dangerous condition or nuisance exists in and around construction sites, equipment and supply storage that are in any manner connected with or arise from the performance of this Contract, the Contractor shall provide and maintain reasonable warning of such danger or nuisance. The Contractor shall not create any dangerous condition or nuisance of any nature whatsoever in connection with the performance of this Contract including, but not limited to, excavations and obstructions, unless necessary to its performance, and in that event the Contractor shall provide and maintain at all times a reasonable means of warning of any danger or nuisance so created. The duties of the Contractor in this paragraph shall be nondelegable and the Contractor's compliance with the specific recommendation and requirements of SAWS as to the means of warning shall not excuse the Contractor from the faithful performance of these duties should such recommendations and requirements not be adequate or reasonable under the circumstances. The Contractor shall take reasonable precautions for the safety of and shall provide protection to prevent damage, injury, or loss to:

- .1 All employees on the Work, and all other persons who may reasonably be foreseen to be affected by the Work.
 - .2 All the Work and all materials to be incorporated at street crossings, along proposed detour routes, and at material stockpiles. Where directed by the Owner or his duly authorized representative, the Contractor shall provide and maintain suitable warning signs, barricades and lights, in accordance with the details included in the Contract Documents, to direct traffic around the Work in progress and to assure the safety of the public. The Contractor shall provide adequate warning signs, barricades, and lights and, where necessary, flagmen for the Project or portions of the Project within which operations are being prosecuted in any one day or which will be closed overnight.
 - .3 Other property at the site or adjacent thereto including but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- .2 The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (Public Law 91-596 and all subsequent amendments) and under Section 107 of the Contract Work Hours and Safety Standards Act (Public Law 91-54 and all subsequent amendments). This project is subject to all of the Safety and Health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910 and all subsequent amendments, General Industry Safety and Health Regulations Identified as Applicable to Construction. Contractors shall be knowledgeable with the requirements of these regulations and any amendments thereto.
- .3 On trench excavation that exceeds a depth of five (5) feet, trench excavation protection shall be accomplished as required by the most current provisions of part 1926 subpart P - Excavations, of the Occupational Safety and Health's Standards and interpretations and as further defined in the note(s) on the Plans and other Contract Documents.
- .4 In any emergency affecting the safety of persons or property, the Contractor shall act to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor resulting from emergency Work shall be considered by Owner in accordance with Articles VI and VIII for Completion Time.
- .5 The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first aid service to anyone who may be injured in connection with the Work. Such equipment shall comply with the most current regulations of the Occupational Safety and Health Administration of the United States Department of Labor.
- .6 The Contractor must promptly report in writing to the Owner all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on or adjacent to the site which caused death, personal injury, or property damage, giving full details and any statements of witnesses. In addition, if death, serious injury, or serious damage is caused, the accident then

shall be reported immediately by telephone or messenger to the Owner.

- .7 SAWS requires all Contractor job sites shall be immediately accessible to appropriate local, State and Federal agency safety officials.

ARTICLE VI. CONTRACT CHANGES:

- 6.1 CHANGE ORDERS - The Contract Sum and/or the Contract Time may be increased or decreased only by written Change Order. A Change Order signed by the Contractor indicates his acceptance and approval thereof including the adjustment in the Contract Sum and/or the Contract Time. Any compensation paid in conjunction with the terms of a Change Order shall comprise the total compensation due the Contractor for the work or the change defined in the Change Order. By signing the Change Order, the Contractor acknowledges that the stipulated compensation includes payment for the Work of Change plus all payment for the interruption of schedules, stop work orders, extended overhead, delay, or any other impact, claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation in respect to the subject of the Change Order. Except as modified by Change Order, all Work performed under a Change Order shall be completed in accordance with these Contract Documents. Each Change Order shall be specific and final as to prices and extensions of time with no reservations or other provisions allowing for future additional money or time as a result of the particular changes identified and fully compensated in the change order.
- 6.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract and applicable law consisting of additions, deletions or other revisions and the Contract Sum and/or the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by written Change Order and shall be performed by Contractor under the applicable provisions of the Contract Documents as provided herein.
- .1 MAJOR CHANGES IN THE WORK - any significant change in a Major Bid Item constitutes a major change in the Work and shall be implemented by a Change Order that shall be binding on the Owner and Contractor. A significant change that constitutes a Major Change in the Work shall be defined as follows:
- .1 An increase or decrease of five percent (5%) or more in the number of units (not price) for a Major Bid Item as included in the Consultant's estimated quantities included in the Bid Documents; or
- .2 An increase or decrease of five percent (5%) or more in the dollar value of a lump sum, Major Bid Item.
- .3 Any change in the Contract Sum resulting from a Major Change in the Work, which reflects among other things, quantity changes, market price changes, and any quantity or volume discounts that might apply, shall be determined as specified in Article 6.5.
- .2 MINOR CHANGES IN THE WORK - The SAWS COI will have authority to order such minor changes in the Work not involving an adjustment in the Contract Sum or Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be implemented by a written directive (a "Work Change Directive") and shall be binding on the Owner and Contractor. The Contractor shall carry out any written directive promptly.
- .1 If the Contractor does not agree with the SAWS COI that a Minor Change in the work is minor and will result in no adjustment in Contract Sum or Contract Time, he must so notify the Owner in writing, within seven (7) calendar days of issuance of the written directive and prior to beginning any disputed work. If the Contractor fails to file such written notification as provided for above, he shall waive and forever forfeit his rights to file a claim for additional compensation or Time for the Work under this section.
- .3 In the event there is a Major Change In The Work as provided for in Article 6.2.1, that causes an increase in the number of units for a Major Bid item, Owner may consider a price increase for the Major Bid item for those additional units. In any event the Contractor shall not be entitled to an adjustment of price due to a decrease in a Major Bid Item.

- 6.3 Contractor proposals, along with the supporting data including impact to the critical path, for the proposals as specified in item 6.5.4 shall be submitted no later than seven (7) calendar days after the owner's issuance of an RFP request by Owner's Representative, unless Owner's Representative grants an extension. Failure of contractor to provide the complete and proper proposal including all support will not be cause for delay or additional time.
- 6.4 The entire cost of extra Work resulting from Change Orders including the incremental cost of extra Work resulting from any prior Change Orders, modifications, or additions so ordered, shall not cumulatively exceed twenty-five percent (25%) of the original Contract Sum, in accordance with Texas Local Government Code, Chapter 252 and provided further that the price is agreed upon in writing by Owner and Contractor before materials are furnished or the Work is done. Contractor shall be responsible for keeping records that track the Contractor's cumulative total for Change Orders and Contractor, by entering this Contract, approves, understands and agrees that no Work is approved, no payment will be made, and no Change Order is authorized, that exceed the statutory limit provided herein and any Work undertaken or performed by the Contractor in excess of this amount is at the Contractors sole risk and expense
- 6.5 Changes or Credits for the Work covered by an approved Change Order shall be determined by one or a combination of the following methods:
- .1 UNIT PRICE - Submitted by the Contractor in the original Contractor Bid Proposal as part of the base bid or as a designated additive or deductive alternate, and if agreed to by the Contractor and the Owner, appropriately adjusted either upward or downward to reflect any increases or decreases in the amount of labor, material or equipment as they relate to Major Bid Items.
 - .2 AGREED CONTRACT CHANGES - Lump Sum Agreement between Owner and Contractor as to the price, quantity and time for changes in the Work. The Contractor shall submit an itemized, estimated cost breakdown together with supporting data. This itemized breakdown shall be in accordance with the requirements established in Article 6.5.4 and 6.5.5.
 - .3 FORCE ACCOUNT - If no Agreed Contract Change or unit price can be reached after good faith negotiations between the SAWS and Contractor, the Owner may direct the Work be performed by the Contractor on a Force Account basis, and payment by the SAWS shall be upon the basis of Actual Cost of the Work as specified in Article 6.5.4 plus the participation allowances as specified in Article 6.5.5.
 - .4 ACTUAL COST OF THE WORK – The “Actual Cost” incurred by the Contractor to perform the additional Work. Contractor shall provide a complete breakdown of the Actual Costs to the Owner on a daily basis as follows:
 - .1 Labor including Foremen
 - .2 Labor burden shall be allowed at a maximum of 35%. Any burden in excess of the percentage shown shall be submitted for review and approval by the Owner and will be subjected to audit.
 - .3 Materials comprising the Work
 - .4 The Contractor's actual incremental ownership or rental cost of equipment during the time of use on the extra Work. (Rental cost shall be based on current Southwest Regional AGC, Association of Equipment Distributors regional computations or equivalent).

For Contractor-owned machinery, trucks, power tools or other equipment, necessary for use on Change Order work, the Rental Rate Blue Book for Construction Equipment (hereafter referred to as “Blue Book”) rate, as modified by the following, will be used to establish Contractor's allowable hourly rental rates. Equipment used shall be at the rates in effect for each section of the Blue Book at the time of use. The following formula shall be used to compute the hourly rates:

$$H = \frac{M \times R1 \times R2}{176} + OP$$

176

Where H = Hourly Rate

M = Monthly Rate

R1 = Rate Adjustment Factor

R2 = Regional Adjustment Factor

OP = Operating Costs

If Contractor-owned machinery and/or equipment is not available and equipment is rented from an outside source, the hourly rate shall be established by dividing the actual invoice cost by the actual number of hours the equipment is involved in the Work. Owner reserves the right to limit the hourly rate to comparable Blue Book rates. When the invoice specifies that the rental rate does not include fuel, lubricants, repairs and servicing, the Blue Book hourly operating cost shall be allowed to be added for each hour the equipment operates. The allowable equipment hourly rates shall be paid for each hour that the equipment is involved in the Work and an additional maximum of fifteen percent (15%) may be added as compensation.

- .5 Power and consumable supplies for the operation of power equipment.
- .6 Insurance and any extra bond premiums shall be allowed at a maximum of two (2%) percent of the total change order cost. Any insurance and extra bond premiums in excess of the percentage shown shall be submitted for review and approval by the Owner and will be subjected to audit.

.5 PARTICIPATION ALLOWANCE

- .1 For Contractor's proposals covering both increases and decreases in the amount of the Contract, the application of overhead and profit percentages (as provided in the following tables) shall be on the net increase in the Actual Cost for the Contractor or Subcontractor performing the Work. However, where the Contractor or first tier Subcontractor receives proposals for additive and deductive amounts from separate sub tier subcontractors, the commission shall be allowed on the added amounts prior to subtraction of the credit amounts. The cost of such extra Work shall be added to the Contract Sum by a Written Change Order as specified in Article 6.1. The following tables provide further explanation of the application of the provisions in this Article:

ALLOWABLE MARK UPS	Work performed by PC		Work performed by Sub A		Work performed by Sub B	
	O & P	Comm.	O & P	Comm.	O & P	Comm.
Prime Contractor (PC)	20%	---	---	5%	---	5%
Subcontractor A (Sub A)	---	---	20%	---	---	5%
Subcontractor B (Sub B)	---	---	---	---	20%	---
Subcontractor C (Sub C)	SAWS Does Not Allow Mark Up On Sub C					

DEFINITIONS	
Prime Contractor	Owns the contract with SAWS
Subcontractor A	Works directly for Prime Contractor
Subcontractor B	Works directly for Subcontractor A
Subcontractor C	Works directly for Subcontractor B
O & P	Overhead & Profit
Comm.	Commission

EXAMPLE		Sub B change order for \$1,000	
		Work performed by Sub B	
		O & P	Comm.
Prime Contractor		---	\$63.00
Subcontractor A		---	\$60.00
Subcontractor B		\$200.00	---
Subcontractor C		---	---
Summary	CO	Mark Up	CO Total
	\$ 1,000.00	\$323.00	\$1,323.00

6.6 **DELETION OF WORK** - The Owner may, pursuant to Texas Local Government Code, Chapter 252, or as otherwise may be provide by law, order the Contractor to omit up to twenty five percent (25%) of the original Contract Sum and associated Work, as specified in Article 6.4, without the consent of the Contractor.

6.7 **CLAIMS FOR ADDITIONAL COSTS**

- .1 If the Contractor pursues a claim for an increase in the Contract Sum and or time prior to final acceptance, he shall give the Owner written notice thereof with a simultaneous information copy to the Consultant, within thirty (30) days after the Contractor knows, or should have known, of the events giving rise to such Contractor claim. This notice shall be presented in writing to the Owner and Consultant by the Contractor and contractor shall not proceed with work until directed by Owner, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Article 5.28.4. No such Contractor claim shall be valid unless the Contractor follows the notice procedure outlined herein, and failure to follow the notice procedure provided above shall cause the Contractor to waive and forever forfeit the right to seek additional amounts on the Contract in regards to the claim. If the Owner and the Contractor cannot agree on the amount of the adjustment in the Contract Sum, if any, it shall be determined by administrative procedures as provided to Article X. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.
- .2 If the Contractor claims that additional cost will be incurred because of: (1) any written Owner or Consultant interpretation of the Contract Documents, (2) any order by the Owner to stop the Work pursuant to Article 4.8 where the Contractor was not at fault, or (3) any written order involving a perceived minor change in the Work issued pursuant to Article 6.2.2, the Contractor shall make such claim as provided in Article 6.7.1.

6.8 **NO DAMAGES FOR DELAY CLAUSE** - Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted under Article 6., shall be the sole remedy of the Contractor for any (i) delay in commencement, prosecution, or completion of Work, (ii) hindrance, interference, suspension or obstruction in the performance of Work, (iii) loss of productivity, or (iv) other similar claims (items (i) through (iv) herein collectively referred to in this Article 6.8 as "Delays") whether or not such Delays are foreseeable, unless a Delay is caused by the acts of the Owner constituting intentional interference with Contractor's performance of the Work, and only to the extent such act continues after the Contractor furnishes Owner with written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages, in connection with any Delay, including, without limitation, consequential damages, lost opportunity costs, impact

damages, or other similar remunerations. For purposes of interpreting this provision, the Owner's exercise of any of its rights or remedies under the Contract Documents (including without limitation, ordering changes in Work, or directing suspension, rescheduling, or correction of the Work), regardless of the intent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as intentional interference with the Contractor's performance of the Work.

- 6.9 SUBCONTRACTOR PASS-THROUGH CLAIMS - In the event that any Subcontractor of Contractor asserts a claim to Contractor that Contractor seeks to pass through to Owner under the Contract Documents, any entitlement to submit and assert the claim as to Owner shall be subject to:

- .1 The requirements herein of these General Conditions; and
- .2 The following additional three (3) requirements listed below, all three (3) of said additional requirements shall be conditions precedent to the entitlement of Contractor to seek and assert such Claim against Owner:
 - (1) Contractor shall:
 - (a) have direct legal liability as a matter of Contract, common law, or statutory law to Subcontractor for the claim that Subcontractor is asserting; or
 - (b) have entered into a written liquidating agreement with Subcontractor, prior to the Claim's occurrence, under which Contractor has agreed to be legally responsible to the Subcontractor for pursuing the assertion of such Claim against Owner under said Contract and for paying to Subcontractor any amount that may be recovered, less Contractor's included markup (subject to the limits in the Contract Documents for any markup). The relationship, liability or responsibilities shall be identified in writing by Contractor to Owner at the time such Claim is submitted to Owner and a copy of any liquidating agreement shall be included by Contractor in the Claim submittal materials.
 - (2) Contractor shall have reviewed the Claim of the Subcontractor prior to its submittal to Owner and independently shall have evaluated such Claim in good faith to determine the extent to which the Claim is believed in good faith to be valid. Contractor shall inform Owner that Contractor has made a review, evaluation, and determination that the Claim is made in good faith and is believed to be valid.
 - (3) Subcontractor making the Claim to Contractor shall certify to both Contractor and Owner that it has compiled, reviewed and evaluated the merits of such Claim and that the Claim is believed in good faith by Subcontractor to be valid. A copy of the certification by Subcontractor shall be included by Contractor in the Claim submittal materials.
- .3 Any failure of Contractor to comply with any of the foregoing requirements and conditions precedent with regard to any such Claim shall constitute a waiver of any entitlement to submit or pursue such Claim.

- 6.10 TIME REQUIRED TO PROCESS CHANGE ORDERS - All Change Orders require written approval by either Owner or Owners Representative or, where authorized by the State. The approval process requires a minimum of forty-five (45) calendar days **after submission** to Owner in final form with all supporting data. Receipt of a submission by Owner does not constitute acceptance or approval of a proposal, nor does it constitute a warranty that the proposal will be authorized by Owner. **THE TIME REQUIRED FOR THE APPROVAL PROCESS SHALL NOT BE CONSIDERED A DELAY AND NO EXTENSIONS TO THE CONTRACT TIME OR INCREASE IN THE CONTRACT SUM WILL BE CONSIDERED OR GRANTED AS A RESULT OF THIS PROCESS.** Pending the approval of a Change Order as described above, Contractor will proceed with the work under a pending Change Order only if directed in writing to do so by Owner.

ARTICLE VII. CONTRACT PAYMENTS:

- 7.1 INTERNET-BASED PROJECT MANAGEMENT SYSTEM. SAWS shall administer its services through an Internet-Based Project Management System (hereafter referred to as "CPMS"). In such case, Contractor shall conduct communication through CPMS and perform all Project-related functions utilizing CPMS, with the exception of Sub-Contractor payment monitoring activities, which shall be through the S.P.U.R. system. This includes any and all correspondence, submittals, requests for information, vouchers, compensation requests and processing, amendment, change orders and other administrative activities as may be required in the Contract. SAWS shall administer the CPMS software, shall provide CPMS training to Project Team members and shall make the software accessible via the Internet to all necessary Project Team members. All invoices shall be submitted through the CPMS.

Monthly payments for work performed shall be reviewed by SAWS upon Contractor entering itemized invoices, with all required back-up, within CPMS. The invoice shall indicate the value of the work performed to date.

- 7.2 ESTIMATED QUANTITIES AND MEASUREMENT - The estimated quantities of the various elements of Work to be done and material to be furnished are approximate only and are provided by Consultant and Owner as a basis for Owner comparison of proposals and award of Contract. It is expressly understood and agreed by Owner and Contractor that the actual amounts of Work to be done and material to be furnished may differ somewhat from these estimated quantities. The quantities of Work actually performed by Contractor will be computed on the basis of measurements taken by the Owner's representatives, and these measurements shall be final and binding on Contractor.

PROGRESS PAYMENTS - During the latter part of each month as the Work progresses on all SAWS Contracts regardless of Contract Sum, said Owner, or his designated representatives and Contractor shall determine either the cost of the labor and materials or quantities incorporated into the Work during that month and actual invoiced cost of Contractor acquired materials stored on the Project site, and/or within off-site local storage facilities either owned or leased by the Contractor. Upon receipt of a complete and mathematically accurate Construction Payment Estimate Form from the Contractor, the SAWS shall make payment to Contractor within thirty (30) calendar days of receipt. Contracts totaling four hundred thousand (\$400,000.00) dollars or less, based upon such cost determination and at the Contract unit prices in a sum equivalent to ninety percent (90%) of each such invoice. The remaining ten percent (10%) retainage shall be held by the SAWS until the final Contract Settlement. However, where the Contract amount exceeds four hundred thousand dollars (\$400,000.00), installments shall be paid to Contractor at the rate of ninety-five percent (95%) of each monthly invoice within thirty (30) calendar days of Owner receipt of an approved and mathematically accurate Construction Payment Estimate Form from the Contractor, and the retainage held until final Contract Settlement shall be five percent (5%). In either case, should the Construction Payment Estimate Form submitted by the contractor be incorrect, the Construction Payment Estimate Form will be rejected and returned to the contractor for correction. Upon receipt of the corrected Construction Payment Estimate form, the timeline stated above for payment will apply.

- .1 Contractor's Payment to Sub-Contractors: The contractor will be required to report the actual payments to all subcontractors, utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System, in the time intervals and format prescribed by SAWS. This information will be utilized for SMWB participation tracking purposes. Any unjustified failure to comply with the committed SWMB levels may be considered breach of Contract.
- .2 Web Submittal of Subcontractor Payment Reports: The Contractor is required to electronically submit monthly subcontractor payment information utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System, beginning with the first SAWS payment for services under the Contract, and with every payment thereafter (for the duration of the contract).

Electronic submittal of monthly subcontractor payment information will be accessed through a link on SAWS' "Business Center" web page. The Contractor and all subcontractors will be provided a unique log-in credential and password to access the SAWS subcontractor payment reporting system. The link may also be accessed through the following internet address:
<https://saws.smwbe.com/>

Training on the use of the system will be provided by SAWS. After the prime receives payment from SAWS, electronic submittals will require data entry of the amount paid to each subcontractor listed on the Contractor's Good Faith Effort Plan.

Owner's payment of installments shall not in any way be deemed to be a final acceptance of any part of the Work by Owner, and will not prejudice Owner in the final settlement of Contract account nor relieve the Contractor from completion of the Work as herein provided.

7.3 WITHHOLDING OF PAYMENT - In the event that the Owner discovers evidence of Contractor and/or Work noncompliance with the Contract Documents subsequent to approval of the Construction Estimate Certification Forms, the Owner may revoke or otherwise amend that part of any Construction Estimate Certification Form to such extent as may be necessary to withhold monies to protect the Owner from loss on account of:

- .1 Defective Work not remedied by Contractor.
- .2 Persistent and uncured Contractor non-compliance with the administrative provisions of the Contract Documents including, but not limited to, failure to electronically submit monthly subcontractor payment information utilizing the Sub-contracting Payment and Utilization Reporting (S.P.U.R.) System.
- .3 Damage to Work of another Contractor.
- .4 Liquidated Damages assessed by Owner for Contractor failure to maintain scheduled progress in accordance with the most recent applicable construction schedule, if any are specified in the Contract Documents, and/or Contractor failure to meet final completion date.
- .5 Receipt of written notice by the Owner of Contractor's unpaid bills, as stipulated in Chapter 53, Texas Property Code, if the Contractor has not provided a payment bond and only if the Contract Sum does not exceed \$25,000.00. Any funds so withheld by Owner shall be released to the Contractor if he furnishes either a special indemnity bond to Owner securing release of lien as provided in Chapter 53, Texas Property Code, or Contractor proof of payment of disputed bills.
- .6 "Indemnification" as provided for in Article 2.3.

When the above Contractor deficiencies are cured, Owner will make payment for amounts withheld because of the deficiencies within (30) thirty calendar days.

7.4 FINAL PAYMENT - Contractor shall not be entitled to receive payment of any sum in excess of the cumulative amounts paid upon such monthly invoices as outlined above until after the Owner transmittal of the Letter of Conditional Approval and in accordance to Article 9 project completion and acceptance and not before all the stipulations, requirements and provisions of this Contract are faithfully performed and complied with by Contractor, and unless and until said structures, Work and improvements shall be entirely completed, and delivered to, and accepted by the SAWS in accordance with the Contract Documents. Completion, delivery and acceptance of the Work is evidenced by the Final Certificate of Acceptance issued in accordance to Article 9.1 by the Owner and such Certificate of Acceptance is approved by the Owner. The Owner shall prepare the final invoice as the basis for final Contract settlement. Owner may deduct from the amount of such final invoice and retain any and all sums which are to be deducted by SAWS or paid or allowed by Contractor to SAWS, or which are to be retained by Owner for reasons stemming from any/all fines, fees, or penalties, in addition to those previously stated in Article 7.2.

- .1 NOTARIZED AFFIDAVIT - Before and as a condition precedent to Final Payment for the work by the Owner, the Contractor shall submit to the Owner a notarized affidavit in duplicate stating under oath that all subcontractors, vendors, and other persons or firms who have furnished or performed labor or furnished materials for the work have been fully paid or satisfactorily secured. Such affidavit shall bear or be accompanied by a statement, signed by the surety company who provided the Payment Bond for the work, to the effect that said surety company consents to Final Payment to the Contractor being made by the Owner.

7.5 OWNER TO FINALLY DETERMINE ALL AMOUNTS PAYABLE OR CHARGEABLE - It is expressly understood and agreed by Contractor that subject only to the prices, terms and provisions specifically set forth in the Contract Documents including Change Orders, the written estimates and Certificates of the Owner shall be final in fixing and determining amounts payable or chargeable hereunder to Contractor by SAWS as required by the other terms and conditions hereof. Also, in case of controversy, the monthly construction estimates and Certificates of Final Acceptance shall be final in fixing and determining all sums to be deducted and retained by SAWS for reasons as stated in Article 7.2, out of any funds otherwise estimated as payable to Contractor by SAWS.

7.6 CLAIMS BY THIRD PARTIES FOR LABOR OR MATERIALS

- .1 Contractor hereby agrees to promptly pay all persons supplying labor, services and materials in the prosecution of the Work provided for in this Contract and any and all duly authorized modifications or Change Orders of said Contract that may hereafter be made, and shall fully indemnify and hold harmless the SAWS and its agents against any and all claims, liens, suits or actions asserted by any person, persons, firm or corporation on account of labor, materials or services furnished such Contractor during the prosecution of the Work herein undertaken. Contractor shall execute a payment bond in accordance with other sections governing same herein for this purpose. Before the SAWS shall be obligated to pay any amount to Contractor on final Contract settlement, Contractor shall execute a sworn, written and notarized statement on an affidavit form to be supplied by the Owner along with a "consent of surety" letter endorsing Final Payment to Contractor, evidencing that all labor employed and all equipment and materials incorporated into the Construction of the Work have been either fully paid for by Contractor and Subcontractors, or that any pending disputes over payment are being properly addressed by the surety as provided for in 7.3.1 herein.
- .2 Suppliers, any subcontractors, and persons claiming to have performed any labor, or to have supplied any equipment and materials toward the performance of this Contract, and who claim not to have received proper compensation from the Contractor or Subcontractors for same, shall be instructed by Owner and Contractor that written and documented claims must be sent directly to the Contractor and his Surety in accordance with Chapter 2253, Texas Government Code. The Owner will furnish to claimants, in accordance with such Chapter 2255, Texas Government Code, a copy of the Contractor's Payment Bond and Contract as provided therein upon claimant's written request. **The Owner shall further furnish a statement to claimants that claimants are cautioned that no legal or equitable lien exists on the SAWS funds yet unpaid to the Contractor, and that reliance on notices sent only to the Owner may result in loss of claimant's rights to timely perfect recovery against the Contractor and/or his Surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any unauthorized representation by any agent or employee of Owner to the contrary.**

ARTICLE VIII. CONTRACT COMPLETION TIME:

- 8.1 COMMENCEMENT OF WORK - The Work called for in this Contract shall commence on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the Work commence prior to the Contractor's receipt of SAWS issued, written Authorization to Proceed.
- 8.2 COMPLETION OF WORK - After commencement of Work as outlined in Article 8.1, the Contractor shall prosecute the Work continuously, diligently and uninterruptedly throughout the Contract Time period, during which period of time Contractor, all subcontractors and suppliers are bound and obligated at all times to employ sufficient Work force and supervisory diligence to complete said structures, Work and improvements, and to deliver same over to the SAWS in a timely acceptable, completed, undamaged and clean condition. THE TIME OF BEGINNING, RATE OF PROGRESS AND TIME OF COMPLETION OF SAID WORK ARE HEREBY DECLARED BY OWNER AND UNDERSTOOD BY CONTRACTOR TO BE "OF THE ESSENCE" TO THIS CONTRACT. By executing this Contract, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Any other provision contained herein notwithstanding, the Owner may suspend said Work either partially or totally as provided for in Article 4.6 and 4.7.

- 8.3 CALENDAR DAY CONTRACT – Unless otherwise specifically provided in Supplemental or Special Conditions to the Contract, all Contracts shall be Calendar Day Contracts and “Day” as used in the Contract Documents shall mean a calendar day which are days of 24 hours each from midnight to the next consecutive midnight. Work on Sundays or SAWS Designated Holidays will not be permitted except in cases of extreme emergency, and then only with the written permission of the Owner. If Sunday or SAWS Designated Holiday Work is permitted, the COI's average salary costs at time and one half will be charged to the Contractor. This amount shall be deducted from Contractor's monthly payment application by Owner. Nothing in this Paragraph shall be construed as prohibiting the Contractor from working on Saturdays if so desired provided they give Owner at least the prerequisite forty-eight (48) hours written notice (and receive subsequent approval by the Owner) of intent to perform Work on Saturday so that Owner's representatives may be scheduled to observe/inspect said Work.
- 8.4 FAILURE TO COMPLETE WORK ON TIME - If the Contractor fails to complete the Contract in the time specified by Owner in the Contract Documents and agreed to by Contractor through execution of this Contract, Contract Time charges will continue to be made for each Calendar Day thereafter. THE TIME SET FORTH IN THE CONTRACT FOR THE COMPLETION OF THE WORK IS AN ESSENTIAL ELEMENT OF THE CONTRACT. For each Calendar Day that any Work shall not be complete, after the expiration of the Calendar Days specified in the Contract, (to include Calendar Days charged for correction of Contractor deficiencies found during the final inspection), plus, any extended days allowed by Owner, the amount of liquidated damages assessed per day as stipulated in the Contract will be deducted from the money owed or to become due to the Contractor, not as a penalty but as liquidated damages owed to SAWS for extended expenses, loss and public inconvenience resulting from Contractor's failure to complete said Work within the Contract Time that the Contractor agreed to by execution of this Contract. Contractor and SAWS agree that such liquidated damages as are set prior to the Contract execution are for projected reasonable costs that are otherwise difficult for either Party to forecast and will be incurred by the SAWS due to Contractor completion beyond the number of Calendar Days calculated herein by the SAWS.
- .1 The Contract Time may only be changed by a Change Order duly executed by both Contractor and Owner.
 - .2 Should progress of the Work fall behind the construction schedule except for reasons stated in 8.4.1, Contactor shall promptly submit at the request of Owner or Authorized Representative an updated Construction schedule to Owner or Authorized Representative for approval. Contractor shall take any and all action necessary to restore progress by working the hours, and lawful overtime operations as necessary to achieve Contract Time.
- 8.5 WEATHER DELAY CLAUSE - SAWS includes weather delay days when determining the total number of days allowed for each Contract. Any additional days beyond those specified in 8.5.3 must be formally requested in writing with the next monthly payment invoice and justified by the contractor with daily logs or NO ADDITIONAL DAYS WILL BE GRANTED.
- .1 Pursuant to the Contract, Contractor may be granted an extension of time because of unusual inclement weather, including but not limited to unusual rainfall events, which are beyond the Normal Rainfall recorded and expected for San Antonio, Texas. However, the Contractor will not be granted an extension of time for “Normal Rainfall”, as described in 8.5.3.
 - .2 "Unusual Inclement Weather" is defined as a rain event or other weather related event which occurs at the site and is of sufficient magnitude, as determined by the COI, to prevent Contractor from performing work critical to maintaining the Progress Schedule. If rain is the basis for the Unusual Inclement Weather event it must at a minimum exceed the Normal Rainfall as defined herein.
 - .3 Baseline Rain Day Determination. “Normal Rainfall”, based on the National Oceanic and Atmospheric Administration (NOAA) or similar data for San Antonio, Texas, is considered a part of the Calendar Day Contract, and is not a justification for an extension of time. Listed below are the number of days in each month for which no compensatory days for rainfall events (“Rain

Days”) in such months may be claimed:

January.....	2 days
February.....	3 days
March.....	4 days
April.....	3 days
May.....	4 days
June.....	6 days
July.....	3 days
August.....	4 days
September.....	5 days
October.....	5 days
November.....	5 days
December.....	3 days

“Rain Days” in addition to the baseline “Rain Day” determination described above will be measured (with the Owner’s Representative’s approval) at the jobsite or at a location as agreed in writing by the parties.

- .4 Contractor may receive credit in any month for Unusual Inclement Weather, and specifically for any Rain Days in that month which exceed the number of Rain Days allocated to that month, if a Claim is made in accordance with paragraph 8.5.1 and the weather event meets the definition for "Unusual Inclement Weather", and as applicable, “Rain Day” and such claimed day is a day on which Work critical to maintaining the Progress Schedule is scheduled to be performed and is otherwise capable of being performed.

- 8.6 Liquidated Damages for Failure to Complete on Time – The Contractor agrees that **Time Is Of Essence** of this Contract and that for each day of delay beyond the number of days herein agreed upon for the completion of work herein specified and contracted for, after due allowance for such extension of time as is provided for under the provisions herein, the Owner may withhold permanently for the Contractor's total compensation, not as a penalty but as liquidated damages, the sum per day in accordance to the Supplemental Conditions of the Contract.

ARTICLE IX. PROJECT COMPLETION AND ACCEPTANCE:

- 9.1 FINAL ACCEPTANCE of the Project will be considered only after all stipulations, requirements and provisions of this Contract are faithfully completed and the Project is delivered to the SAWS by Contractor in an acceptable condition for the intended use by Owner. In the event that all major Contract pay items are complete and only minor clean-up operations remain for Contract completion, the Owner has the discretionary authority to issue a Conditional Letter of Acceptance. Should the Owner's Conditional Letter of Acceptance contain conditions for the Final Acceptance of the Work, Contract Time will continue to be charged against the Contractor until such conditions have been corrected to the satisfaction of the Owner.

- .1 Final Release of Retainage - Contractor shall be entitled to receive payment of all retainage within forty-five (45) calendar days of completion, receipt and acceptance of all required "completion items" as stipulated below:
 - .1 The “Semi-Final Pay Request” indicating that no additional monthly invoices will be submitted by the Contractor for payment.
 - .2 The “Conditional Letter of Acceptance” with all “Punch List Items” completed indicating that Owner is approving the Release of Retainage.
 - .3 When applicable, the “Recapitulation Change Order” reconciling all Pay Item Quantities. Recapitulation Change Orders exceeding \$100,000 positive or negative are subject to formal Board of Trustee approval.
 - .4 The “Contractor Certification” provided for herein indicating that all subcontractors and suppliers have been paid.

- .5 The "Consent of Surety" provided for herein indicating the Bonding Agent's approval to remit all retainage directly to the Contractor.
- .6 When applicable, the "TWDB Certificate of Approval & Release of Retainage" letter indicating Texas Water Development Board's approval to remit all retainage directly to the Contractor.

9.2 PARTIAL ACCEPTANCE by Owner for beneficial occupancy of any completed part of the Work, which has specifically been identified in the Contract Documents as being eligible for early Owner Acceptance, or which Owner, Engineer and/or Consultant and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to completion of the total Work identified in the Contract Documents, subject to the following:

- .1 Owner may at any time request Contractor in writing to permit Owner to beneficially occupy any such part of the Work which Owner believes to be ready for its intended use. If Contractor agrees, Contractor will certify to Owner and Consultant that said part of the Work is substantially complete and request the Owner to issue a Conditional Letter of Acceptance, for only that part of the Work. Within a reasonable time after such request, Owner, Contractor, Engineer and/or Consultant shall make an inspection of the said part of the Work to determine its status of completion. Warranties (as provided under Article 9.3) on that part of the Work beneficially occupied by Owner will commence upon issuance of the Conditional Letter of Acceptance. Any Work items remaining to be completed as defined in the Conditional Letter of Acceptance for the said part of the Work will have warranty commencement upon completion and Final Acceptance by Owner.
- .2 Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the Work although it is not Substantially Complete. A copy of such request will be sent to the Engineer and within a reasonable time thereafter, Owner, Contractor, and Engineer and/or Consultant, shall make an inspection of that part of the Work affected by the request to determine its status of completion and will jointly prepare a list of the items remaining to be completed or corrected issuance of a Conditional Letter of Acceptance. If Contractor does not agree that said part of the Work is ready for separate operation by Owner or that separate operation by Owner will not significantly interfere with Contractor's remaining operations, the Contractor must submit their objections and appropriate justifications in writing to the Owner and Engineer and/or Consultant within 5 days of the request by the Owner. Once any objections have been addressed or if there are no objections, the Owner will finalize a list of items to be completed or corrected and will deliver such list to Contractor together with a written recommendation as to the division of responsibilities pending issuance of the Conditional Letter of Acceptance with respect to security, operation, safety, maintenance, warranties, utilities, insurance, and retainage for that part of the Work taken over for operation by Owner. During such operation, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

9.3 Correction Period/Warranty - During a period of twenty four (24) months from and after the date of the Conditional Letter of Acceptance, the Contractor shall make all needed repairs arising out of defective workmanship or materials, or both, which in the judgment of the Owner shall become necessary during such period. The Owner shall notify and submit a "Performance Claim Form", which will be completed by the Owner and details the location and nature of needed repairs, to the Contractor. The Contractor shall submit a schedule for inspection and completion of said repairs within three (3) days after the notification of the warranty repairs to be approved by the Owner. If within three (3) days after the receipt of a notice in writing from the Owner, the Contractor shall neglect to make or to undertake with due diligence the aforesaid repairs, the Owner is hereby authorized to make demand of performance from the company issuing the Performance Bond. If the Contractor fails to complete the repairs within the approved schedule, the Owner is hereby authorized to make demand of performance from the company issuing the Performance Bond. In case of an emergency where, in the judgment of the Owner, delay would cause a serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

ARTICLE X. DISPUTES:

- 10.1 GENERAL - Prior to any anticipated litigation between the Owner and the Contractor, both hereby agree that disputed matters shall first be submitted to Owner administrative appellate procedures as described below:
- .1 Except as otherwise provided in this Contract, any dispute concerning a question of fact arising under this Contract which is not disposed of by mutual agreement shall be initially decided by the Owner (as represented by the decision of the Owner) who shall reduce his decision to writing and promptly mail or otherwise furnish a copy thereof to the Contractor. The decision of the Owner shall be final and conclusive unless within thirty (30) calendar days from the date of issuance of such decision by Owner the Contractor mails or otherwise furnishes to the Owner a written notice of appeal addressed to the SAWS President/C.E.O., whose appellate decision on behalf of the SAWS shall be the final and conclusive SAWS decision. In connection with any appeal under this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of the appeal to persons to be promptly appointed by the SAWS President/C.E.O. to review such disputed matters. The SAWS department sponsoring the Project or any other Owner's representative will also be allowed to present information supporting Owner's position.
 - .2 Pending final President/C.E.O. decision after a dispute hearing, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the President/C.E.O. decision. Neither the SAWS nor the Contractor is precluded from resorting to litigation or other remedy at law nor in equity to perfect a legal filing prior to the expiration of an applicable statute of limitations or after this Owner administrative review process is completed.
- 10.2 PREVAILING PARTY. In any dispute arising under this Agreement, the following shall apply in the determination of which party is the prevailing party. If a party claiming a right to payment of an amount in dispute is awarded all or substantially all of such disputed amount, then such claiming party shall be the prevailing party. If a party defending against such claim is found to be not liable to pay all or substantially all of the disputed amounts claimed by the claiming party, then the party so defending against such claim shall be the prevailing party. If both Parties prevail with respect to different claims by each of them, then the party who is prevailing with respect to the substantially greater monetary sum shall be deemed the prevailing party; otherwise, if both Parties prevail with respect to monetary sums on different claims, neither of which sums is substantially greater than the other, the tribunal having jurisdiction over the controversy, claims or actions shall in rendering the award determine in its discretion whether and to what extent either party should be entitled to recover any portion of its attorney fees. The Prevailing Party shall be entitled to recover reasonable attorney fees and costs.

ARTICLE XI. SUPPLEMENTAL AND SPECIAL CONDITIONS:

- 11.1 GENERAL - When the Work contemplated by the Owner is of such a character that the foregoing Standard General Conditions of the Contract cannot adequately cover necessary and additional contractual provisions, the Contract Documents may include Supplemental and Special Conditions as described below:
- .1 SUPPLEMENTAL CONDITIONS shall describe any additional procedures and requirements of Contract administration to be followed by the Contractor, Owner, and Owner representatives. Supplemental Conditions may expand upon matters covered by the Standard General Conditions, where necessary.
 - .2 SPECIAL CONDITIONS shall relate to terms, conditions and procedures related to a specific project and that are unique to that project.
- 11.2 ARCHAEOLOGICAL - "Unidentified Archaeological Sites": If the Contractor should encounter archaeological deposits during construction operations, the Contractor must stop excavation immediately and contact the Owner, who will then contact appropriate agencies for an archaeological investigation. The Contractor cannot begin excavation again in this area without written permission from the Owner.

- 11.3 FUNDED PROJECTS - On State or Federally funded projects, the Owner may waive, suspend, or modify any Article in these General Conditions which conflicts with any State or Federal statute, rule, regulation or procedure, where such waiver, suspension, or modification is essential to receipt by the Owner of such State or Federal funds for the Project. In the case of any project financed in whole or in part by State or Federal funds, any Contract standards or provisions required by the enabling State or Federal statute, or any State or Federal rules, regulations or procedures adopted pursuant thereto that conflict with, or preempt these local Standard General Conditions, shall be controlling.

ARTICLE XII. RIGHT TO AUDIT CLAUSE:

- 12.1 By execution of the Construction Contract, the Contractor grants the Owner the right to audit, at the Owner's election, all of the Contractor's records and billings relating to the performance of the Work under the Contract Documents. The Contractor agrees to retain its Project records for a minimum of three (3) years following completion of the Work. The Owner agrees that it will exercise the right to audit only at reasonable hours. Any payment, settlement, satisfaction, or release provided under this Contract shall be subject to the Owner's rights as may be disclosed by any audit.

ARTICLE XIII. VENUE:

This Contract is performed in Bexar County, Texas, and if legal action is necessary to enforce this Contract, exclusive venue shall lie in Bexar County, Texas.

- END -

CONTRACT

Contract No
20-8610

STATE OF TEXAS §
COUNTY OF BEXAR §

KNOW ALL MEN BY THESE PRESENTS:

That this Agreement made and entered into this «Board Date» day of «Board Month», A.D.,«Board Year», by and between **THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES**, hereinafter called **THE SAN ANTONIO WATER SYSTEM, COUNTY OF BEXAR, STATE OF TEXAS**, Acting through its Contracting Officer, First Party, hereinafter termed the Owner, and «Company Name», of the City of «City», County of «County», State of «State », Second Party, hereinafter termed the Contractor.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned to be made and performed by said First Party, (Owner), the said Second Party, (Contractor), hereby agrees with the First Party to commence and complete the construction of certain improvements in the amount of «Written Contract Amt» Dollars «Formatted Price», for the San Antonio Water System Job No(s). «Bid Opening Date», dated «Bid Opening Date», the same being designated as San Antonio Water System Project Water Resources Integration Program Phase 2 – Pipeline Segments 2C and 3.

The Contractor shall perform all work shown on the Plans and described Specifications and shall meet all requirements of this Agreement, The General and Special Conditions of the Agreement; and such Orders and Agreements for Extra Work as may subsequently be entered by the above named parties to this Agreement.

The Contractor shall not offer, confer, or agree to confer any benefit or gift to any San Antonio Water System employee and Water System employees are prohibited from soliciting, accepting or agreeing to accept any gifts from outside sources; please see Section M. – Gifts or Benefits of the Water System’s Code of Ethical Standards. Section M of the Water System’s Code of Ethical Standards regarding Gifts or Benefits is available on the SAWS Business Center website.

The Contractor hereby agrees to commence work under this Contract on the date indicated in the SAWS written Authorization to Proceed. Under no circumstances shall the work commence prior to the Contractor's receipt of SAWS issued, written Authorization to Proceed. Computation of Contract Time will begin on the construction start date as indicated on the written Authorization to Proceed. All work specified in these Contract Documents shall be completed within 720 calendar days from the construction start date indicated on the written Authorization to Proceed.

It is agreed and understood by the Owner and the Contractor that the provisions of Chapter 252, Texas Local Government Code, and/or Chapter 2269, Texas Government Code (as amended) apply to this contract. As applicable, the terms of the aforementioned state law are incorporated herein by reference. Contractor and Owner agree that pursuant to state law, Owner authorizes its duly designated administrative officer (Contracting Officer) to negotiate change orders up to and including the amount of \$100,000.00. It is also agreed and understood that any change orders which increase the cost of the work provided under the contract in excess of 25% of the original contract price are prohibited. The cost of the work provided under the contract may be decreased over 25% of the original contract price with the consent of the Contractor.

The Owner agrees to pay the Contractor in current funds, and to make payments on account, for the performance of the work in accordance with the Contract, at the prices set forth in the Contractor's Proposal, subject to additions and deductions, all as provided in the General Conditions of the Agreement.

The following documents, together with this Contract, comprise the Agreement, and they are as fully a part thereof as if herein repeated in full:

The Invitation to Bidders or Invitation for Competitive Sealed Proposals
The Instructions to Bidders or Instructions to Respondents
The Supplementary Instructions to Respondents (if applicable)
The Bid Proposal or Price Proposal
The Payment Bond
The Performance Bond
The General Conditions of the Contract
The Special Conditions of the Contract
The Supplemental Conditions of the Contract
The Construction Specifications
The Standard Drawings
Addenda
Change Orders
Good Faith Effort Plan

The Plans, designated San Antonio Water System Project 20-8610; Water Resources Integration Program Phase 2 – Pipeline Segments 2C and 3.

In witness thereof of the Parties of these presents have executed this Agreement in the year and day of first above written.

The individuals executing this Contract each represent and warrant to the other party that he/she has full authority to execute this Contract on behalf of his/her respective party.

**SAN ANTONIO WATER SYSTEM BOARD
OF TRUSTEES, OWNER**

By _____
«Contracting_Director»
Director - Contracting

Date: _____

By _____
Contractor

By _____
(Signature)

(Print/Type Name)

Title _____

Date: _____

STATUTORY PERFORMANCE BOND
Pursuant to Vernon's Texas Government Code
Title 10, Chapter 2253, as amended

Bond No. _____

(Penalty of this Bond must be 100% of Contract Award)

KNOW ALL MEN BY THESE PRESENTS:

That «Company Name» «Street Address» «City and State» «Zip Code» (hereinafter called "Principal"), as Principal, and «Surety Name», a Corporation organized and existing under the laws of the State of «Suretys State », with its principal office in the City of «City of Suretys Principal Office», and authorized under the laws of the State of Texas to act as surety on bonds for principals (hereinafter called "Surety"), are held and firmly bound unto THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES, San Antonio, Bexar County, Texas (hereinafter called "Owner/Obligee"), in the amount of «Written Contract Amt». Dollars «Formatted Price», for the payment whereof, Principal and Surety firmly bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, Principal has entered into a certain written contract with the Owner/Obligee, dated the «Board Date» day of «Board Month», «Board Year», consisting of 20-8610: Water Resources Integration Program Phase 2 – Pipeline Segments 2C and 3 (hereinafter called "the Contract"), which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if Principal shall faithfully perform the work in accordance with the plans, specifications and Contract Documents, then this obligation shall be void; otherwise to remain in full force and effect.

NOW, THEREFORE, if Principal shall repair any and all defects in said work occasioned by and resulting from defect in materials furnished by, or workmanship of, Principal in performance of the work covered by the Contract, occurring during a period of within 24 months from the date of the Contract Completion Certification, therein this obligation shall be null and void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 10, Chapter 2253, as amended, of the Texas Government Code, and all liabilities on this bond shall be determined in accordance with the provisions of this Chapter, to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, or other waiver or amendment of the terms of the Contract or to the work to be performed thereunder, nor any change in the method nor any change in the method or amount of payments stipulated to be made by Owner/Obligee under the Contract, shall relieve Surety of its obligations hereunder, and Surety hereby waives notice of any such change, extension of time, waiver or amendment of the terms of the Contract or to the work to be performed thereunder. The bond shall be automatically extended in time, without formal and separate amendment, to cover full and faithful performance of the Contract in the event of modification of the Contract, regardless of the length of time involved.

IN WITNESS THEREOF, Principal and Surety have signed and sealed this instrument on _____ day of _____, 2019.

Principal

Surety

By _____

By _____

Title _____

Title _____

Address _____

Address _____

Name, Address and Telephone Number of Resident Agent of Surety:

STATUTORY PAYMENT BOND
Pursuant to Vernon's Texas Government Code
Title 10, Chapter 2253, as amended

Bond No. _____

(Penalty of this Bond must be 100% of Contract Award)

KNOW ALL MEN BY THESE PRESENTS:

That «Company Name»«Street Address»«City and State»«Zip Code» (hereinafter called "Principal"), as Principal, and «Surety Name», a corporation organized and existing under the laws of the State of «Surety's State », with its principal office in the City of «City of Surety's Principal Office», and authorized under the laws of the State of Texas to act as surety on bonds for principals (hereinafter called "Surety"), are held and firmly bound unto THE SAN ANTONIO WATER SYSTEM BOARD OF TRUSTEES, San Antonio, Bexar County, Texas (hereinafter called "Owner/Obligee"), in the amount «Written Contract Amt» Dollars «Formatted Price», for the payment whereof, Principal and Surety firmly bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, Principal has entered into a certain written contract with the Owner/Obligee, dated the «Board Date» day of «Board Month», «Board Year» consisting of 20-8610; Water Resources Integration Program Phase 2 – Pipeline Segments 2C and 3 (hereinafter called "the Contract"), which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if Principal shall faithfully pay in full all claimants supplying labor and material to Principal or to a subcontractor in the prosecution of the work provided for in the terms of the Contract Documents, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 10, Chapter 2253, as amended, of the Texas Government Code, and all liabilities on this bond shall be determined in accordance with the provisions of this Chapter, to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no change, extension of time, or other waiver or amendment of the terms of the Contract or to the work thereunder, nor any change in the method nor any change in the method or amount of payments stipulated to be made by Owner/Obligee under the Contract, shall relieve Surety of its obligations hereunder, and Surety hereby waives notice of any such change, extension of time, waiver or amendment of the terms of the Contract or to the work thereunder. The bond shall be automatically extended in time, without formal and separate amendment, to cover full and faithful performance of the Contract in the event of modification of the Contract, regardless of the length of time involved.

IN WITNESS THEREOF, Principal and Surety have signed and sealed this instrument on the _____ day of _____, 2019.

Principal

Surety

By _____

By _____

Title _____

Title _____

Address _____

Address _____

Name, Address and Telephone Number of Resident Agent of Surety:

EXHIBIT B

ADMINISTRATIVE AND OPERATIONAL PROCEDURES FOR CONTRACTOR BID SUSPENSION HEARINGS AND APPEALS

I. SCOPE

These Administrative and Operational Procedures for Contractor Bid Suspension Hearings and Appeals apply to all contractors awarded contracts with SAWS.

The term “contractor” as used in these Procedures means a construction contractor, subcontractor, vendor, supplier, materialman or any other person or entity supplying labor or material to SAWS on a contract basis.

"SAWS Management Officials" means SAWS personnel who are at the Manager level or above and who are involved in the supervision, review or acceptance of services, work or materials provided by contractors under contract with SAWS.

II. GENERAL PROCEDURES

A. If a SAWS Management Official determines that a particular contractor's responsiveness, capabilities or performance under one or more SAWS contracts is unsatisfactory, the SAWS Management Official may file a complaint with the Chief Operating Officer recommending that the particular contractor be suspended from consideration for award of contracts with SAWS. A complaint may not be filed unless:

- 1) SAWS has sent the contractor at least three letters advising that the contractor is in non-compliance with a contract with SAWS, and the letters each include a warning that further defaults or breaches may lead to a suspension; or
- 2) the contractor has had a previous contract with SAWS terminated for contractor default; or
- 3) either the City of San Antonio or the State of Texas has suspended the contractor.

B. A SAWS Management Official filing a complaint will provide the Contracting Committee with any information he or she may have relating to the Reasons for Contractor Suspension as described in Section 4.9, Contractor Bid Suspension Policy of the General Conditions.

- C. SAWS will maintain the materials relating to any and all complaints filed against a particular contractor in a “complaint file” pertaining to the contractor.
- D. A contractor may be suspended if the contractor is determined by the Contracting Committee to be not sufficiently responsible to warrant consideration for award of contracts with SAWS.

III. RIGHTS AT HEARING

A hearing on a complaint will be held before a Contracting Committee which will review the evidence presented at the hearing and make a determination as to whether the contractor should be suspended. The Committee will select a chair to preside at the hearing. At the hearing, SAWS and the contractor will each have the following rights and opportunities:

- A. to be heard before an impartial committee;
- B. to be represented by an attorney or a representative of choice;
- C. to hear the witnesses and other evidence presented by the opposing party;
- D. to cross-examine adverse witnesses;
- E. to testify on one’s own behalf;
- F. to present witnesses and other evidence on one's own behalf;
- G. to have a record of the hearing made, by transcript, tape, or otherwise;
- H. to have all testimony presented under oath.

IV. COMMITTEE PROCESS

- A. The President/Chief Executive Officer of SAWS shall appoint a standing Contracting Committee comprising of SAWS staff. At least one Committee member will be a Vice President of SAWS and all other Committee members will be Managers or higher. If a standing Contracting Committee member has been involved in the day-to-day administration or supervision of a contract with a contractor being reviewed by the Committee, such Committee member will not serve on the Committee with regard to a complaint or appeal affecting that contractor. The President/CEO may either appoint a substitute or the Committee may proceed with fewer members, but in no event will there be less than three members available at any Committee meeting to hear evidence or take action on a complaint or appeal. The members of the Committee

hearing the complaint will be SAWS Management Officials not directly involved with the contractor being considered for bid suspension.

- B. When a SAWS Management Official submits a complaint to the Chief Operating Officer, the Chief Operating Officer will review the complaint to determine whether to convene the Contracting Committee to hear and act on the complaint. The Committee will be convened on a case-by-case basis.
- C. The Contracting Committee will review evidence, obtain testimony from witnesses, deliberate and vote on the matters brought before the Committee. The Committee will consider (i) all evidence in the complaint file pertaining to the contractor and any previously filed complaints and (ii) any other relevant evidence pertaining to the contractor, including evidence presented by SAWS Management Officials familiar with the contractor's performance.
- D. After considering all relevant evidence, the Contracting Committee will either:
 - 1) take no action other than sending a written warning notice by certified mail, return receipt requested, to the contractor (i) indicating that pursuant to these procedures, the Committee has received a complaint regarding the contractor, (ii) indicating that after reviewing the complaint and related evidence, the Committee has decided, at this time, to take no action regarding the contractor, and (iii) including any other information that the Committee, in its discretion, deems appropriate; or
 - 2) pursuant to these procedures, suspend the contractor from consideration for awards of contracts with SAWS.
- E. If the Contracting Committee decides to suspend the contractor, the Committee will send written notice as described in General Conditions, Section 4.7, Contractor Bid Suspension Policy, indicating the following:
 - 1) that, pursuant to these procedures, the contractor has been suspended from consideration for award of contracts with SAWS;
 - 2) in general terms, the reasons for the suspension;
 - 3) that the suspension commences upon issuance of the notice of suspension;
 - 4) the length of time and other relevant terms of the suspension as delineated in these procedures;

- 5) that bids or proposals will not be accepted or solicited from the contractor, and if they are received, they will not be opened and considered for award during the suspension period; and
- 6) the Contractor's right to appeal the suspension pursuant to these procedures.

V. PROCEDURE AT HEARING

The procedure described below will be followed in a general sense. The Contracting Committee may vary these procedures when necessary because of circumstances.

A. Copies of Exhibits

Whenever possible, the party wishing to introduce exhibits should make sufficient copies ahead of time. This will prevent interruptions and delays of the proceedings. Generally, in addition to those to be used by the party and the witness, copies will be made available to each of the Committee members, one for the official record and one for the representative of the other party.

B. Order of Presentation

- After the beginning formalities, each party will be allowed an opportunity to make a brief introductory statement.
- Initially, SAWS will present the evidence it believes warrants the suspension. As each witness is called, the contractor or the contractor's attorney/representative will have the right to cross-examine the witness after the witness has testified and before the next witness is called. The contractor or the contractor's attorney/representative may object to testimony and exhibits.
- After the presentation of SAWS' evidence, the contractor may present evidence, including his or her own testimony and that of others. As each witness is called, SAWS will have the right to cross-examine each witness after the witness has testified and before the next witness is called. A SAWS Management Official may object to testimony and exhibits.
- After the contractor has presented his/her case, SAWS may recall witnesses and present additional witnesses or evidence, again subject to cross-examination and objections. After this, the contractor may recall witnesses and present additional witnesses or evidence, also subject to cross-examination and objections.
- Each party may be allowed additional time to present further rebuttal evidence.

- After the presentation of the evidence, and before the close of the hearing, each party will have the opportunity to give a brief closing argument or summary of his/her position. The Committee may limit the time available to each of the parties depending on the amount of evidence, issues, or other circumstances the Committee deems appropriate.
- The Committee will ensure the orderly and efficient presentation of the evidence.
- The Committee will rule on any objection to testimony or other evidence.
- The Committee will have the right to prevent any threatening or abusive language or conduct and to exclude witnesses who engage in conduct that is disruptive of the proceedings.
- Stipulations (i.e., agreements between all affected parties) which expedite the proceedings are highly favored. Therefore, both SAWS and the contractor are encouraged to reach agreements regarding the admissibility of documents and the proposed testimony of witnesses. Where both SAWS and the contractor (or his/her attorney/representative) have agreed in writing or “on the record,” affidavits of absent witnesses may be introduced.
- All testimony will be under oath. The Committee chair or his/her designee will administer the oaths.
- In its discretion, the Committee may limit or exclude testimony that is superfluous or irrelevant.
- The Committee will utilize its discretion regarding the amount of time allowed for each proceeding and will have the authority to make decisions that will expedite the proceedings.
- In the Committee's discretion, Committee members may ask questions of any witness or party when they believe clarification or further information is needed.
- Unless testifying as an expert, no witness may testify unless he or she has personal knowledge regarding the issues, events, and matters relevant to the hearing.
- The Committee may exclude or limit witnesses who do not have personal knowledge regarding the issues, events, and matters relevant to the hearing.
- The Committee may take other appropriate action when the contractor fails to attend the hearing.

VI. POSTPONEMENTS

Postponements are not favored. However, where emergency circumstances are beyond the control of the contractor, the Contracting Committee will consider postponing the hearing. There will be no guarantee that a second postponement will be granted.

VII. SUSPENSIONS

- A. If the contractor has not been previously suspended pursuant to these procedures, the term of the suspension will be for one year from the date of issuance of the notice of suspension.
- B. If the contractor has been previously suspended pursuant to these procedures, the term of the suspension will be for two years from the date of issuance of the notice of suspension.
- C. After the suspension period is over, the contractor may resume submitting bids for SAWS contracts, provided, however, that initially SAWS will award no more than one contract to the suspended contractor. Only after the satisfactory completion of such contract will SAWS resume considering the award of multiple contracts to the contractor. The period of time after the suspension period is over but before SAWS will consider awarding multiple contracts to the contractor is referred to as the “post-suspension period.” The purpose of the post-suspension period is to provide SAWS an opportunity to confirm that the contractor has demonstrated a satisfactory level of responsibility to warrant the award of further SAWS contracts.
- D. Unless the Contracting Committee, in its sole discretion, decides otherwise, during the suspension period and the post-suspension period the contractor may not provide SAWS with labor or materials as a contractor or a subcontractor through another contractor. (This provision does not apply to the single contract that may be awarded to the contractor by SAWS during the post-suspension period or to any contracts or subcontracts in effect prior to the issuance of the notice of suspension.)
- E. If another contractor (“other contractor”) hires a suspended contractor to provide labor or material on a SAWS project while the contractor is suspended from SAWS work, SAWS may notify the other contractor that he or she has 30 days in which to remove the suspended contractor from the SAWS project. If the other contractor does not remove the suspended contractor from the SAWS project within thirty (30) days, SAWS may either (i) reject the portion of the other contractor’s work performed by the suspended contractor because it was performed by a suspended contractor, or (ii) immediately terminate the other contractor’s contract for the project.

Continued use of a suspended contractor after the thirty (30) day notice and cure period will be an event of default under any contract the other contractor has with SAWS under which the suspended contractor provides labor and/or materials.

- F. Notwithstanding the foregoing, a suspended contractor may provide equipment to SAWS as a subcontractor through another contractor, unless the Contracting Committee, in its sole discretion, decides otherwise. In addition, any contractor may hire employees of a suspended contractor as its employees and use them on a SAWS project.
- G. Unless the Contracting Committee, in its sole discretion, decides otherwise, if one or more of the former principal officers or owners of a suspended contractor forms a new business entity or joins a different business entity, or if the suspended contractor is reconstituted as or made a part of a new or different business entity by any means, the terms of the suspension will apply to the new or different business entity as if the new or different business entity were one and the same as the suspended contractor.
- H. All bids for contracts submitted to SAWS by the contractor prior to the issuance of the notice of suspension and all contracts existing between SAWS and the contractor prior to the issuance of the notice of suspension will remain valid and effective on their own accord regardless of the suspension. Notwithstanding the suspension, both SAWS and the contractor will remain obligated to perform all duties owed one another pursuant to any contracts or subcontracts in effect prior to the issuance of the notice of suspension.

VIII. APPEALS

- A. A suspended contractor may request an appeal hearing regarding the suspension, provided such request is received in writing by the Contracting Committee within ten (10) days after the contractor has received notice of the suspension. If no written request for an appeal hearing is received by the Committee within such ten (10) day period, then the decision to suspend will be final and conclusive.
- B. If an appeal hearing is requested, the Contracting Committee will schedule the appeal hearing to be held within ten (10) days after it receives the written request. The Committee will send the contractor written notice by certified mail, return receipt requested, of the time and place of the hearing.
- C. Both SAWS and the contractor will be allowed to request only one postponement of the appeal hearing. Any such request must be in writing and received by the other party at least five days before the originally scheduled date of the appeal hearing. In the event of a postponement, the Contracting Committee will reschedule the appeal hearing to be held within ten (10) days

of the date that the request for postponement was received. The Committee will send the contractor written notice by certified mail, return receipt requested, of the time and place of the rescheduled hearing.

- D. Appeal hearings will be as informal as reasonable and appropriate under the circumstances. Appeal hearings are intended to be a forum for the contractor to express to the Contracting Committee why the contractor should not be suspended and they are not to be adversarial in nature. A verbatim record is not required.
- E. The contractor may be represented by counsel at the appeal hearing.
- F. Within ten (10) days of the appeal hearing, the Contracting Committee will send the contractor written notice by certified mail, return receipt requested, of its final decision on the matter.
- G. If the Contracting Committee upholds the suspension, the contractor may request review of the decision by the President/Chief Executive Officer of SAWS by filing a written request for review with the President/CEO within ten (10) days of the date of the notice of the result of the appeal hearing. The President/CEO will review the material available from the appeal and meet with the contractor and the Committee either separately or jointly as he or she elects. The President/CEO will then send written notice of his/her decision on the suspension by certified mail, return receipt requested, to the contractor within fifteen (15) days of the date of receiving the request for review by the President/CEO.
- H. Only if the contractor has pursued both appeals and the Contracting Committee and the President/CEO have both upheld the suspension may the contractor seek further recourse by filing suit in an appropriate court of law. Any such suit must be filed within 180 days after the contractor has received notice of the President/CEO's final determination upholding the suspension. After such 180 day limitation period has elapsed, the contractor will be barred from seeking recourse in a court of law regarding the suspension. Such 180 day limitation period is necessary for SAWS to effectively administer the contracts to which it is a party. The 180 day limitation period applies only to the contractor's appeal of suspension and will not affect the obligations or rights of any party under a contract with regard to contract obligations and rights.
- I. The suspension and all other relevant provisions herein will remain in effect throughout any appeals process.
- J. For purposes of determining time periods, notices of appeal and requests for review by the President/CEO will be deemed filed when received by SAWS, and notices of decisions will be deemed given when deposited in the U.S.

Mail, certified mail, return receipt requested, addressed to the contractor at the address given on the notice of appeal or the contractor's last contract with SAWS.

Exhibit C

SECURITY PROCEDURES

If work will be conducted on SAWS property, on SAWS infrastructure, on a SAWS customer's property, or involve any SAWS networks, or any SAWS facility, the Contractor shall provide background screening information of their employees and sub-contractors to CastleBranch, the SAWS-approved vendor of background screening services, at sawsbackgroundcheck@castlebranch.com. Any person found to have an unacceptable background check will not be allowed to perform work under this Contract (however, at SAWS's sole discretion, a waiver may be given by SAWS Security for an unacceptable finding, provided that it must first be approved and signed off on by the Director of SAWS Security). Any sub-contractors performing work must also receive a background screening by CastleBranch. Contractor shall be responsible for the accuracy of information on the background screening information sent to sawsbackgroundcheck@castlebranch.com. For further questions about background screening, call CastleBranch at 910-679-2979 or 888-723-4263 ext. 7857 and advise them the Contractor is working for SAWS. Once background screening is approved by SAWS Security, Contractor must also complete a Project Contractor Data Form ("PCDF"). The PCDF will be sent to securitygroup@saws.org. The PCDF is required for the Contractor and its sub-contractors to receive the required badges and parking tags necessary to fulfill the work under this Contract. The PCDF must be sent electronically to securitygroup@saws.org.

Each employee and agent of Contractor shall obtain a SAWS photo identification badge (a "Contractor's Badge") and parking tag prior to any work on SAWS property or asset, which shall be used only for purposes necessary to perform the work under this Contract. SAWS Badge Office hours are Monday, Wednesday and Friday from 9:00am to 12:00pm, excluding SAWS holidays (hours are subject to change). SAWS Security staff can be contacted at (210) 233-3177 or (210) 233-3338. Once the Project is completed, the Contractor shall return all Contractor Badges and parking tags to the Security Office. A Contractor who does not return the Contractor Badges or parking tags is not in compliance with these procedures.

SAWS facilities require a SAWS employee to physically escort the Contractor at all times. SAWS may, at its sole discretion, waive the escort requirements if the PCDF and a "clean" background screening from CastleBranch are approved. Waiver of the escort requirement shall only be through a written correspondence to Contractor from SAWS Security.

Sub-contractors must always be under escort of Contractor while performing work on any SAWS property or asset. Sub-contractors must display the Contractor's Badge at all times while working on any SAWS property or asset. Sub-contractors are required to complete a background screening and be listed on the PCDF regardless of receiving a Contractor's Badge. The Contractor is solely responsible for the actions of its employees, agents, sub-contractors and consultants.

Contractor shall advise their SAWS Project Manager/Inspector of any employee terminations or changes to personnel performing work under this Contract, and the Contractor shall immediately turn in any and all Contractor's Badges and/or parking tags of employees or agents who are terminated or no longer performing work under this Contract. If Contractor becomes aware of any changes in the information contained in the PCDF or the background screening information, Contractor shall immediately notify the SAWS Project Manager/Inspector and provide an updated PCDF to securitygroup@saws.org and background screening information to sawsbackgroundcheck@castlebranch.com.

Contractor is responsible for being in compliance with SAWS Security requirements and for maintaining security of SAWS property, infrastructure, SAWS customer's property, networks, and facilities for the length of the Project. Security incidents must be reported to SAWS Security immediately at (210) 233-3338.

If the Contractor plans to leave the site unsecure or open during the Project, they must provide a SAWS-approved security guard to monitor ingress and egress to the SAWS site.

If Contractor takes any action that diminishes the security of a SAWS site, Contractor will be responsible for providing additional security requirements at its expense. Some examples of additional requirements that SAWS may require include hiring of SAWS approved security guards, temporary fencing, mobile Closed Circuit Television Monitoring trailer(s), or extra lighting. Notwithstanding anything herein to the contrary, any provisions in these Security Procedures that may appear to give SAWS the right to direct Contractor as to details of doing any work under this Contract or to exercise a measure of control over any security measures or such work shall be deemed to mean that Contractor shall follow the desires of SAWS in the results of the work or security measures only.

Advance coordination by Contractor with SAWS Security for these security requirements is necessary to ensure no delays with timely performance of work. Any other provision of this Contract notwithstanding, in the event Contractor fails to comply with SAWS Security requirements, SAWS may, with no penalty, claim of any nature (including but not limited to breach of contract) against SAWS by the Contractor:

- Issue a Work Stoppage Order until the security violation (s) are remedied
- Ask any unidentified or improperly identified person or equipment to leave SAWS site immediately and not return until items or deficiencies are remedied to SAWS's satisfaction.

Request for Taxpayer Identification Number and Certification

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

► Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. ☐ Individual/sole proprietor or single-member LLC ☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. ☐ Other (see instructions) ► _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)
	6 City, state, and ZIP code	
	7 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 generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number									
				-				-	
or									
Employer identification number									
				-					

Part II Certification

Under penalties of perjury, I certify that:

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

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 for Part II, later.

Sign Here	Signature of U.S. person ►	Date ►

General Instructions

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

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. 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, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and 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 under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 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 section 1446 withholding on your share of partnership income.

In the cases below, the following person must give 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.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 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, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% 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, payments made in settlement of payment card and third party network transactions, 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 instructions for Part II 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 *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships*, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

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

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. 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 line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

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

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

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

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

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

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.

If you are a single-member LLC that is disregarded as an entity separate from its owner, 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 *What Name and Number To Give the Requester*, later, 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 SSA 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. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and 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 U.S. 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 item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 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 made in settlement of payment card and third party network transactions, 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), ABLE accounts (under section 529A), 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) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. 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
6. Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee

For this type of account:	Give name and EIN of:
14. 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
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

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 "Business name/disregarded entity" 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*, earlier.

***Note:** The grantor also must provide a Form W-9 to trustee of trust.

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.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, 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.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic 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 property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at spam@uce.gov or report them at www.ftc.gov/complaint. You can contact the FTC at www.ftc.gov/idtheft or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see www.IdentityTheft.gov and Pub. 5027.

Visit www.irs.gov/IdentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and 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. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

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1. **DATE (MM/DD/YYYY)** – this is the date the Certificate is generated;
2. **PRODUCER** – insert the complete name and address of the insurance agency or broker issuing this Certificate; in the adjacent cell (located just to the right of the PRODUCER cell) include CONTACT PERSON's name, office phone, Fax number(s) and e-mail address.
3. **INSURED** – enter the complete legal name and address of the Consulting Firm, the Contractor's Company or the Supplier's Company (to include any dba used);

4. INSURERS AFFORDING COVERAGE

- a. **INSURER A** through **E** – enter the insurance carrier's complete Operating Company name; **or**
- b. **NAIC #** - enter National Association of Insurance Commissioners (5 – digit) insurance carrier ID number.

NOTE:

If the name of the Insurer used cannot be located in the A.M. Best Directory, then the NAIC # will be required.

5. CERTIFICATE NUMBER/REVISION NUMBER

These two data fields, if utilized by the insurance agency or insurance broker, could be used as a quick reference number; SAWS does not require this to be used.

6. COVERAGES

- a. **INSURER Letter (INSR/LTR)** column - place the corresponding letter of the insurance carrier affording coverage by each respective type of insurance coverage;
- b. **TYPE OF INSURANCE:**
 - 1) **GENERAL LIABILITY:**
 - a) **COMMERCIAL GENERAL LIABILITY** – place an "X" in the space provided;
 - b) **OCCUR** (Occurrence based form) - place an "X" in the space provided;

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c) **GEN'L AGGREGATE LIMIT APPLIES PER:**

- For *Construction Contracts* - place an "X" in the box right in front of the word **PROJECT**; **or**
- For all *Other Contracts* - an "X" in the box right in front of either the word **POLICY** **or** **LOCATION** is acceptable.

d) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an "X" whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

"The Automobile Liability, **Commercial General Liability** and Umbrella Liability policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status."

Or use:

"The Automobile Liability, **Commercial General Liability** and Umbrella Liability policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured."

Waiver of Subrogation:

Either use:

The Automobile Liability, **Commercial General Liability** and Workers' Compensation and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of

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San Antonio that requires such status.

Or use:

“The Automobile Liability, **Commercial General Liability**, Workers’ Compensation and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- e) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE** (MM/DD/YYYY), and **POLICY EXPIRATION DATE** (MM/DD/YYYY);
- f) The minimum policy **LIMITS** for the Commercial General Liability coverage are as follows:

\$ 1,000,000.00	Occurrence Limit
2,000,000.00	General Aggregate
1,000,000.00	Products/Completed Operations Aggregate (See NOTE below)
1,000,000.00	Personal and Advertising Injury

NOTE:

The above limits for Products/Completed Operations Aggregate for all Construction Contracts is \$2 million.

2) **AUTOMOBILE LIABILITY:**

- a) Place an “X” in the box in front of each appropriate auto category for which coverage applies.
- b) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

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“The **Automobile Liability**, Commercial General Liability and Umbrella Liability policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status.”

Or use:

“The **Automobile Liability**, Commercial General Liability and Umbrella Liability policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured.”

Waiver of Subrogation:

Either use:

The **Automobile Liability**, Commercial General Liability and Workers’ Compensation and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The **Automobile Liability**, Commercial General Liability, Workers’ Compensation and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- c) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY)**, and **POLICY EXPIRATION DATE (MM/DD/YYYY)**.
- d) The typical minimum limits of liability for bodily injury and property damage **combined** for this line of insurance coverage shall be not less than \$1,000,000.00 each accident.

NOTE:

If the Contractor’s Pollution Liability policy is required and the Contractor’s Pollution Liability policy **is not endorsed** to provide transportation coverage beyond the boundaries of the job site the Commercial/Business Automobile Liability policy must have the CA9948 endorsement (“**Pollution Liability – Broadened Coverage for Covered Autos – Business Auto, Motor Carrier and Truckers Coverage**” forms) - the following statement noting this endorsement shall be placed either in the blank area just below the NON_OWNED AUTOS wording on the Certificate **or** in the **DESCRIPTION OF OPERATIONS** section of the Certificate:

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“Contractor’s Commercial/Business Automobile Liability insurance coverage is endorsed with the CA9948 endorsement to provide transportation coverage beyond the boundaries of the job site.”

Policy must also be endorsed with MCS90 endorsement when hazardous material(s) are being transported.

3) **EXCESS/UMBRELLA LIABILITY** (where applicable):

- a) Coverage form used - place an “X” in the appropriate box that identifies the coverage form under which this Policy is written: **UMBRELLA LIAB** or **EXCESS LIAB**; and
- b) Occurrence or Claims-Made basis - SAWS requires an “X” be placed in the box right in front of the word **OCCUR**;
- c) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

The use of these two columns **alone** does not meet SAWS Insurance Specifications.

SAWS requires the following specific endorsement wording for the Additional Insured and Waiver of Subrogation endorsements, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Additional Insured:

Either use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status.”

Or use:

“The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured.”

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Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and Workers' Compensation and **Umbrella Liability** policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The Automobile Liability, Commercial General Liability, Workers' Compensation and **Umbrella Liability** policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- d) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY),** and **POLICY EXPIRATION DATE (MM/DD/YYYY).**

- e) The minimum limits* of liability for this line of insurance coverage shall be:

\$ 2,000,000.00	<u>Occurrence Limit</u>
2,000,000.00	<u>General Aggregate</u>

*The above limits may vary from \$5 million to \$50 million depending on the degree of and potential for greater liability exposure to SAWS. Check the General Conditions – Special Conditions section of the Bid document for the increased coverage limits.

4) **WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY:**

- a) Answer the Question: ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below.

- b) **ADDL INSR and SUBR WVD** columns:

The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured (which is not required by SAWS) and the Waiver of Subrogation. With this line of coverage “N/A” is already placed in the Additional Insured column on the form.

The use of the Waiver of Subrogation column **alone** does not meet SAWS Insurance Specifications.

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SAWS requires the following specific endorsement wording for only the Waiver of Subrogation endorsement, to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and **Workers' Compensation** and Umbrella Liability policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

“The Automobile Liability, Commercial General Liability, **Workers' Compensation** and Umbrella Liability policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio.”

- c) Enter complete **POLICY NUMBER, POLICY EFFECTIVE DATE (MM/DD/YYYY)**, and **POLICY EXPIRATION DATE (MM/DD/YYYY)**.

- d) **WORKERS' COMPENSATION (“WC”):**

SAWS requires having an “X” entered in the box right in front of the words **WC STATUTORY LIMITS**.

- d) **EMPLOYERS' LIABILITY (“E.L.”):**

The minimum policy limits of liability shall not be less than:

\$ 1,000,000.00	E.L. each Accident
1,000,000.00	E.L. Disease - Each Employee
1,000,000.00	E.L. Disease - Policy Limit

- 5) **Row of blank cells** located immediately below the **WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** row:

- a) This empty slot of spaces is typically used for such lines of coverage as PROFESSIONAL (Engineer's & Architect's E&O) LIABILITY, CONTRACTOR'S POLLUTION LIABILITY, COMMERCIAL CRIME and/or BUILDER'S RISK lines of insurance coverage.

- b) **ADDL INSR and SUBR WVD** columns:

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The two columns labeled **ADDL INSR** and **SUBR WVD** are provided to indicate by a check mark or an “X” whether this line of insurance coverage is endorsed with both the Additional Insured and the Waiver of Subrogation.

Since SAWS does not require the PROFESSIONAL (Engineer’s & Architect’s E&O) LIABILITY, CONTRACTOR’S POLLUTION LIABILITY, COMMERCIAL CRIME and/or BUILDER’S RISK lines of insurance coverage to be endorsed with either of the Additional Insured or the Waiver of Subrogation endorsements, do not place anything in either of the **ADDL INSR** or **SUBR WVD** columns.

- c) Enter complete **POLICY NUMBER**, **POLICY EFFECTIVE DATE** (MM/DD/YYYY), and **POLICY EXPIRATION DATE** (MM/DD/YYYY).
- d) The minimum limits (the per occurrence/claims-reported limit as well as the policy aggregate limit) for whichever TYPE OF INSURANCE coverage you are declaring in this OTHER space must match with or exceed limits stated in the Insurance Specifications/Requirements contained in the respective Construction Bid, RFP or RFQ document.

NOTE:

- 1. If the line of insurance coverage is either for Professional Liability or Contractor’s Pollution Liability, identify in the **DESCRIPTION OF OPERATIONS** section of the Certificate the coverage form under which the respective line of coverage is written – either:
 - a. Claims-made form; **or**
 - b. Occurrence basis.
- 2. In instances where the coverage form used is Claims-made include the “Retro- Active date” according to the following:
 - a. For all contracts requiring Professional Liability and/or Contractor’s Pollution Liability coverage, the “**Retro-Active date**” shall be the Project start date or earlier and must be identified in the **DESCRIPTION OF OPERATIONS** section of the Certificate.
 - b. That date must be maintained (carried forward) as the “**Retro-Active date**” throughout the life of the Project/Contract to include the two-year warranty period (if required) following the close out of the Project/Contract.
- 3. If the Occurrence based coverage form is declared, no further information is required; and

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4. If the Contractor's Pollution Liability insurance coverage is required, the policy shall be endorsed to provide transportation coverage beyond the boundaries of the job site—the following statement noting this endorsement shall be placed in the **DESCRIPTION OF OPERATIONS** section of the Certificate;

“Contractor's Pollution Liability insurance coverage is endorsed to provide transportation coverage beyond the boundaries of the job site.”

If the Contractor's Pollution Liability policy is **not endorsed** to provide transportation coverage beyond the boundaries of the job site then the Commercial/Business Automobile Liability policy must have the CA9948 endorsement (**“Pollution Liability – Broadened Coverage for Covered Autos – Business Auto, Motor Carrier and Truckers Coverage” forms**) - the following statement noting this endorsement shall be placed either in the blank area just below the NON_OWNED AUTOS wording on the Certificate **or** in the **DESCRIPTION OF OPERATIONS** section of the Certificate:

“Contractor's Commercial/Business Automobile Liability insurance coverage is endorsed with the CA9948 endorsement to provide transportation coverage beyond the boundaries of the job site.”

Policy must also be endorsed with MCS90 endorsement when hazardous material(s) are being transported.

**7. DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS
ADDED BY ENDORSEMENT/SPECIAL PROVISIONS**

a. DESCRIPTION OF OPERATIONS:

- 1) Enter in this space the SAWS' Job, Contract and/or Project number such as 09-1111 **or** P-09-011-MR;
- 2) The Project or Contract name may be included but is not required - such as “42” Water Main replacement Maltsberger from Loop 410 to U.S. 281 at Isom Road Engineering Design Project **or** Construct 1 MG Composite Potable Water Elevated Storage Tank.

b. Where applicable or as needed, enter into this section, the DESCRIPTIONS of LOCATIONS, VEHICLES and/or EXCLUSIONS ADDED BY ENDORSEMENT.

c. DESCRIPTION OF SPECIAL PROVISIONS:

SPECIAL PROVISIONS to SAWS would include the wording for the Additional Insured and

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Waiver of Subrogation endorsements, declaring the type of policy coverage under which the Professional and Contractor's Pollution Liability policies are written, 30-day Notice of Cancellation, and other miscellaneous information that may be required; the wording may require a second page to complete.

Special ENDORSEMENT's wording required on the Certificate:

Additional Insured:

Either use:

"The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies include a blanket automatic Additional Insured endorsement that provides additional insured status to the Certificate Holder (SAWS) and the City of San Antonio only when there is a written contract between the named Insured and the Certificate Holder that requires such status."

Or use:

"The Automobile Liability, Commercial General Liability and **Umbrella Liability** policies are endorsed naming the San Antonio Water System and the City of San Antonio as an Additional Insured."

Waiver of Subrogation:

Either use:

The Automobile Liability, Commercial General Liability and Workers' Compensation and **Umbrella Liability** policies include a blanket, automatic Waiver of Subrogation endorsement that provides this feature only when there is a written contract between the named Insured, the Certificate Holder (SAWS) and the City of San Antonio that requires such status.

Or use:

"The Automobile Liability, Commercial General Liability, Workers' Compensation and **Umbrella Liability** policies are endorsed with the Waiver of Subrogation in favor of the San Antonio Water System and the City of San Antonio."

30-day Notice of Cancellation:

"Each of the above described policies is so endorsed requiring SAWS and the City of San Antonio to be provided thirty (30) calendar days, advance written notice of cancellation or non-renewal, and not less than ten (10) calendar days advance written notice for nonpayment of premium."

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8. CERTIFICATE HOLDER

SAWS shall be shown as the Certificate Holder in the Certificate Holder section located in the bottom half of the standard ACORD Certificate forms as follows:

**San Antonio Water System
City of San Antonio
2800 US Hwy 281 N
San Antonio, TX 78212**

9. CANCELLATION

Despite the wording in this section of the Certificate SAWS requires the following wording to be inserted into the **DESCRIPTION OF OPERATIONS** section of the Certificate:

30-day Notice of Cancellation:

“Each of the above described policies is so endorsed requiring SAWS and the City of San Antonio to be provided thirty (30) calendar days, advance written notice of cancellation or non-renewal, and not less than ten (10) calendar days advance written notice for nonpayment of premium.”

10. AUTHORIZED REPRESENTATIVE

The original certificate(s) or form must include at least one of the below acceptable names/signatures:

- a. Agency's Authorized person's (wet or stamped) signature;
- b. Agent's (wet or stamped) signature; or
- c. Agent's typed in name.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	NAIC #	
	INSURER A :	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
INSURER F :		

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE \$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence) \$
							MED EXP (Any one person) \$
							PERSONAL & ADV INJURY \$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE \$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG \$
	OTHER:						\$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident) \$
	☐ ANY AUTO						BODILY INJURY (Per person) \$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS NON-OWNED AUTOS ONLY						BODILY INJURY (Per accident) \$
	☐ HIRED AUTOS ONLY						
	☐ OTHER:						
	UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE \$
	EXCESS LIAB ☐ CLAIMS-MADE						
	DED ☐ RETENTION \$						\$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						☐ PER STATUTE ☐ OTH-ER
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	☐ Y ☐ N	N/A				E.L. EACH ACCIDENT \$
							E.L. DISEASE - EA EMPLOYEE \$
							E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Supplemental Conditions

ARTICLE III – Contract Documents and Bonds

Remove First Sentence of Section 3.3.1 of the general conditions and replace with the following:

RECORD DRAWING – Each month as the Work progresses the Contractor shall formally submit to SAWS, along with the monthly payment application, a set of red line drawings noting work completed during that period.

Remaining section of 3.3.1 shall remain the same.

ARTICLE IV- CONTRACT ADMINISTRATION

Section 4.4 of the general conditions shall be amended to add the following:

CONTRACTORS – The Contractor shall perform the Work with its own organization on at least 40% of the total original contract price to be confirmed by the Bidder on page 1 of the Good Faith Effort Plan.

The term to “perform the Work with its own organization” is defined herein as utilizing only:

- Workers employed and paid directly by the Contractor or a wholly owned subsidiary of the contractor.
- Equipment owned by the contractor or its wholly owned subsidiary.
- Rented or leased equipment operated by the Contractor’s, or its wholly owned subsidiaries, employees.
- For purposes of determining the value of the Work self-performed, the amount shall include all materials incorporated into the Work where the majority of the value of the Work involved in incorporating the material is performed by the Contractor’s own Organization, including wholly owned subsidiary; and
- Labor provided by staff leasing firms licensed under Chapter 91 of the Texas Labor code for non-supervisory personnel if the contractor or wholly owned subsidiary maintains direct control over the labor.

Remove Section 4.6.2.1 in its entirety and replace with the following:

TERMINATION FOR CONVENIENCE - The right to terminate this Contract for the convenience of Owner (including, but not limited to, non-appropriation of funding) expressly is retained by Owner. In the event of a termination for convenience by Owner, Owner shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor’s receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by Owner, in accordance with the terms and provisions of the Contract Documents, an amount

not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the Project site or away from the Project site, as approved in writing by Owner, but not yet paid for and which cannot be returned; and actual, reasonable and documented demobilization costs, if any, paid by Contractor and approved by Owner in connection with the Work in place which is completed as of the date of termination by Owner and that is in conformance with the Contract Documents, less all amounts previously paid for the Work. No amount ever shall be owed or paid to Contractor for lost or anticipated profits on any part of the Work not performed or for consequential damages of any kind or unabsorbed overhead, opportunity costs or other damages as a result of a termination for convenience under this section. In addition, any amount payable to the Contractor pursuant to this section shall be reduced in the amount of (1) any claim Owner may have against the Contractor under this Contract, and (2) the fair value, as determined by Owner, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to Owner, excluding normal spoilage and except to the extent that Owner shall have otherwise expressly assumed the risk of loss with respect to such property hereunder.

Remove Section 4.9.2 of the general conditions and replace with the following:

The Contractor shall not, except upon procuring written consent from proper private parties, enter or occupy with men, tools, materials, or equipment, any privately owned land except for those on easements or rights of entry provided herein by SAWS. Contractor must submit a copy of the written consent from the land owner to SAWS.

The remaining sections of Article IV shall remain the same.

ARTICLE V – CONTRACT RESPONSIBILITIES

Remove Section 5.7.1.1.7.8 in its entirety and replace with the following:

Installation Floater - Physical Damage Insurance which insures SAWS and the City for damages to all Property Purchased for, or Assigned to, the Project commencing on the start date through completion. Policy limits shall be in an amount equal to the total contract cost contracted herewith. The policy form shall be an All Risk form and shall include coverage for both during transit and while stored at the work site.

Insert the following as Section 5.7.4

Riggers Liability – For the Contractor’s work involving the moving, lifting, lowering, rigging or hoisting of property or equipment, Contractor and/or any relevant sub-contractor shall carry Rigger’s Liability Insurance to insure against physical loss or damage to the property or equipment. Policy limits shall be in an amount equal to the total construction cost contracted herewith.

Remove Section 5.11 in its entirety and replace with the following:

EQUAL MATERIALS. The manufacturers and suppliers of materials specifically listed in the Contract Documents shall be provided without exception. After the Contract has been executed,

the CONTRACTOR may submit an “or equal” material to OWNER for review. If OWNER accepts an “or equal” material submitted by the CONTRACTOR, the Contract Sum shall be modified to reflect the change in material cost. OWNER reserves the rights to reject all submitted or equal materials.

The remaining sections of Article V shall remain the same.

ARTICLE VI – CONTRACT CHANGES

6.4 Delete section 6.4 in its entirety.

6.6 Delete section 6.6 in its entirety.

The remaining sections of Article VI shall remain the same.

ARTICLE VIII. - CONTRACT COMPLETION TIME

Section 8.6 Liquidated Damages for Failure to Complete on Time: of the General Conditions shall be amended as follows:

Add the following to the end of the paragraph:

Liquidated Damages, for the purpose of this contract, will be assessed at \$2,100.00 per day.

The remaining sections of Article VIII shall remain the same.

Special Conditions

PROJECT REQUIREMENTS

SC1. The CONTRACTOR shall, to the extent allowed by law, list a landowner or other person or entity with an insurable interest as an additional insured on the Commercial General Liability (CGL) and Commercial/Business Automobile Liability (AL) policy(s) of insurance that CONTRACTOR is required to maintain under this Contract. Landowners shall be added as an additional insured if indicated in the landowner's easement agreement and upon request as needed.

SC2. Time is of the essence on this project. Contractor shall not divert specified Key Personnel or Subcontractors to other projects, without reasonable advance notification to SAWS. No diversion shall be made without the written consent of SAWS. Contractor shall provide detailed written justification for any such diversions, including proposed qualified substitutions, in sufficient detail to permit evaluation of the impact to the project. No diversion shall be made without written Owner approval of the proposed diversion and substitution.

SC3. A Geotechnical Data Report has been developed for SAWS on this project and will be made available to potential Bidders for informational purposes only. SAWS will require the execution of a SAWS disclaimer form by the potential Bidder as a condition of and prior to the release of the report. To complete the disclaimer form electronically and obtain the report, please go to the following link on SAWS website:

http://www.saws.org/business_center/ContractSol/

Find this Project, select 'More', then 'Geotechnical Data Report'.

The Contractor shall hire an independent geotechnical engineering firm to perform field activities as necessary in order to prepare a geotechnical report for the use of the Contractor.

SC4. Communication Protocol

All communication from SAWS to the Contractor shall be through the Contractor's PM and/or Superintendent. Communication to/from the Contractor's subcontractor to SAWS shall be routed through the Contractor. Contact information for SAWS POCs during construction will be provided at the pre-construction meeting.

SC5. Project Signs

Contractor shall provide project signs at points of ingress and egress and at locations designated by the Construction Observer. Signs shall be relocated by the Contractor as work progresses if requested by the Construction Observer.

SC6. Work Area and Easements

- A. The Contractor shall limit construction activities, excluding staging, to 30' to either side of the pipe or as dimensioned on the plans, a 60' clearing width total. No provisions have been made for construction activities or storage of materials and/or equipment on private property. Additional rights of way, storage, staging, access, or other areas required are the sole responsibility of the Contractor to obtain. Prior to utilizing other property for any purpose, the Contractor shall provide landowner and tenant (if applicable) written approval to the inspector for all activities that will be involved on said properties.
- B. Contractor shall install silt fence along the Limits of Construction and shall install a temporary construction fence to contain the active work zone. Areas outside of the Limits of Construction and within the easement can be used for staging purposes. Contractor shall preserve and protect tree canopy and shall restore all property and vegetation to pre-construction conditions unless designated for removal in the contract documents.

SC7. CPS Energy Pole Bracing or Relocation Allowance

- A. Description – The Contractor shall coordinate with the utility company and provide all labor, supervision, tools, equipment, and materials necessary to brace and/or relocate power poles as required to complete work. No contract days will be added due to delays. This allowance shall reimburse Contractor for direct fees incurred for bracing/relocation of power poles. Any unused portion of the allowance will be credited to SAWS by a deduct change order.
- B. Payment – Payment for this item will be made under the allowance included in the bid. If quotes for power pole bracing exceed allowance amount, Contractor shall submit to SAWS and received approval prior to authorizing the work to proceed. Contractor shall provide receipts to SAWS for reimbursement.

SC8. CPS Rectifier Station Power Service Allowance

- A. Description – The Contractor shall coordinate with the utility company and provide all labor, supervision, tools, equipment, and materials necessary to obtain power service from CPS to connect, startup, operate and complete all work for the rectifier stations. No contract days will be added due to delays. This allowance shall reimburse Contractor for direct fees incurred for obtaining power service from the utility company. Any unused portion of the allowance will be credited to the SAWS by a deduct change order.
- B. Payment – Payment for this item will be made under the allowance included in the bid. If quotes for power supply exceed allowance amount, Contractor shall submit to SAWS and received approval prior to authorizing the work to proceed. Contractor shall provide receipts to SAWS for reimbursement.

SC9. Enterprise Gas Crossings (Bandera to S.A.D.F. South Texas-TX150, Line 213 - 24" Gas Line)

- A. Enterprise Gas Lines in the project area are high pressure pipelines. Excavation and/or construction is prohibited without prior written permission from Enterprise Products Operating LLC.
- B. Contractor shall install warning tape in accordance with the American Public Works Association (APWA) Uniform Color Code above the water line 12" below the ground. The tape shall extend at least twenty feet (20') in each direction measured from the crossing point.
- C. Contractor shall notify Enterprise a minimum of 72 business hours prior to crossing gas line with heavy construction equipment. Air bridge matting must be installed to support all heavy construction equipment.
- D. Contractor shall clean up and repair all damages within the Enterprise Easement limits.
- E. Contractor shall notify SAWS at least 60 calendar days prior to conducting any work in the Enterprise Easement.
- F. Contractor shall utilize non-mechanized excavation procedures when excavating within thirty inches (30") of the indicated Enterprise Facilities.

SC10. Right-of-Way

Upon Request, Contractor shall add any affected landowner (e.g., a landowner whose property contains a project easement) as an additional insured party on Contractor's commercial general liability policy, and shall provide to such landowner a policy endorsement reflecting such additional insured status.

SC11. Bexar County Crossings (Cagnon Road, Spurs Ranch Road, Marbach Road, Dodge City Trail, Emory Peak, Dove Canyon, Blue Bell Run, Wiseman Blvd, Cottonwood Way, Military Drive, Westcreek Oaks, Upton Park)

Contractor shall notify SAWS at least 60 days prior to conducting any work in the Bexar County Right-of-Way.

SC12. TxDOT Crossings (Loop 1604, FM 143, US 90, Potranco Road (FM 1957)

Contractor shall notify SAWS at least 60 calendar days prior to conducting any work in the TxDOT Right-of-Way.

SC13. City of San Antonio Tree Permit

- A. Prior to commencement of any activities requiring a tree permit, the Contractor shall schedule an in-field/fencing pre-construction meeting with the City Arborist to review

procedures for protection and management of all significant, heritage or mitigation trees. This can be scheduled with tree fencing inspection.

- B. Call 210-207-1111 to schedule an infield pre-construction & fencing inspection (per Section 35-477 of the UDC, subsection tree permits (5)(C).
- C. It shall be the responsibility of the Contractor to maintain a copy of the approved tree plans, approved tree permit and the conditions of approval imposed by the City Arborist readily available at the site at all times during which authorized work is in progress. All offsite staging, storage, project trailers, employee parking, etc. is required to comply with the terms and conditions of the approved tree permit.
- D. 35-477 (h) Amendments. Notification and approval of the City Arborist are required if changes need to be made to an approved tree preservation plan. Approval of the changes must be received from the City Arborist, in writing, before commencement of any work that is the subject of the change or field adjustment. Failure to comply with this requirements may result in a Stop Work Order, a penalty of \$2,000.00, or both.

SC14. Nationwide Permit

- A. The project is authorized under Nationwide Permit No. 12 for stream crossings and wetland areas. These permits and accompanying requirements are included and made a part of the requirements for this project.
- B. The Contractor shall not disturb more than 1/10th of an acre within the water way and must restore all ground surface elevations to pre-existing conditions. It is the Contractor's responsibility to meet these requirements.

SC15. Buckner Pass Right-of-Way

- A. Contractor shall notify Kith Management Services and SAWS at least 60 calendar days prior to conducting any work in Buckner Pass Right-of-Way.
- B. Contractor shall notify Homeowner's Association (HOA) and SAWS at least 60 calendar days prior to conducting any work in Buckner Pass Right-of-Way. HOA requested SAWS provide FAQ fliers or door hangers to alert nearby homeowners of upcoming construction work.

SC16. Construction Activities Between STA. 2297+10 and STA.2298+89

- A. Contractor shall not perform work between STA. 2297+10 and STA. 2298+89 until 600 days after NTP, unless SAWS provides prior authorization in writing.

SC17. Frederick H. Neumann (P10-240)

- A. Contractor shall provide access to landowners and tenants at all times throughout construction of improvements.

- B. Contractor shall provide notification a minimum of 48 hours in advance before driveway is cut and coordinate with landowner and tenants ingress and egress.
- C. The existing private water line on P10-240, which is crossed by the SAWS' easement, shall remain in service during the construction period.
- D. Contractor shall protect the existing water line during construction and shall employ proper construction methods to minimize the occurrence of damage to the existing private water line.
- E. Any damage done to the private water line caused by the activities of Contractor or its subcontractors shall be promptly remedied and shall be at Contractor's sole responsibility and expense.

SC18. Frederick H. and Margaret L. Neumann (P10-250)

- A. Contractor shall provide access to landowners and tenants at all times throughout construction of the improvements.
- B. Contractor shall provide notification a minimum of 48 hours in advance before driveway is cut and coordinate with landowner and tenants ingress and egress.
- C. The existing private water line on P10-240, which is crossed by the SAWS' easement, shall remain in service during the construction period.
- D. Contractor shall protect the existing water line during construction and shall employ proper construction methods to minimize the occurrence of damage to the existing private water line.
- E. Any damage done to the private water line caused by the activities of contractor or its subcontractors shall be promptly remedied and shall be at Contractor's sole responsibility and expense.

SC19. Waste Management of Texas, Inc. (P10-242)

- A. Contractor shall install two (2) utility trench gas vents, one in the approximate area of the western boundary of the Easement Area and one in the approximate area of the eastern boundary of the Easement Area in substantial accordance with the plans previously provided by Grantor.
- B. Upon completion, the gas vents shall be the property of Grantor and Grantor shall be responsible for maintenance and operation.
- C. Grantor shall provide advance notification to Contractor prior to Grantor entering onto the Easement Area to maintain, operate, repair or replace the gas vents.

- D. Contractor shall repair and replace the utility trench gas vents in the event that the gas vents are damaged due to current or future water line construction by the Contractor.

SC20. Pulte Homes of Texas (P10-309 & P10-318 A-D)

- A. Contractor shall remove all excess materials from the site.
- B. Contractor shall leave land as close as possible to prior existing condition.
- C. Contractor has the right to remove all trees and structures in easement.
- D. Contractor shall refrain from conducting any nuisance activities.
- E. Contractor shall not install nor construct any building or other improvement without Grantors prior written consent except for the construction, reconstruction, addition to and replacement of facilities as provided.

SC21. CDDR Properties (P10-310 & P10-311)

- A. Contractor shall remove all excess materials from the site.
- B. Contractor shall restore ground disturbances by Grantee's use of easement prior to construction.
- C. Contractor must construct water facilities and appurtenances no less than five (5) feet from surface of easement area.
- D. Contractor has the right to remove trees and structures in the easement.
- E. Contractor shall restore roadways, permitted in easement agreement (roadways and reasonable construction related to roadways, excludes buildings or building like structures), as nearly as possible prior to damage due to construction and improvements.

SC22. Milestone Land Investments (P10-322, P10-323, P10-324, P10-325 & P10-289)

- A. Contractor shall remove all excess materials from the site.
- B. Contractor shall leave land as close as possible to prior existing condition.
- C. Contractor has the right to remove all trees and structures in easement.
- D. Grantor reserves the right to enjoy easement provided such use will not interfere with Contractor from exercising the rights granted hereunder.

- E. Contractor may construct, reconstruct, inspect, maintain, operate, across, under, along and through, including upon the surface of the easement areas and Grantee is responsible at its sole expense to immediately return the Easement Area to its condition prior to any work.
- F. Contractor agrees that no work may affect the condition of the easement area.
- G. Contractor agrees that the pipeline will be buried and maintained not less than five (5) feet below the ground elevation of the easement area.
- H. Contractor is allowed prior use of the easement area for construction, maintenance, repair, and replacement of grantees facilities.
- I. Contractor agrees to provide not less than sixty (60) days advance notice of commencement of construction work.
- J. Contractor agrees that all at grade and above ground appurtenances constructed shall be located on that portion of the easement area, being the ten foot (10') wide strip furthest from Highway 1604.
- K. Contractor shall name grantor as an additional insured on commercial general liability policy and to provide certificate of insurance to Grantor.

SC23. Longhorn Seaworld Hotel (P10-326B)

- A. Contractor shall bury and locate such pipeline at a depth of not less than 5 feet subsurface.
- B. Contractor shall install the pipeline by means of boring at or below such depth (rather than trenching).
- C. Contractor shall remove all excess materials from the site.
- D. Contractor shall leave land as close as possible to prior existing condition.
- E. Contractor shall not move or relocate its pipeline within the Easement Area without at least (30) days' prior written notice to Grantor.
- F. Contractor shall use good faith efforts to construct such improvements and conduct all subsequent operations on such easement so as to minimize interference with and damage to Grantor's adjoining property operations.

SC24. Levcal Loop 1604 (P10-329)

- A. Contractor shall construct and maintain all water facilities at SAWS's sole cost and expense and provide Grantor reasonable written notice prior to commencement of

construction except in case of emergency. Additionally, after completion of construction SAWS should use good faith efforts to provide prior notice of entry.

- B. Contractor agrees that water facilities shall be constructed at a depth below the surface of not less than two (2) feet. Grantee may not exercise any right that would cause them or Grantor to be in violation of Grantee's "Tree Preservation Ordinance".
- C. Contractor shall remove all excess materials from the site.
- D. Contractor shall leave land as close as possible to prior existing condition, however. Easement Area shall be re-seeded rather than re-sod.
- E. Contractor shall provide grantor with a schematic showing the location of such water facilities.
- F. Contractor shall keep easement area free from debris and hazards including providing fencing or other barriers surrounding the construction area.
- G. Contractor shall maintain a commercial general liability insurance and/or umbrella insurance in a cumulative amount equal to at least \$5,000,000 per occurrence and covering bodily and personal injury.
- H. Contractor shall provide a certificate of insurance evidencing this coverage prior to the commencement of construction of the water facilities.
- I. Contractor may remove after written notice such portion of Grantor's roads/ sidewalks but must repair any physical damage.

SC25. The Villages of Westcreek HOA (P10-296)

- A. Contractor seeks the rights and benefits necessary for the full enjoyment and use of the rights described herein, together with the right of ingress and egress over the Easement tract for the purpose of construction, reconstructing, realigning, inspecting, patrolling, maintaining, operating, repairing, adding, removing, and/or replacing the facilities.
- B. Contractor has the right to remove all trees and structures in easement.
- C. Contractor shall remove all excess materials from the site.
- D. Contractor shall leave land as close as possible to prior existing condition, including revegetating affected areas of the easement tract with grass to the extent of construction of the facilities damages or destroys existing grass areas.

SC26. Gloria Jean Duhaime (P10-297)

- A. Contractor shall remove all excess materials from site.

- B. Contractor shall leave land as close as possible to prior existing condition.
- C. Contractor has the right to remove all trees and structures in easement.
- D. Contractor shall refrain from construction activities from September 1 to November 15.
- E. Contractor shall provide notification at least at least two weeks prior to commencing work on the property and coordinate with the Owner to ensure the Owner's horseback riding operations are not adversely affected by construction activities.

SC27. Edwynna Tindall (P10-288)

- A. Contractor must remove all excess materials from the site.
- B. Contractor agrees to leave land as close as possible to prior existing condition.
- C. Contractor has the right to remove all trees and structures in easement.

COSA SPECIAL PROVISION 540A

**REVISION TO STANDARD SPECIFICATION
ITEM NO. 540 TEMPORARY EROSION, SEDIMENTATION AND WATER
POLLUTION PREVENTION AND CONTROL**

540.5 MEASUREMENT

REPLACE Section 540.5 with the following section:

1. Measurement of “Temporary Erosion, Sedimentation and Water Pollution Prevention and Control,” complete in place, shall be by the lump sum.

540.6 PAYMENT

REPLACE Section 540.6 with the following section:

1. “Temporary Erosion, Sedimentation and Water Pollution Prevention and Control,” measured as provided above, will be paid for at the contract lump sum bid price, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

-END OF SECTION-

Special Specification

ITEM NO. 100

Mobilization

100.1 DESCRIPTION:

1. This item shall govern the mobilization of personnel, equipment, and supplies at the project site in preparation for beginning work on other contract items that will be performed by the contractor. Mobilization shall include, but is not limited to, the movement of equipment, personnel, material, supplies, etc. to the project site , application fees, permit fees for all necessary permits and the establishment of the contractor's office and other facilities prior to beginning the work. The cost of required insurance and bonds shall be included in this item.
2. Intermediate Demobilization and Remobilization (Open Cut): This item includes all the Contractor's expenses for an Owner-directed intermediate project demobilization of personnel and equipment that occurs after the contract Notice to Proceed has been give and Work has commenced, and the subsequent remobilization of personnel and equipment to complete the Project. Each Intermediate Demobilization and Remobilization shall only be authorized upon a written directive from the Owner. Related Work shall include furnishing all labor, materials, tools, equipment and incidentals required to demobilize for the Project, in accordance with the Contract Documents, complete in place.
3. Intermediate Demobilization and Remobilization (Trenchless): This item includes all the Contractor's expenses for an Owner-directed intermediate project demobilization of personnel and equipment that occurs after the contract Notice to Proceed has been give and Work has commenced, and the subsequent remobilization of personnel and equipment to complete the Project. Each Intermediate Demobilization and Remobilization shall only be authorized upon a written directive from the Owner. Related Work shall include furnishing all labor, materials, tools, equipment and incidentals required to demobilize for the Project, in accordance with the Contract Documents, complete in place.

100.2 MEASUREMENT:

1. Measurement of the Item, Mobilization, as specified herein, shall be Lump Sum as the Work progresses.
2. Measurement of the Item, Intermediate Demobilization and Remobilization (Open Cut), as specified herein, shall be by the Each as the Work progresses.
3. Measurement of the Item, Intermediate Demobilization and Remobilization (Trenchless), as specified herein, shall be by the Each as the Work progresses.

100.3 PAYMENTS: Partial payments of the "Lump Sum" bid for mobilization will be as follows: (The adjusted contract amount for construction items, as used below, is defined as

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the total contract amount, less the lump sum bid for Mobilization and Preparing Right-Of-Way).

1. Price shall be compensation for all work including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
2. When 1% of the adjusted contract amount for construction items is earned, 50% of the "Lump Sum" bid or 5% of the total contract amount, whichever is less, will be paid.
3. When 5% of the adjusted contract amount for construction items is earned, 75% of the "remainder of the Lump Sum" bid or 10% of the total contract amount, whichever is less, will be deducted from the above amount.
4. When 10% of the adjusted contract amount for construction items is earned, 90% of the "remainder of the Lump Sum" bid or 15% of the total contract amount, whichever is less, will be paid. Previous payments under this item will be deducted from the above amount.
5. Total Payment for this line item will be withheld, until said documents are submitted and approved by SAWS: all material submittals, Specification Item No. 902 Safety and Health Program, Specification Item No. 903 Construction QC/QA Program, Specification Item No. 1114 Pre-Construction Videos, and Specification Item No. 1110 Progress Schedule.

Upon completion of all work under this contract, payment for the remainder of the "Lump Sum" bid for Mobilization will be made.

6. SAWS General Conditions (GCs) ARTICLE 7.2 states payments shall be made by the Inspector for approved materials stored on the project site that are deemed necessary and required for the "PROJECT WORK". Materials considered as "on-site" material must be stored on the project site and/or within off-site facilities either owned or leased (signed by both parties) by the Contractor. Materials On-Site are limited to the items listed in Table 1.
7. Intermediate Demobilization and Remobilization (Open Cut): this bid item will only be paid if prior authorized in writing by Owner. This bid item is limited to delays outside of the Contractor's control that are not otherwise provided for in the General Conditions. Examples of these types of delays would be Owner easement acquisition, permitting issues (only those permits not controlled by the Contractor), or other Owner activities. Any other provision contained herein notwithstanding Contractor will not be entitled to compensation under this bid item for work suspended during the 10 cumulative days allowed for by the Contract in the General Conditions, Article IV, Paragraph 4.8 Suspension of Work by Owner.
8. Intermediate Demobilization and Remobilization (Trenchless): this bid item will only be paid if prior authorized in writing by Owner. This bid item is limited to delays

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outside of the Contractor's control that are not otherwise provided for in the General Conditions. Examples of these types of delays would be Owner easement acquisition, permitting issues (only those permits not controlled by the Contractor), or other Owner activities. Any other provision contained herein notwithstanding Contractor will not be entitled to compensation under this bid item for work suspended during the 10 cumulative days allowed for by the Contract in the General Conditions, Article IV, Paragraph 4.8 Suspension of Work by Owner.

Table 1	
“Materials On-Site” Payment Guidelines	
<u>“Materials On-Site” Application</u>	
<i>Water, Recycle, Re-Use or Wastewater Pressure Main</i>	
Pipe	4-inch diameter or greater (rounded down to the nearest whole foot)
Valves	4-inch diameter or greater (only when bid as a separate line item)
Fire Hydrants	Includes all items for complete assembly
<i>Wastewater Gravity Main Facilities</i>	
Pipe	6-inch. diameter or greater (rounded down to the nearest whole foot)
Manholes	Includes base and cone section, risers, rings and covers. Excludes risers for FRP unless proper stations are provided noting location.
Wet wells	Excludes covers
<u>“Materials On-Site” Limitations</u>	
SAWS will <i>not</i> pay “Materials On-Site” for:	Quantities that exceed plan quantities
	Items that are not specifically listed as individual lines items (example: 6-in. valves that are included in the unit price of a fire hydrant assembly)

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	Fittings, flanges, small diameter pipe or valves, cleanouts, meter boxes or incidentals.
	Materials stored at a supplier's yard or facility.
	Materials that are stored at an excessive distance from the project site (based solely on the judgment of the SAWS Inspector)
	Any other items not specifically included in the "application" section of <i>Table 1: "Materials On-Site" Payment Guidelines</i>

End of Specifications

Special Specification

ITEM NO. 101

Preparing Right- Of-Way

101.1 DESCRIPTION: This item shall govern preparing the right-of-way for construction operations by removing and disposing of all obstructions from the right-of-way and from designated easements where removal of such obstructions is not otherwise provided for in the contract documents.

1. It is the intent of this specification to provide for the removal and disposal of all obstructions and/or materials, not specifically provided for elsewhere by the contract documents.
2. This item shall also include the removal of trees, stumps, bushes, shrubs, brush, roots, vegetation, logs, rubbish, paved parking areas, miscellaneous stone, brick, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron and all debris, whether above or below ground, except live utility facilities.
3. This item shall not govern the demolition of buildings by the use of explosives. Such demolition work shall be governed by the use of a special specification controlling the work.

101.2 CONSTRUCTION METHODS: Areas designated in the contract documents shall be cleared of all obstructions, vegetation, abandoned structures, etc., as listed within this specification Item No. 101 Preparing Right-Of-Way and as shown on the plans, except trees or shrubs specifically designated by the Engineer for preservation.

1. Such obstructions shall be considered to include, but not be limited to, remains of houses or structures not completely removed by Contractor or others, foundations, floor slabs, concrete, brick, lumber, plaster, cisterns, septic tanks, basements, abandoned utility pipes or conduits, equipment or other foundations, fences, retaining walls, outhouses, shacks, and all other debris, as well as buried concrete slabs, curbs, driveways and sidewalks.
2. All fences along the right-of- way which are damaged or removed temporarily by the Contractor shall be replaced by the Contractor to an equal or better condition, at no expense to SAWS.
3. Contractor shall adhere to the current City of San Antonio Tree Ordinance
4. Trees and shrubs designated by the tree ordinance for preservation shall be carefully trimmed as noted in the contract documents and shall be protected from scarring, barking, or other injuries during construction operations. Exposed ends of pruned limbs shall be treated with an approved pruning material.

Special Specification

5. Unless otherwise indicated in the contract documents, all underground obstructions shall be removed to the following depths:
 - a. In areas to receive embankment, 2 ft below natural finished grade.
 - b. In areas to be excavated, 2 ft below the lowest elevation of the excavation;
 - c. All other areas, 2 ft below finished grade.
6. Holes remaining after removal of all obstructions, objectionable materials, vegetation, etc., shall be backfilled and tamped as directed by the SAWS Inspector, and the entire area shall be bladed to prevent ponding of water and to provide drainage. In areas that are to be immediately excavated, backfilling and blading may be eliminated, if approved by the SAWS Inspector.
7. Areas to be used as borrow sites and material sources shall have all obstruction, objectionable materials, vegetation, etc., removed to the complete extent necessary to prevent such objectionable matter from becoming mixed with the material to be used in the construction.
8. Where a conduit is shown to be replaced, it shall be removed in its entirety, and all connections to the existing conduit or pipe shall be made. Where an existing conduit or pipe is to be cut and plugged, the line shall be cut back not less than 2 ft, and a plug of concrete not less than 2 ft long shall be poured and held in the end of the conduit or pipe. The plug may also be accomplished by using a precast stopper grouted into place.
9. Material to be removed will be designated as “salvageable” or “non-salvageable” in the contract documents prior to bidding by the Contractor. All “salvageable” material will remain the property of the SAWS and will be stored at the site as directed by the SAWS Inspector. All “non-salvageable” materials and debris removed shall become the property of the Contractor and shall be removed from the site and shall be disposed of properly.
10. All asphaltic material shall be disposed of or recycled at the facility authorized to accept the asphalt for such purposes and applicable to appropriate guidelines and regulations.

101.3 MEASUREMENT:

1. Measurement of the Item No. 101, Preparing Right of Way, as specified herein, will be by the “Lump Sum,” as the work progresses.
2. Tree protection will be measured by the lump sum.

Special Specification

101.4 PAYMENTS: Partial payments of the “Lump Sum” bid for preparing right-of-way will be as follows: (The adjusted contract amount for construction items, as used below, is defined as the total contract amount, less the lump sum bid for Mobilization and Preparing Right-Of-Way).

1. Price shall be compensation for all work including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
2. When 1% of the adjusted contract amount for construction items is earned, 50% of the “Lump Sum” bid or 5% of the total contract amount, whichever is less, will be paid.
3. When 5% of the adjusted contract amount for construction items is earned, 75% of the “remainder of the Lump Sum” bid or 10% of the total contract amount, whichever is less, will be deducted from the above amount.
4. When 10% of the adjusted contract amount for construction items is earned, 90% of the “remainder of the Lump Sum” bid or 15% of the total contract amount, whichever is less, will be paid. Previous payments under this item will be deducted from the above amount.
5. Total Payment for this line item will be withheld, until said documents are submitted and approved by SAWS: all material submittals, Item No. 902 Safety and Health Program, Item No. 903 Construction QC/QA Program, Item No. 1114 Pre-Construction and Post Construction Videos, and Item No. 1110 Progress Schedule.
6. Upon completion of all work under this contract, payment for the remainder of the “Lump Sum” bid for Preparing Right-Of-Way will be made.
7. This item will be paid for at the contract lump sum price bid for “Tree Protection,” which price shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

- End of Specification -

Special Specification

ITEM NO. 299

Flowable Fill

299.1 DESCRIPTION: The work covered by this item consists of furnishing, transporting, mixing, testing and installing flowable fill. Flowable fill is a concrete material suitable as a backfill for utility trenches, abandoned pipes, manholes and valves. It is a heavy material and will exert a high fluid pressure against any forms, embankment, or wall used to contain backfill.

299.2 REFERENCE STANDARDS: Reference standards cited in this Specification Item No. 299 refer to the current reference standard published at the time of the latest revision date of this Specification Item No. 299.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction
 - a. ASTM C 31 – Making and Curing Concrete Test Specimens in the field.
 - b. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens.
 - c. ASTM C 40 – Organic Impurities in Fine Aggregates for Concrete.
 - d. ASTM C 94 - Ready-Mixed Concrete.
 - e. ASTM C 150 - Portland Cement.
 - f. ASTM C 192 – Making and Curing Concrete Test Specimens in the Laboratory.
 - g. ASTM C 260 – Air-Entraining Admixtures for Concrete.
 - h. ASTM C 494 - Chemical Admixtures for Concrete.
 - i. ASTM C 618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Concrete.
3. ASTM C 4318 – Liquid Limit, Plastic Limit and Plasticity Index of Soils. Texas Department of Transportation (TxDOT)
 - a. TxDOT DMS-4600 Hydraulic Cement
 - b. TxDOT DMS-4610 Fly Ash
 - c. TxDOT DMS 4640 Chemical Admixtures for Concrete
 - d. Tex-401-A
 - e. TxDOT Tex-106-A
 - f. TxDOT-Tex-418-A
 - g. TxDOT-Tex-447-A

299.3 SUBMITTALS:

1. All submittals shall be in accordance with Engineer's requirements. All submittals shall be approved by the Engineer's and acknowledged by the Inspector prior to delivery of materials and commencing any portion of the proposed scope of work.
 - a. Submit proposed mix design. Mix design shall state the following information:

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- 1) Mix design number or code designation to order the concrete from the supplier.
- 2) Design strength at 7 days (unless otherwise noted on the Plans).
- 3) Cement type and brand.
- 4) Fly ash type and brand.
- 5) Admixtures type and brand.
- 6) Proportions of each material used.
- 7) Submit a copy of delivery tickets accompanied by batch tickets, providing the information required by ASTM C 94 to SAWS Inspector in the field at time of delivery.

299.4 MATERIALS:

1. Cement. Furnish hydraulic cement that meets the requirements of TxDOT's DMS-4600, "Hydraulic Cement," TxDOT's Hydraulic Cement Quality Monitoring Program (HCQMP), and ASTM C-150 Type I Portland Cement. Sources not on the HCQMP or other sources to be used in combination with an approved source will require approval before use.
2. Fly Ash. Furnish fly ash conforming to TxDOT DMS-4610, "Fly Ash."
3. Chemical Admixtures. Furnish chemical admixtures conforming to TxDOT DMS-4640, Chemical Admixtures for Concrete.
4. Fine Aggregate. Provide fine aggregate that will stay in suspension in the mortar to the extent required for proper flow and that meets the gradation requirements of Table 1. Test fine aggregate gradation in accordance with TxDOT standard laboratory test procedure Tex-401-A. Plasticity Index (PI) must not exceed 6 when tested in accordance with TxDOT standard laboratory test procedure Tex-106-A.
5. Mixing Water. Use mixing water conforming to the requirements of Specification Item No. 300, Concrete (Natural Aggregate).

Table 1	
Aggregate Gradation Chart	
<i>Sieve Size</i>	<i>Percent Passing</i>
$\frac{3}{4}$ inch	100
No.200	0-30

299.5 CONSTRUCTION: Unless otherwise shown on the plans, furnish a mix meeting the requirements of this section as set forth below.

1. Strength. The compressive strength range shall be between the following strength values unless otherwise directed by the Engineer or shown on the plans:
 - a. Low Strength. Between 80 psi and 150 psi at 28 days,
 - b. High Strength. Greater than 500 psi at 28 days. For emergency repairs, strength shall be greater than 50 psi at 2 hours.
2. Consistency. Design the mix to be placed without consolidation and to fill all intended voids.
 - a. Fill an open-ended, 3 inch diameter by 6 inch high cylinder to the top to test the consistency.
 - b. Immediately pull the cylinder straight up. The correct consistency of the

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- mix must produce a minimum 8 inch diameter circular spread with no segregation.
- c. When necessary, use specialty type admixtures to enhance the flowability, reduce shrinkage, and reduce segregation by maintaining solids in suspension.
 - d. All admixtures must be used and proportioned in accordance with the manufacturer's recommendations.
 - e. Mix the flowable fill using a central-mixed concrete plant, ready-mix concrete truck, pug mill, or other approved method.
3. Shrinkage and Bleeding. Limit shrinkage to 0.5% or less based upon the results from ASTM C 827, "Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures."
- a. Batch, mix and transport flowable fill in accordance with ASTM C 94, except when directed otherwise by the Engineer.
 - b. Mix flowable fill in quantities required for immediate use. Do not use portions which have developed initial set or which are not in place within 90 minutes after the initial water has been added.
 - c. Do not mix flowable fill while the air temperature is at or below 35 degrees F. without prior approval of the Engineer.
 - d. Monitor and control the fluid pressure during placement of flowable fill prior to set. Take appropriate measures to avoid excessive pressure that may damage or displace structures or cause flotation. Cease operations if flowable fill is observed leaking from the area.
 - e. Repair or replace damaged or displaced structures at no additional cost.
 - f. Clean up excess flowable fill discharged from the work area and remove excess flowable fill from pipes at no additional cost.

299.6 TESTING: Testing shall be in accordance with TxDOT standard laboratory test procedure Tex-418-A

1. Contractor to furnish all labor, equipment, tools, containers, and molds required for sampling, making, transporting, curing, removal, and disposal of test specimens. Furnish test molds meeting the requirements of TxDOT standard laboratory test procedure Tex-447-A
2. Two specimens are required for a strength test, and the compressive strength is defined as the average of the breaking strength of the 2 cylinders.
3. Contractor to transport, strip, and cure the test specimens as scheduled at the designated location.
4. Cure test specimens in accordance with TxDOT standard laboratory test procedure Tex-447-A.
5. The Contractor will sample, take, and test all quality control testing.
6. Contractor to dispose of used, broken specimens in an approved location and manner.
7. The frequency of job control testing will be at the direction of the Engineer.
8. SAWS will be responsible for quality assurance testing.

299.7 MEASUREMENT: This Item will be measured by the cubic yard of material placed of accepted work complete in place.

- a. Measurement will not include additional volume caused by slips, slides, or

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cave-ins resulting from the Contractor's operations.

299.8 PAYMENT: The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Flowable Fill (Low Strength)," "Flowable Fill (High Strength)," or "Flowable Fill (High Strength emergency Repair)." This price is full compensation for furnishing, hauling, and placing materials and for equipment, tools, labor, and incidentals. **When shown on the plans or when other specifications indicates, such as in Specification Item No 852 Sanitary Sewer Manholes, the use of flowable fill is incidental to another pay item, no direct payment for the material will be made.**

-End of Specification-

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ITEM NO. 300

Concrete (Natural Aggregate)

300.1 DESCRIPTION: This item shall govern the storage, handling and usage of materials; and the proportioning, mixing and transportation of concrete for all concrete construction. This specification does not cover the placement, consolidation, curing, or protection of the concrete.

300.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 300 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 300, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. American Concrete Institute
 - a. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
 - d. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. ACI 308 - Standard Practice for Curing Concrete.
 - f. ACI 309R - Guide for Consolidation of Concrete.
 - g. ACI 311 - Guide for Concrete Plant Inspection and Field Testing of Ready-Mix Concrete.
 - h. ACI 315 - Details and Detailing of Concrete Reinforcement
 - i. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary.
 - j. ACI 544 - Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete.
4. American Society for Testing and Materials (ASTM) International:

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- a. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- b. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- c. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- d. ASTM A 767 - Standard Specifications for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- e. ASTM A 775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- f. ASTM A 820 - Standard Specification for Steel Fibers for Fiber-Reinforced Concrete.
- g. ASTM A 884 - Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
- h. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- i. ASTM C 33 - Standard Specification for Concrete Aggregates.
- j. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- k. ASTM C 42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- l. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
- m. ASTM C 138 - Standard Test Method for Unit Weight Yield and Air Content (Gravimetric) of Concrete.
- n. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- o. ASTM C 150 - Standard Specification for Portland Cement.
- p. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.

300.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

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1. Submit proposed mix design and test data for each type and strength of concrete in Work.
2. Submit laboratory reports prepared by independent testing laboratory stating that materials used comply with requirements of this Section.
3. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by Engineer.
4. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.
5. When required on Drawing, Submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details, and other pertinent information.
6. For waterstops, submit product information sufficient to indicate compliance with this Section, including manufacturer's descriptive literature and specifications.

300.4 MATERIAL: The concrete shall be composed of Portland cement, mineral filler, if necessary, natural aggregates (fine and coarse), and water, proportioned and mixed as hereinafter provided in these specifications. Concrete shall meet all the requirements as set forth in the latest provision of ASTM C94 or the most applicable approved equal provision.

1. The minimum cement content, maximum allowable water content, and maximum slump of the various classes of concrete shall conform to Table 1.

300.5 MEASUREMENT: Concrete (Natural Aggregate) will not be measured for payment.

300.6 PAYMENT: No direct payment shall be made for costs associated with Concrete (Natural Aggregate). All costs in the connection with this work shall be included in the application contract price for the item to which the work pertains.

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Table 1				
Class	Minimum compressive strength @ 28 days, psi (Mpa)	Maximum water/cement ratio	Slump range, inches	Min.-max. sacks cement, cubic yard
A	4,000 (28)	4.5	2-4	5
B	2,500 (17)	8	2-5	4.5
C	2,000 (14)	9	1-4	4
D	1,000 (6)	11	1-4	2
G	(as specified in the contract documents)	5.5	2-3	6.0-8.0

End of Specification

Special Specification

ITEM NO. 301

Reinforcing Steel

301.1 DESCRIPTION: This item shall provide for the furnishing and placing of bar reinforcing steel for use in structures and other concrete items that require reinforcing steel as shown in the contract documents.

301.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 301 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 301, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. American Society for Testing and Materials (ASTM) International:
 - a. ASTM A 615, Grades 60,75, or 80
 - b. ASTM A996, Type A, Grade 60
 - c. ASTM A996, Type R, Grade 60, permitted in concrete pavement only (Furnish ASRM A996, Type R bars as straight bars only and do not bend them. Bend tests are not required.) or
 - d. ASTM A706, Grades 60 or 80
4. Texas Department of Transportation Specification Item 440 Reinforcement for Concrete

301.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

301.4 MATERIALS: Reinforcing steel shall be grade 60 and all bar reinforcement shall be deformed, conforming to the latest provision of Item No. 440, "Reinforcing Steel" of the TX-DOT Standard Specifications or most applicable approved equal

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provision. Reinforcing steel bars produced outside of the United States are acceptable, if such bar reinforcement conforms to the requirements of the latest provision of the ASTM Specifications for the various designations of bars.

301.5 CONSTRUCTION: Unless otherwise shown on plans the reinforcing steel shall on plans the reinforcing steel shall meet the requirements of this Section as set forth below.

1. **BENDING, TOLERANCES AND STORAGE:** Bending, tolerances and storage of reinforcing steel shall conform to the latest provision of Article 440.3.A-C, in Item No. 440, "Reinforcement for Concrete" of the TX-DOT Standard Specifications or most applicable approved equal provision.
2. **SPLICES:** No splicing of bars, except when provided in the contract documents, will be permitted without written approval of the Engineer.
3. **PLACING REINFORCEMENT:** All steel reinforcing shall be accurately placed in the position shown in the contract documents and firmly held during the placement and setting of concrete. All reinforcement shall be free from dust, rust, mill scale, paint, oil, mortar or foreign material. Bars shall be tied at all intersections. Where spacing of bars in each direction is less than 12 inches, only alternate intersections need be tied. Distances from forms shall be maintained by means of stays, precast blocks, ties, hangers, metal chairs or other approved supports. Blocks for holding reinforcing bars from contact with the forms shall be precast concrete blocks of approved shape and dimensions or other equally suitable devices. The use of pebbles, pieces of broken stones or brick, metal pipe and wooden blocks shall not be permitted. Reinforcement in any sections shall be placed and then inspected and approved by the Inspector before the placing of concrete begins.

301.6 MEASUREMENT: Bar Reinforcing Steel will not be measured for payment.

301.7 PAYMENT: No direct payment shall be made for costs associated with Bar Reinforcing Steel. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

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TABLE 1			
Bar size, number	Nominal diameter, inches	Nominal Area, square inches	Weight, pound per linear foot
2	0.250	0.05	0.167
3	0.375	0.11	0.376
4	0.500	0.20	0.668
5	0.625	0.31	1.043
6	0.750	0.44	1.502
7	0.875	0.60	2.044
8	1.000	0.79	2.670
9	1.128	1.00	3.400
10	1.270	1.27	4.303
11	1.410	1.56	5.313
14	1.693	2.25	7.65
18	2.257	4.00	13.60

End of Specification

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ITEM NO. 307

Concrete Structures

307.1 DESCRIPTION: This item shall govern the construction and repair of headwalls, wingwalls, box transitions, approach slabs, retaining walls, and other designated structures. All concrete structures shall be constructed and repaired in accordance with the specifications herein outlined and in conformity with the required lines, grades, sections and details shown in the contract documents or as directed by the Engineer. New Sanitary Sewer Structures shall be Polymer Concrete.

307.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 307 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 307, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. American Society of Mechanical Engineers
 - a. ASME B 16.1 –Cast Iron Pipe Flanges and Flanged Fittings
4. American Society for Testing and Materials (ASTM) International:
 - a. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile
 - b. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - c. ASTM C 270 - Standard Specification for Mortar for Unit Masonry
 - d. ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

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- e. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
- f. ASTM C 890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
- g. ASTM C 913 – Standard Specifications for Precast Concrete Water and Wastewater Structures
- h. ASTM C 923 - Standard Specifications for Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes.
- i. ASTM C 990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- j. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic - Cement Grout (Nonshrink).
- k. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³).
- l. ASTM D 2665 - Standard Specification for Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe, and Fittings.
- m. ASTM D 2996 - Standard Specification for Filament-wound Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- n. ASTM D 2997 - Standard Specification for Centrifugally Cast Fiberglass (Glass-Fiber- Reinforced Thermosetting-Resin) Pipe.
- o. 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.
- p. ASTM F 2510 – Standard Specification for Resilient Connectors Between Concrete Manhole Structures and Corrugated High Density Polyethylene Drainage Pipes
- q. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil 3 Using Standard Effort (12,400 ft-lb/ft)

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- r. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
 - s. ASTM D 2996 - Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber- Reinforced Thermosetting-Resin) Pipe
 - t. ASTM D 2997 - Standard Specification for Centrifugally Cast “Fiberglass” (Glass-Fiber- Reinforced Thermosetting Resin) Pipe
 - u. 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
 - v. ASTM F 2510 – Standard Specification for Resilient Connectors between Concrete Manhole Structures and Corrugated High Density Polyethylene Drainage Pipes.
5. American Water Works Association (AWWA)
- a. AWWA C 213 - Standard for Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines
6. American Association of State Highway and Transportation Officials (AASHTO)
- a. M306: Standard Specification for Drainage, Sewer Utility and Related Changes.

307.3 SUBMITTALS: Contractor shall submit manufacturer’s product data, instructions recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer’s requirements and submittals shall be approved prior to delivery.

- 1. Submit proposed design mix and test data for each type and strength of concrete.
- 2. Submit manufacturer’s data and details of following items for approval:
 - a. Frames, grates, rings, and covers.
 - b. Materials to be used in fabricating drop connections.
 - c. Materials to be used for pipe connections at structure walls.
 - d. Materials to be used for stubs and stub plugs.
 - e. Installation instructions for forms.

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- f Shop drawing of manhole sections, base units and construction details, including reinforcement, jointing methods, materials and dimensions.
- 3. Summary of criteria used in structure design including, as minimum, material properties, loadings, load combinations, and dimensions assumed. Include certification that structure design is in full accordance with ASTM C478 and /or ASTM C 890 and design criteria.
- 4. Materials and procedures for corrosion-resistant liner and coatings or concrete additive, if required.
- 5. Seal submittal drawings by Professional Engineer registered in State of Texas.

307.4 MATERIALS:

- 1. Concrete: All concrete shall conform to the latest provisions of Item No. 300, "Concrete (Class A)" or the most applicable approved equal provision, or the concrete shall be of a class as noted in the contract documents.
- 2. Reinforcing Steel: All reinforcing steel shall conform to the provisions of Item No. 301, "Reinforcing Steel."
- 3. Membrane Curing Compound: Provide membrane curing compounds that conform to the latest provision of TX-DOT's DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants" or most applicable approved equal provision.
- 4. Expansion Joint Materials: Provide materials that conform to the latest provision of TxDOT's DMS-6310, "Joint Sealants and Fillers" or most applicable approved equal provision.
- 5. Cast Iron Castings: All cast iron castings shall conform to the latest provision of the City of San Antonio Department of Public Works' Standard Specifications for Construction Item No. 409, "Cast Iron Castings", or most applicable approved equal provision.
- 6. Metal for Structures: Metal for structures shall conform to the latest provision of the City of San Antonio Department of Public Works' Standard Specifications for Construction Item No. 302, "Metal for Structures", or most applicable approved equal provision.

307.5 CONSTRUCTION METHODS:

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1. Forms: Forms shall be of wood, metal or other approved materials and shall conform to the following requirements
 - a. Wood Forms:
 - 1) Unexposed concrete surfaces, No. 2 common or better lumber.
 - 2) Exposed concrete surfaces, dressed and matched boards of uniform thickness and width.
 - b. Plywood: Commercial Standard Douglas Fir, moisture resistant, concrete form plywood, not less than 5 ply and at least 9/16th of an inch in thickness. The face of the plywood shall be free from knot holes and other blemishes.
 - c. Metal Forms: Metal forms of an approved type that will produce surfaces equal to or better than those specified for wood forms.
 - 1) Forms may be constructed of any of the above substances or of other material if suited to the intended purpose and when approved by the Inspector.
 - 2) Forms shall be built mortar tight and of sufficient strength to prevent bulging between supports and shall be set and maintained to the line and grade designated until the concrete is sufficiently hardened to permit removal.
 - 3) All details of form construction shall be subject to the approval of the Inspector and, in special cases, the approval of the Engineer may be required.
 - 4) Permission to place concrete will not be given by the Inspector until all form work has been placed in accordance with the above requirements.
 - 5) If at any stage of the work, the forms show signs of bulging, sagging or moving, that portion of the concrete causing such conditions shall be immediately removed, if required by the Inspector, and the forms reset and securely braced against further movement.
 - 6) All corners and edges, which will be exposed after construction, shall be chamfered with triangular chamfer strips $\frac{3}{4}$ inch measured on the sides.
2. Placing Reinforcement: All steel reinforcement shall be placed in accordance with Item No. 301, "Reinforcing Steel."

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3. Placing Concrete: The base slabs of inlets, junction boxes, headwalls, culverts and other structures shall be placed and allowed to set before the remainder of the structure is constructed.
- a. Suitable provisions shall be made for bonding the sidewalls to the base slab by means of longitudinal keys so constructed as to prevent the percolation of water through the construction joints.
 - b. Before concrete is placed in the walls, the keyed-edge joints shall be thoroughly cleaned of all shavings, sticks, trash or other extraneous materials.
 - c. The top slabs of culverts and like structures may be poured monolithic with the walls, provided the walls are poured and allowed to set a minimum of 1 hour, no more than 2 hours, shall elapse between the placing of the concrete in the wall and that in the top slab; such interval is to allow for shrinkage of the concrete in the wall.
 - d. Under adverse weather conditions, the minimum time will be increased by the Inspector.
 - e. All concrete shall be placed with the aid of mechanical vibrating equipment supplemented inside the forms.
 - f. Vibrating equipment shall be of the internal type and shall maintain a speed of 6,000 impulses per minute, when submerged in concrete. Vibrators shall be adequate in number of units to properly consolidate all concrete. Provide a backup vibrator for large concrete pours.
 - g. Form or surface vibrators shall not be used. The duration of vibration shall be limited to properly consolidate the concrete without causing objectionable segregation of aggregates.
 - h. Insertion of vibrators into lower courses that have commenced initial set, or the disturbance or reinforcement in concrete beginning to set, shall be avoided.
 - i. Concrete shall not be allowed to drop freely more than 5 feet in unexposed work, nor more than 3 feet in exposed work; where greater drops are required, a tremie or other approved means shall be employed.
 - j. Concrete shall not be placed when the ambient temperature is below 40°F, nor where the concrete is likely to be subject to freezing before final set has occurred.
 - k. When the air temperature is expected to drop below 40°F during the first 72

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hours of the curing period, polyethylene sheeting or burlap-polyethylene blankets shall be placed in direct contact with the top surface of the concrete.

- l. Concrete may be poured in temperatures below 40°F, when poured in protected areas, or where adequate protection can be provided against freezing, if approved by the Engineer.
 - m. When concrete is poured in air temperatures above 85°F, an approved retarding agent, meeting the latest provision of ASTM C494, Type B or most applicable approved equal provision, will be required in all concrete used in superstructures and top slabs of culverts unless directed otherwise by the Engineer.
4. Form Removal: Forms shall be removed only with the approval of the Inspector and in a manner to insure complete safety of the structure when the structure as a whole is supported on shoring.
 - a. Form removal from structures shall not begin until the concrete has attained the following compressive strengths:
 - b. Vertical forms shall not be removed until the concrete has set a minimum of 24 hours, or the concrete has attained a minimum compressive strength of 500 psi.
 - c. When wall and top slabs are poured monolithically, wall forms shall not be removed until the concrete has attained a minimum compressive strength of 2,000 psi, or as directed by the Engineer.
5. Finish: Honeycomb and other minor defects shall be patched with one part of cement to 2 parts fine aggregate. All exposed surfaces shall be given one of the following finishes:
 - a. Rough Finish: Concrete for which no other finish is indicated or specified shall have fins and rough edges removed.
 - b. Smooth Finish: Smooth finish shall be given to the interior of inlets, junction boxes, culverts and other structures. Joint marks, fins and rough edges shall be smoothed off and blemishes removed, leaving finished surfaces smooth and unmarred, subject to approval by the Inspector.
 - c. Floor Finish: Floor finish shall be given to the floors of all inlets, culverts and other structures, and shall be struck off true to the required grade as shown in the contract documents and floated to a smooth, even finish by manual or mechanical methods. No coarse aggregate shall be visible after finishing.

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- d. Rubbed Finish: All exposed surfaces of retaining walls, wingwalls, headwalls and other structures, after patching and painting has been completed and the surface has been wetted, shall be given a first rubbing with a No. 16 Carborundum Stone.
 - i. After the first rubbing is completed and the ground material has been evenly spread, the material shall be allowed to take a reset.
 - ii. After sufficient aging, the surface shall be wetted and given a finish rubbing with a No. 30 Carborundum Stone, after which the surface shall be neatly striped with a brush and allowed to take a reset.
 - iii. On the inside surfaces of all culvert walls an area from the top slab, on a line 30 degrees from the vertical, to the bottom slab shall be rubbed as specified above.
 - e. The entire structure shall be left with a clear, neat, uniform finish, free from form markings and shall be uniform in color.
 - f. Sidewalk surfaces shall be given a wood float finish, a light broom finish, or may be stripped with a brush as directed by the Inspector or specified in the contract documents.
 - g. Roadway slabs shall be given a broom finish after completion of the floating or straight-edging operation, but before the disappearance of the moisture sheen.
 - i. The grooves of the finish shall be parallel to the centerline of the roadway.
 - ii. The average texture depth of the grooves shall be a minimum of 0.035 inches.
 - h. The Contractor has the option of substituting the surface finish described in the latest provision of the City of San Antonio Department of Public Works' Standard Specifications for Construction Item No. 311, "Concrete Surface Finish," or most applicable approved equal provision, on the surface areas listed in the specification.
6. Curing: Immediately after placing or finishing, concrete surfaces not covered by forms shall be protected from loss of surface moisture for not less than 4 curing days. When forms are left in place, they shall be kept sufficiently wet to reduce cracks in the forms and prevent the form joints from opening.
- a. If forms are removed before 4 curing days have transpired, the formed surface shall be protected for the remainder of the 4 day curing period.

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Protection and curing shall be accomplished by one of the following methods and shall be subject to the approval of the Inspector during the entire curing process:

- b. Water Curing: Water curing shall be effected by covering exposed surfaces with cotton or burlap mats, previously wetted before applying, and kept thoroughly wet during the entire curing period.
 - c. The application of the mats shall not mar or disturb surfaces which will be exposed on completion.
 - d. Membrane compound curing: Provide membrane curing compounds that conform to the latest provision of TxDOT's DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants" or the most applicable approved equal provision.
- 7. Fine Grading: All fine grading of structure foundations shall provide for seating on firm, clean, natural earth foundation except as otherwise provided.
 - 8. Any under-cut foundations, except where authorized, shall be corrected to the satisfaction of the Inspector, at the sole expense of the Contractor.
 - 9. Excavation and Backfilling shall conform to the latest provision of the City of San Antonio Department of Public Works' Standard Specifications for Construction Item No. 306, "Structural Excavation" or the most applicable approved equal provision. All references therein to density and/or compaction levels are superseded by those of SAWS, described elsewhere in these standard specifications.

307.6 MEASUREMENT: No direct measurement or payment will be made for the work to be done or the equipment to be furnished under this item, but shall be considered subsidiary to the particular items of work for which unit prices are required in the proposal.

307.7 PAYMENT: No direct payment will be made for the work to be done or the equipment to be furnished under this item, but shall be considered subsidiary to the particular items of work for which unit prices are required in the proposal.

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ITEM NO. 550

Trench Excavation Safety Protection

550.1 DESCRIPTION: This item shall govern the trench excavation safety protection required for the construction of all trench excavation protection systems to be utilized in the project and including all additional excavation and backfill necessitated by the protection system.

550.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 550 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 550, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 217 Design Criteria for Domestic Wastewater Systems
 - b. Chapter 213 Edwards Aquifer
 - c. Chapter 290; Subchapter D – Rules and Regulations for Public Drinking Water
4. Occupational Safety and Health Administration (OSHA).
 - a. Federal Regulations, 29 CFR, Part 1926, Standards – Safety and Health Regulations for Construction – Subpart P Excavation,

550.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

1. 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.
2. Construction and shop drawings containing deviations from OSHA standards or special designs shall be sealed by a Professional Engineer Licensed in the State of Texas retained and paid by Contractor.
3. Review of the safety program by Engineer will only be in regard to compliance with specification and will not constitute approval by Engineer nor relieve Contractor of obligations under State and Federal trench safety laws.
4. Submit certification that trench safety system will not be subjected to loads exceeding those which the system was designed to withstand according to the available construction and geotechnical information.
5. An excavation plan submittal signed and sealed by a Texas licensed professional engineer shall be submitted for review and acceptance by the SAWS'

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Representative, if applicable, prior to the delivery of materials and commencing any portion of proposed construction activities where the planned excavation is 20 feet or greater.

550.4 CONSTRUCTION: Trench excavation safety protection shall be accomplished as required by the latest provision of Part 1926, Subpart P – Excavations, Trenching, and Shoring of the OSHA Standards and Interpretations, or the most approved equal provision.

1. A trench shall be defined as a narrow excavation made below the surface of the ground or pavement. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.
2. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less (measure at the bottom of the excavation), the excavation is also considered to be a trench.
3. In addition, "Trench Excavation Protection" will not be limited to these applications, but may be used whenever deemed expedient and proper to ensuing work.

550.5 MEASUREMENT: Trench Excavation Safety Protection shall be measured by the linear foot along the centerline of any OSHA defined trench that may be entered by personnel and is not greater than 15 feet wide, including manholes and other structures.

550.6 PAYMENT: Payment for Trench Excavation Safety Protection, measured as described above, shall be made at the unit price bid per linear foot of Trench Excavation Safety Protection regardless of the depth of the trench.

1. Payment shall include all components of the Trench Excavation Safety Protection System which can include, but not be limited to, sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or temporary diversion and proper recapture and transportation of water to provide adequate drainage.
2. Payment shall also include the additional excavation and backfill required, any jacking, jack removal, and removal of the trench supports after completion.
3. Payment of all work prescribed under this item shall be full compensation for all additional excavation and backfill associated with the item; for any retention by Contractor of structural design/geotechnical/safety/equipment consultant; for furnishing, placing and removing all shoring, sheeting, or bracing; for dewatering or temporary diversion and proper recapture and transportation of water; for all jacking and jack removal; and for all other labor, material, tools, equipment and incidentals necessary to complete this portion of the work.

- End of Specification -

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ITEM NO. 804

EXCAVATION, TRENCHING AND BACKFILL

804.1 DESCRIPTION: This section shall govern the excavation, trenching, and backfilling for water, sanitary sewer, and recycled water construction, unless otherwise noted in the contract documents. The work shall include all necessary drainage, dewatering, pumping, bailing, sheeting, shoring and incidental construction.

804.2 REFERENCE STANDARDS: Reference standards cited in this Specification Item No. 804 refer to the current reference standard published at the time of the latest revision date of this Specification Item No. 804, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 217 Design Criteria for Domestic Wastewater Systems
 - b. Chapter 290; Subchapter D – Rules and Regulations for Public Drinking Water
4. American Society for Testing and Materials (ASTM) International:
 - a. ASTM C 12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
 - b. ASTM C76- Standard Specification for Reinforced Concrete Culverts, Storm Drain, and Sewer Pipe.
 - c. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
 - d. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
 - e. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes.
 - f. ASTM D 6938 - Test Method for in place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - g. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - h. ASTM D 558 - Standard Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
 - i. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³)).

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5. American Association of State Highway and Transportation Officials (AASHTO)
 - a. AASHTO M306: Standard Specification for Drainage, Sewer, Utility, and Related Castings.
6. Occupational Safety and Health Administration (OSHA).
 - a. Federal Regulations, 29 CFR, Part 1926, Standards – Safety and Health Regulations for Construction – Subpart P Excavation,
7. International Organization of Standardization (ISO)
 - a. ISO9001 Standards
8. Texas Department of Transportation (TxDOT)
 - a. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
 - b. TxDOT Tex-110-E - Particle Size Analysis of Soils.
 - c. TxDOT Tex-112-E – Test Procedure for admixing Lime to Reduce Plasticity Index of Soils
 - d. TxDOT Tex-113-E - Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials
 - e. TxDOT Tex-114 -E- Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade, Embankment Soils, and Backfill Material
 - f. TxDOT Tex-142- E –Laboratory Classification of Soils for Engineering Purposes

804.3 SUBMITTALS: All submittals shall be in accordance with Owner’s requirements. All submittals shall be approved by the Owners’ Representative prior to delivery of materials and commencing any portion of the proposed scope of work.

1. Contractor to submit cut sheets when applicable.
 - a. No trenching will commence until cut sheets have been approved by SAWS’ Representative.
 - b. The depths of cuts indicated on the cut sheet, are from the center line hub elevation to the invert of the pipe.
2. Submit detailed trench plans, shoring system designs, installation sequences, and flowable fill mix designs.
3. Submit planned typical method of excavation, backfill placement and compaction including:
 - a. Trench widths
 - b. Procedures for foundation and pipe zone bedding placement, and trench backfill compaction
 - c. Procedures for assuring compaction against undisturbed soil when pre-manufactured trench safety systems are proposed.

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- d. An excavation plan submittal signed and sealed by a Texas licensed professional engineer shall be submitted for review and acceptance by the SAWS' Representative, if applicable, prior to the delivery of materials and commencing any portion of proposed construction activities where the planned excavation is 20 feet or greater.
4. Submit trench excavation safety program in accordance with requirements of Specification Item No. 550 Trench Excavation Safety Protection
5. Submit record of location of utilities as installed, referenced to survey control points. Include:
 - a. Locations of utilities encountered or rerouted.
 - b. Give stations, horizontal dimensions, elevations, inverts, and gradients.
6. Submit detailed drawing with plotted utility or obstruction location to SAWS' Representative.
7. Submit Emergency Action Plan (EAP) to address contingency plans in the event of damage to utilities. Include the following:
 - a. Contact personnel and agencies including primary and secondary telephone, numbers,
 - b. Contractor's hierarchy of responsible personnel,
 - c. Traffic control measures, and
 - d. Identification of resources to be available on or near project site in event of damage to utilities.
8. Submit backfill material sources and product quality information in accordance with requirements of this specification.

804.4 MATERIALS: The Contractor shall procure, store, and place materials from either onsite or offsite sources which comply with the specified requirements.

1. The use of sand backfill is not allowed, unless sand is native soil to trenchline, is clean, and is approved by SAWS' Engineer.
2. Backfilling for pipelines is divided into three (3) separate zones:
 - a. Bedding: the material in the trench bottom in direct contact with the bottom of the pipe;
 - b. Initial backfill: is defined as backfill having a thickness in its compacted state from the surface of the bedding to a point 1 foot above the top of the pipe.
 - c. Secondary backfill: the backfill zone extending from the initial backfill surface to the top of the trench.
 - d. Materials and placement for each of the zones shall be as described herein
3. Trench Bottom Materials:
 - a. Stable Material: Existing stable material present during excavation

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includes:

- (1) Trench bottom (free of water, muck, debris);
 - (2) Rock in boulder, ledge or coarse gravel (particle size not larger than 1- ¾ inch) formations;
 - (3) Coarse sand and gravels with maximum particle size of 1- ¾ inch, various graded sands and gravels containing small percentages of fines, generally granular and non-cohesive either wet or dry; and
 - (4) Fine sands and clayey gravels; fine sand, sand-clay mixtures, clay and gravel-clay mixtures.
- b. Unstable Material: Existing unstable materials are silt, muck, trash or debris in the trench bottom bearing level; rock on boulder ledge or coarse gravel (particle size larger than 1- ¾ inch) formations.
4. See Table 1 for an outline of the bedding and initial backfill requirements for various pipe materials.

**TABLE 1
BEDDING AND INITIAL BACKFILL REQUIREMENTS**

	UNSTABLE		STABLE*		ROCK	
	Bedding	Initial Backfill	Bedding	Initial Backfill	Bedding	Initial Backfill
WATER	6" or D/8	1.0' above	6" or D/8	1.0' above pipe	6" or D/8	1.0' above pipe
CSC	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5
DI	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5
PVC	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5
HDPE	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5
WSP	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5	Modified Grade 5
SEWER	6" or D/8	1.0' above pipe	6" or D/8	1.0' above pipe	6" or D/8	1.0' above pipe
RIGID	sewer gravel	sewer gravel	sewer gravel	sewer gravel	sewer gravel	sewer gravel

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FLEXIBLE	sewer gravel	sewer gravel	sewer gravel	sewer gravel	sewer gravel	sewer gravel

NOTE: The use of sand backfill is not allowed, except as secondary backfill if sand is native soil to trenchline, is clean, and is approved by SAWS' Engineer.

CSC = Concrete Steel Cylinder
DI = Ductile Iron
HDPE = High Density Polyethylene Pipe.
PVC = Polyvinyl Chloride
WSP = Tape Wrapped Steel Pipe.
D = Outside Diameter of Pipe

5. Sanitary Sewer Backfill:
- a. Bedding Material:
- (1) The existing material at the bearing level shall be removed and replaced to a minimum depth of 6 inches or 1/8 of the outside diameter of the pipe, whichever is greater, with bedding material.
 - (2) The bedding material shall extend up the sides of the pipe sufficient to embed the lower quadrant of the pipe.
 - (3) The bedding material shall be composed of well-graded, crushed stone or gravel conforming to the requirements of Table 2 unless modified by the Engineer in writing.

Table 2	
Sanitary Sewer Backfill Materials	
Sewer Gravel	Percent
Passing 1- ½ inch sieve	100
Passing 1 inch sieve	95 to 100
Passing 1/2 inch sieve	25 to 60
Passing No. 4 sieve	0 to 10
Passing No. 8 sieve	0 to 5

6. Potable Water and Recycle Mains Backfill
- a. Bedding Material:
- (1) The existing material at the bearing level shall be removed and replaced to a minimum depth of 6 inches or 1/8 of the outside diameter of the pipe, whichever is greater, with

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bedding material.

- (2) The bedding and initial backfill materials for concrete steel cylinder pipe (CSC), ductile iron pipe (DI), Wrapped Steel (WS) Pipe, High Density Polyethylene Pipe (HDPE) and Polyvinyl Chloride Pipe (PVC) in all nominal diameters shall be composed of well graded crushed stone or gravel conforming to the requirements of Table 3 unless modified by the Engineer in writing.

Table 3	
Modified Grade 5 Backfill Materials	
Modified Grade 5	Percent
Passing ½ inch sieve	100
Passing 3/8 inch sieve	95 to 100
Passing No. 4 sieve	20 to 80
Passing No. 10 sieve	0 to 25
Passing No. 20 sieve	0 to 2

- b. Where copper or HDPE services (¾" – 2") are installed, initial backfill shall be sand conforming to the following requirements:
 - (1) Natural sand or sand produced from crushed gravel or crushed rock maximum ¼ inch free from clay and organic material conforming to the requirements of Table 4 unless modified by the Engineer.
 - (2) Larger services utilizing DI pipe or PVC (C-900) pipe shall be backfilled the same as mains and conform to the requirements of Table 3 unless modified by the Engineer in writing.

Table 4	
Sand Backfill- For Services	
Sand No.	Percent
Passing No. 4 Sieve	95
Passing No. 200 sieve	8

804.5 CONSTRUCTION: All existing utilities shall be protected from damage during the excavation and backfilling of trenches and, if damaged, shall be replaced by the Contractor at their own expense.

1. General:
 - a. Unless otherwise shown in the contract documents, **all excavation**

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shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed, to include but not limited to groundwater, water, rock, stone, sand, concrete, organic material, existing abandoned utility lines whether shown on the plans or not, or any kind of material that is encountered.

- b. Trenches shall not be backfilled until constructed structures or appurtenances, as installed, conform to all requirements specified.
 - (1) Failure to comply will require Contractor to re-excavate trench at no expense to SAWS.
- c. Where pipe is specially coated or sleeve/tape wrapped for protection against corrosion, care shall be taken not to damage the coating or sleeve/tape wrap.
 - (1) Damage to be assessed by Manufacturer and repaired to manufacture's recommendation at no expense to SAWS.
- d. Where a trench has been improperly backfilled, or settlement occurs, the identified section shall be excavated to the trench depth and a length 50 feet in both directions of the failed area, then refilled and compacted to the grade and compaction level required.
- e. Safety Devices: The Contractor shall provide and maintain barricades, flags, road flares, and other safety devices as required by local, state, and federal codes and ordinances and conduct work to create a minimum inconvenience to the public.
- f. Temporary suspension of work does not relieve Contractors' responsibility of the above requirements.
- g. Safety and Health Regulations: The Contractor shall at all times conform to all of the latest applicable regulations of 29 CFR Part 1926 Subpart "P" entitled Excavation, of OSHA Safety and Health Regulations for Construction," or most applicable approved equal provisions, and all other applicable state and local rules and regulations.
- h. Archeological (Unidentified Archeological Sites): If the Contractor should encounter a section of an archeological feature, such as a acequia (early Spanish irrigation ditch) or any other archeological deposits during construction operations, the Contractor must stop excavation immediately and contact the SAWS' Engineer and SAWS' Inspector, who will call the City of San Antonio Historic Preservation Officer at (210) 207-0035 for an archeological investigation as per Section 35-432.3 of the City Code, "Unidentified Sites Archeological."
 - (1) The Contractor cannot begin excavation again without written permission from SAWS.

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- (2) If more than three days are required for investigation (not including holidays and weekends) and the Contractor cannot work on other project scope items, the Contractor will be permitted to negotiate for additional construction time through a Request for Information (RFI).
 - i. The RFI shall be submitted within ten days after date of the first notice, additional standby time will not be considered.
 - (3) If the time required for investigation does not exceed three days for each event, contract duration will not be extended.
- 2. Excavation: The Contractor shall perform all excavation of every description and of all substances, including rock, encountered to the lines and grades shown in the contract documents or as determined by the Engineer.
 - a. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner a safe distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins as per 29 CFR Part 1926 Subpart "P" entitled Excavation, of OSHA Safety and Health Regulations for Construction,"
 - b. All excavated materials not required or suitable for backfill shall be removed and properly disposed of by the Contractor or as directed by the Inspector at no additional cost to SAWS.
 - c. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods.
 - d. Sheet piling and shoring shall be installed in accordance with all applicable safety requirements for the protection of the work, adjoining property, and for the safety of all personnel.
 - e. Unless otherwise indicated, excavation shall be by open cut, hand, backhoe, hoe-ramp, rock saw, or other approved method.
 - f. Short sections of a trench may be tunneled, if the pipe or structure can be safely and properly installed or constructed and backfill can be properly compacted in such tunnel sections.
 - g. Tunneled section must be authorized by SAWS' Engineer prior to start of Construction.
 - h. Where over-excavation occurs and when not as directed by the Engineer or Inspector, the under-cut trench shall be restored to grade at no cost to SAWS by replacement with a material conforming to the requirements of the bedding material or a material approved by the Engineer.
- 3. Trenching

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- a. Trench walls shall be vertical
- b. Open trenches are limited to 400 ft. open at one time.
- c. Contractor shall compact trench and install an all-weather surface on any paved surface, roadway or trench as directed by SAWS' inspector, prior to proceeding to the next section. Sections are limited to 400 ft. of open trench.
- d. Projects under 500 ft. must be completely restored at the end of each day.
- e. Where the trench bottom has been over excavated in excess both vertically and horizontally, beyond the limits as defined in contract documents, the pipe shall be concrete-encased or encased as directed by the engineer.
 - (1) Encasement shall extend from the trench wall to trench wall and be a minimum of 6 inches above the top of pipe. No separate pay item (See Specification Item No. 858, Concrete Encasement.)
- f. Where the trench bottom is not excavated in accordance with this specification due to rock or other hard under lying materials, then the pipe shall be concrete encased as defined in Specification Item No. 858, Concrete Encasement.
- g. The practice of undercutting at the bottom or flaring at the top will not be permitted except where it is justified for safety or at the Engineer's and/or Inspector's direction.
- h. In special cases, where trench flaring is required, the trench walls shall remain vertical to a depth of at least 1 foot above the top of the pipe.
- i. The trench bottom shall be square or slightly curved to the shape of the trenching machine cutters.
- j. The trench shall be accurately graded along its entire length to provide uniform bearing and support for each section of pipe installed upon the bedding material.
- k. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and bedding installed.
- l. The pipe shall rest upon the new bedding material for its full length.
- m. The minimum allowable base width of the trench shall be not less than 36 inches greater than the exterior diameter of the pipe, not less than 18 inches on each side.
- n. Trench supports are exclusive of the minimum trench width.
- o. The maximum allowable base width of trench shall be not greater than 48 inches than the exterior diameter of the pipe, not more than 24 inches on each side.
- p. Trench supports are exclusive of the maximum trench width.

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- q. Whenever such maximum allowable width of trench is exceeded, except as provided for in the contract documents, or by written approval of the Engineer, the Contractor, at his sole expense, shall encase the pipe in concrete from trench wall to trench wall.
 - r. Any additional trench restoration required as a result of an excavation wider than this maximum width or subsequent surface or paving work, will be done at the Contractor's sole expense.
 - s. When unsuitable bearing materials such as water, silt, muck, trash, debris or rock in ledge, boulder or coarse gravel (particle size larger than 1- ¾ inch) is encountered at the bearing level, the Contractor shall over- excavate and remove such materials to a depth no less than 6 inches below the bottom of the pipe and replace it with a material conforming to the requirements of this Specification or as approved by the Engineer and/or Inspector.
4. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
- a. The Contractor shall not allow water to accumulate in excavations or at subgrade level.
 - b. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades and foundations.
 - c. Provide and maintain dewatering system components necessary to convey water from excavations.
 - d. Convey water removed from excavation and rainwater to collecting or runoff areas away from buildings and other structures.
 - e. Establish and maintain temporary drainage ditches and other diversions outside excavation limits.
 - f. Do not use trench excavations as temporary drainage ditches.
 - g. Dewatering devices shall be provided by the Contractor with filters to prevent the removal of fines from the soil.
 - h. Should the pumping system draw fines from the soil, the Inspector shall order immediate shutdown, and remedial measures will be the responsibility of the Contractor.
 - i. Upon completion of the dewatering work, the Contractor shall remove all equipment and leave the construction area in a neat, clean, condition that is acceptable to the Inspector.
 - j. The Contractor shall maintain a groundwater table at least 12 inches below the finished excavated trench depth.
 - k. Performances of the dewatering system for lowering groundwater shall be measured by observation wells on piezometers installed in conjunction with the dewatering system, and these shall be documented at least daily.

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- l. The Contractor shall maintain a daily log of these readings and submit them to the Inspector before payment.
 - m. No direct payment shall be made for costs associated with dewatering.
 - n. All costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.
5. Backfilling: Trenches shall not be backfilled until the construction structures or appurtenances, as installed, conform to the requirements specified.
- a. Initial backfill is defined as backfill having a thickness in its compacted state from the surface of the bedding to a point 1 foot above the top of the pipe.
 - b. Initial Bedding material shall be consolidated to assure it is incorporated from the bottom of the trench up to the pipe centerline.
 - (1) A hand-held vibrator, commonly used for concrete work, can be used for this purpose. The vibrator shall be inserted every 3 feet on each side of the pipe.
 - c. For pipelines up to 24 inches in diameter initial backfill material shall be placed in two separate lifts above the bedding material the pipe is set on.
 - (1) The first lift shall be spread uniformly and simultaneously on each side and under the bottom quadrant of the pipe to the mid-point or spring line of the pipe.
 - d. For diameters larger than 24 inches, initial backfill material shall be evenly and simultaneously spread alongside, under the lower quadrant of the pipe and over the pipe in 18 (first lift) or 12 inch lifts to a point sufficient to a minimum of 1 foot above the top of the pipe (See Drawing Series DD-804).
 - e. Placement of the first lift of initial backfill shall be subject to inspection and approval prior to placement of second lift, which shall extend from the spring line of the pipe to a minimum of 1 foot above the top of the pipe.
 - f. Secondary backfill is defined as backfill from 1 foot above the top of the pipe to the top of the trench or bottom of pavement section.
 - g. Secondary backfill shall generally consist of materials removed from the trench and shall be free of brush, debris and trash.
 - (1) Rock or stones having a dimension larger than 6 inches at the largest dimension shall be sifted out and removed before the material is used in the secondary backfilling zone.
 - (2) Secondary backfill material shall be primarily composed of compactible soil materials. The secondary backfill material shall be placed in maximum 12 inch loose lifts or

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as directed by the Engineer and/or Inspector.

- h. Secondary backfill shall be constructed in accordance with details shown in the construction documents.
- i. All compaction within the secondary backfill zone shall be such that the relative dry density of each layer shall be not less than 98% compaction from the top of the initial backfill to the bottom of pavement section as outlined in TxDOT Testing Methods Tex-113 or Tex-114.
- j. For native sand backfill and non-cohesive soils, Engineer will specify compaction requirements.
- k. The second lift shall be evenly spread in a similar manner as the first lift.
- l. Where specified, by Engineer, only the secondary backfilling may incorporate native excavated materials approved, by Engineer, for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale or other approved materials, free from large clods of earth or stones.
- m. Where pipe is specially coated or sleeve/tape wrapped for protection against corrosion, care shall be taken not to damage the coating or sleeve/tape wrap.
- n. Damaged wrap will be replaced at Contractor's expense.
- o. Where a trench has been improperly backfilled, or where settlement occurs, the identified section shall be excavated to the trench depth and a length 50 feet in both directions of the failed area, then refilled and compacted to the grade and compaction level required at the Contractor's expense.
- p. The use of sand backfill shall not be allowed, except as secondary backfill if the native soil is sand. Compaction and moisture-density relationship to be determined by TxDOT Testing Methods Tex-113 or Tex-114.
- q. Soil Characteristic determined by TxDOT-142e.
- r. The pavement (asphalt) section shall have 95% compaction density with a maximum dry density at + or - 1% optimum moisture content as determined by tests on samples as outlined in the latest provisions of TX-DOT Testing Method Tex 113-E or Tex-114, unless otherwise shown on the contract documents.
- s. At the time of compaction, the water content shall be at optimum moisture content, + or - 1% points as outlined in the latest provisions of TX-DOT Testing Method Tex 113-E or Tex-114.
- 6. Trench Surface Restoration: The surface of the backfilled trench shall be restored to match the previous existing conditions.
 - a. This shall include final grading, placement of topsoil and seeding, placement of sod (such as at homes or businesses that had maintained grass), or other unprepared and prepared surfaces.
 - b. Contractor shall compact trench and install an all-weather surface

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on any paved surface, roadway or trench as directed by SAWS inspector, prior to proceeding to next section . Sections limited to 400 ft. of open trench.

- c. Trenches in alleys actively being used by vehicles (such as trash pickup, vehicle parking, etc.) shall be restored by grading and compacting to 98% (per TxDOT Tex-113 or Tex - 114) or higher with a minimum of 4 inches of flex- base materials for the entire width of the alley.
- d. Asphaltic materials shall have a compaction density of 95%.
- e. Alleys not actively used by vehicles shall be graded and compacted to 98% (per TxDOT Tex-113 or Tex - 114) or higher from the top of the initial backfill to the bottom of the pavement section, then spread grass seed for entire width of the alley.
- f. Trenches in paved streets shall be covered with a temporary all-weather surface to allow for vehicular traffic and protect trench from weather, water infiltration and runoff until the final asphalt/concrete paving is complete.
 - (1) This surface shall be a minimum of 4 inches hot-mix cold lay compacted and rolled asphaltic black base, either hot-mix or cold-mix applied, or plates with cold mix asphalt installed around the edges.
 - (2) It is the Contractor's responsibility to maintain this surface until the final street restoration is complete.
 - (3) Sections limited to 400 ft. of open trench at a time.
 - (4) Temporary street striping may also be required.
 - (5) This surface must be removed prior to final asphaltting.
- g. All street work shall be done in accordance with the latest City of San Antonio Public Works' (or other city as applicable) construction specifications.
- h. Included in this requirement is replacement of any curbs or sidewalks damaged or removed during the construction.
- i. No separate payment for the surface restoration is permitted. The cost for this work must be included in the appropriate bid item.

804.7 DISPOSAL OF EXCAVATED MATERIALS: Any excess excavated material, not utilized after all fill requirements have been met, shall become the responsibility of the Contractor.

- 1. The Contractor shall dispose of it by hauling and wasting outside the limits of the rights-of-way or easements of this project and of public thoroughfares and water courses, in conformity with pertinent City, County, State and Federal codes and ordinances and in a manner meeting the approval of the Engineer or Inspector.

804.8 QUALITY CONTROL:

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1. All testing to be coordinated 48 hours in advance with SAWS Inspector.
2. Samples to be taken in conjunction with SAWS samples at same time and location.
3. Contractor to be prepared to test if coordinated with Inspector.
4. **Fines maybe assessed if Contractor cancels or delays owners geotechnical testing.**
5. Quality Assurance Testing: The Owner shall have such tests and inspections as he may desire performed by a nationally-accredited, independent testing laboratory for his guidance and control of the work.
 - a. The Owner will determine in-place density and moisture content by anyone or combination of the following methods:
 - (1) TxDOT Tex-113-E - Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials
 - (2) TxDOT Tex-114 -E- Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade, Embankment Soils, and Backfill Material
 - (3) ASTM D2922 (density of soil and soil aggregate in-place by nuclear methods – shallow depth),
 - (4) ASTM D1556 (density and unit weight of soil in-place by sand cone method),
 - (5) ASTM D2216 (lab density of water content of soil and rock),
 - (6) ASTM D3017 (water content of soil and rock – shallow depth in-place by nuclear methods) or most applicable approved equal provisions.
 - b. Payment for such tests shall be the responsibility of the Owner, including the material proctor tests and density tests.
 - c. The Contractor shall request testing work performed by the Owner by notifying the Owner of the areas available by Station Numbers or Dimensions and Lift Numbers.
 - d. The Contractor shall provide access to SAWS and to lab to the test area, backfilling test areas and provide associated trench excavation safety protection at the Contractor's expense for all depths and lifts.
 - e. The frequency and location of testing shall be determined solely by the SAWS. Or at a minimum tests will be done at location points randomly selected as indicated by the Inspector/Test Administrator, per each 18 (first lift from bottom) and 12 inch loose lift per 400 linear feet, at a probe depth of six (6) inches. One per lift per 400 ft.
 - f. The Owner may test any lift of fill at any time, location, or

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elevation.

5. Quality Control Testing: The Contractor shall be responsible for compaction in accordance with the appropriate Specification.
 - a. Compaction tests will be done at location points randomly selected or as indicated by the SAWS' Inspector/Test Administrator, per each 18 (first lift from bottom) and 12 inch loose lift per 400 linear feet, at a probe depth of six (6) inches. One per lift per 400 ft.
 - b. The inspector shall determine the depth at which the density test shall be taken.
 - c. All depths shall be considered for testing without a predetermined maximum or minimum
 - d. Test requirements above are indicated as a minimum requirement, but maybe subjected to follow more stringent requirements as established by other appropriate agencies (such as COSA Public Works Right of Way Management Plan, etc.)
 - e. Any failed test shall require the Contractor to remove and replace that layer of backfill in the identified section of the failed test location to the trench depth and a length 50 feet in both directions, then refilled and compacted to the grade and compaction level required.
 - 1) The Contractor will also be required at no cost to SAWS to provide two additional tests at the replaced location where the initial test failed and at one location point, randomly selected or as indicated by the SAWS Inspector/Test Administrator.
 - f. Sanitary Sewer Laterals will be subject to compaction tests at the discretion of the SAWS' Inspector/Test Administrator within 400 linear foot segments.
 - 1) Any failed test shall require the Contractor to remove and replace that layer of backfill in the identified section of the failed test location to the trench depth and a length 50 feet in both directions, then refilled and compacted to the grade and compaction level required.
 - 1) The Contractor will also be required at no cost to SAWS to provide two additional tests at the replaced location where the initial test failed and at one location point, randomly selected or as indicated by the SAWS' Inspector/Test Administrator.
 - g. The Contractor shall be responsible for all costs associated with the proctor and density tests, and for providing to SAWS and

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Consultant, if applicable, verification that necessary compaction levels were achieved.

- h. These tests shall be performed by a nationally-accredited, independent testing laboratory.
- g. The Contractor shall provide access to SAWS and to lab to the test area, backfilling test areas and provide associated trench excavation safety protection at the Contractor's expense for all depths and lifts.

804.9 MEASUREMENT: Excavation, Trenching and Backfill will not be measured for payment.

804.10 PAYMENT: No direct payment shall be made for incidental costs associated with quality control testing, excavation, trenching backfilling for water mains and sanitary sewers, and placement of all-weather material and all costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

End of Specification

Special Specification

ITEM NO. 840

Water Tie-Ins

840.1 DESCRIPTION: This item shall consist of water main tie-ins installed in accordance with these specifications and as directed by the Engineer.

840.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 840 refer to the current reference standard published at the time of the latest revision date Specification Item No. 840, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 290; Subchapter D – Rules and Regulations for Public Drinking Water
4. American National Standard Institute
 - 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.
5. American Society for Testing and Materials (ASTM) International: Pressure Pipe and Fittings.
 - a. ASTM A 36 - Standard Specification for Carbon Structural Steel.
 - b. ASTM A 536 - Standard Specification for Ductile Iron Castings.
 - c. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - d. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
 - e. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
 - f. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod and Bar.
 - g. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
 - h. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
 - i. ASTM E 709 - Standard Guide for Magnetic Particle Examination.
 - j. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
5. American Water Works Association (AWWA)
 - a. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
 - b. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inches through 144 Inches
 - c. AWWA C 800 - Standard for Underground Service Line Valves and Fittings.

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6. Occupational Safety and Health Administration
 - a. OSHA 29 CFR 1926.1101 - Asbestos

840.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawing, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

840.4 MATERIALS: The materials for water main tie-ins shall conform to the specifications contained within the latest revision of SAWS' Material Specifications for all appropriate items.

840.5 CONSTRUCTION: The Contractor shall make tie-ins from new water mains to existing water mains as shown in the contract documents or as directed by the Engineer.

1. The Contractor shall be responsible for all shutdowns and isolation of the existing mains; cutting pipe for the connection; dewatering the excavation; customer notification of the shutdown; and all other requirements as directed by the Inspector in order to provide completion of this effort in a safe and secure manner.
2. Work performed by the Contractor on mains 16 inches and larger, and any valves identified as critical will require operation of any valves by SAWS Distribution and Collection Department.
3. The planned shutdown and tie-in work and hours shall be coordinated through and approved by the Inspector with a minimum of two weeks prior to such activities and accomplished at a time which will be at the least inconvenience to the customers.
4. No additional compensation will be provided for tie-ins accomplished after normal working hours.
5. Contractor to be prepared to shutdown if coordinated with Inspector. Fines may be assessed if Contractor cancels or delays owners.

840.6 MEASUREMENT: Tie-ins will be measured by the unit of each such assembly of the various sizes of tie-ins installed at the proposed main to be accepted.

1. Measurement of "48" Water Tie-in Connection" complete in place, shall be by unit price per each tie-in connection installed.

840.7 PAYMENT: Payment for "Tie-ins" will be made at the unit price bid for each tie- in of the various types and sizes completed from an existing main to the proposed main to be accepted.

1. Such payment shall include; shut-down and isolation of the existing main to which the new main is to be connected, cutting pipe for the connection, dewatering the excavation, and customer notification of service interruption where required.
2. Connections between new and existing mains which are made with tapping sleeves and valves and by cutting-in tees will be processed as separate pay item.
3. "48" Water Tie-in Connection," measured as provided above, will be paid for at

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the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

End of Specification

Special Specification

ITEM NO. 841

Water Hydrostatic Testing Operations

841.1 DESCRIPTION: This item shall consist of hydrostatic testing operations, of water mains in accordance with these specifications.

841.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 841 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 841, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specification for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 210 Use of Reclaim Water and
 - b. Chapter 290 Public Water Systems
 - c. Chapter 217 Design Criteria for Domestic Wastewater Systems
 - d. Chapter 213 Edwards Aquifer

841.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawing, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

841.4 MATERIALS: The materials for hydrostatic testing operations installation and adjustment shall conform to the appropriate specifications contained within the latest revision of SAWS' Material Specifications.

841.5 CONSTRUCTION:

1. General:
 - a. Flushing: Immediately upon completion of water main work, the Contractor shall flush all mains affected by the scope of the work. This flushing shall consist of completely filling sections of main between valves and then displacing such initial volumes of water by introducing clear water from existing facilities into and through the main to the point of discharge from the main being flushed. The flow-through shall continue until it is determined all dust, debris, or foreign matter that may have entered during pipe laying operations has been flushed out. All new mains shall then be isolated prior to and during testing.

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- b. To avoid damage to pavement and inconvenience to the public, fire hoses shall be used to direct flushing water from the main into suitable drainage channels or sewers. The contractor is to coordinate with the Inspector prior to flushing.
 - c. Cross Contamination is to be avoided.
 - d. Operation of Valves: No valve in the Owner's water distribution system shall be operated by the Contractor without prior permission of the Inspector. The Contractor shall notify the Inspector when a valve is to be operated and shall only operate the valve in the presence of the Inspector.
2. Hydrostatic Test: The transmission main pipe segments shall be hydrostatically field tested at the working pressure of the pipe before acceptance by the Engineer.
- a. It is the intent of these Specifications that all joints be watertight and that all joints which are found to leak by observation during any test shall be made watertight by the Contractor.
 - b. When repairs are required, the hydrostatic field test shall be repeated until the pipe installation conforms to the specified requirements and is acceptable to the Engineer/Inspector.
 - c. The Contractor shall insure that the Engineer/Inspector be present for the duration of the pressure test.
3. Test Procedures: After the new main has been laid and backfilled as required in Specification Item No. 804 Excavation, Trenching, and Backfill, (but prior to chlorination and replacement of pavement), it shall be filled with water for a minimum of 24 hours and then subjected to a hydrostatic pressure test.
- a. The specified test pressure shall be supplied by means of a pump connected to the main in a satisfactory manner.
 - b. The pump, pipe connection, and all necessary appurtenances including gauges and meters measuring (gallons) shall be furnished by the Contractor.
 - c. Unless otherwise specified, the Owner will furnish water for filling lines and conducting tests from existing mains.
 - d. Before applying the specified test pressure, all air shall be expelled from the main.
 - e. To accomplish this, taps shall be made, if necessary, at the points of highest elevation and afterwards tightly plugged at no cost to the Owner.
 - f. At intervals during the test, the entire route of the new main shall be inspected to locate any leaks or breaks.
 - i. If any are found, the test shall be stopped and the main repaired, and the main test shall be repeated until satisfactory results are obtained.
 - g. The hydrostatic test shall be made so that the maximum pressure at the lowest point does not exceed the specified test pressure.

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- h. The duration of each pressure test shall be a minimum of 4 hours for new mains in excess of 1000 linear feet and a minimum of 1 hour for new mains less than 1000 linear feet after the main has been brought up to test pressure.
- i. The test pressure shall be measured by means of a tested and properly calibrated pressure gauge acceptable to the Engineer/Inspector.
- j. All pressure tests shall be continued until the Inspector is satisfied that the new main meets the requirements of these Specifications.
- k. Should any test of pipe in place disclose leakage greater than that listed in Table 841-1 or 841-2, "Hydrostatic Test Leakage Allowances," as applicable, the Contractor shall, at his own expense, locate and repair the main until the leakage is within the specified allowance.
- l. All pipelines with welded joints shall have zero leakage.
- m. Leakage is defined as the quantity of water supplied into the newly laid main, or any valved section of it, necessary to maintain the specified leakage test pressure after the main has been filled with water and the air expelled.
- n. DD-841 Drawing Series includes a schematic showing the arrangement of the test apparatus as well as the detailed procedure for conducting the hydrostatic field test.
- o. Contractor to be prepared to test if coordinated with Inspector. Fines maybe assessed if Contractor cancels or delays testing

841.6 MEASUREMENT: Reference Supplementary Specification SS 841A for measurement requirements.

841.7 PAYMENT: Reference Supplementary Specification SS 841A for payment requirements.

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TABLE 841-1

HYDROSTATIC TEST LEAKAGE ALLOWANCES (MAXIMUM) @ 150 PSI														
Nominal Diameter & Type Pipe	ALLOWABLE LEAKAGE IN GALLONS PER HOUR (GPH)*													
	100 L.F.	200 L.F.	300 L.F.	400 L.F.	500 L.F.	600 L.F.	700 L.F.	800 L.F.	900 L.F.	1000 L.F.	2000 L.F.	3000 L.F.	4000 L.F.	5000 L.F.
6" DI**	0.11	0.22	0.33	0.44	0.55	0.66	0.77	0.88	0.99	1.10	2.20	3.30	4.40	5.50
8" DI**	0.15	0.29	0.44	0.59	0.71	0.88	1.03	1.18	1.32	1.47	2.94	4.41	5.88	7.35
12" DI**	0.22	0.44	0.66	.088	1.10	1.32	1.54	1.76	1.98	2.20	4.40	6.60	8.80	11.00
16" DI**	0.29	0.59	0.88	1.18	1.47	1.76	2.06	2.35	2.65	2.94	5.88	8.82	11.76	14.70
20" DI**	0.39	0.74	1.10	1.47	1.84	2.21	2.55	2.94	3.31	3.68	7.63	11.04	14.72	18.40
20" CSC	0.08	0.16	0.24	0.32	0.40	0.47	0.55	0.63	0.71	0.79	1.58	2.37	3.16	3.95
24" DI**	0.44	0.88	1.32	1.76	2.21	2.65	3.09	3.53	9.97	4.41	8.82	13.23	17.64	22.05
24" CSC	0.1	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.90	2.85	3.80	4.75
30" DI**	0.55	1.1	1.66	2.21	2.76	3.31	3.86	4.42	4.97	5.52	11.04	16.56	22.08	27.60
30" CSC	0.12	0.24	0.35	0.47	0.59	0.71	0.83	0.94	1.06	1.18	2.36	3.54	4.72	5.90
36" DI**	0.66	1.32	1.99	2.65	3.31	3.97	4.63	5.3	5.96	6.62	13.24	19.86	26.48	33.10
36" CSC	0.14		0.28	0.57	0.71	0.85	0.99	1.14	1.28	1.42	2.84	4.26	5.68	7.10
42" DI**	0.77	1.54	2.32	3.09	3.86	4.63	5.4	6.18	6.95	7.72	15.44	22.16	30.88	38.60
42" CSC	0.17	0.33	0.5	0.66	0.83	1	1.16	1.33	1.49	1.66	3.32	4.98	6.64	8.30
48" DI**	0.88	1.77	2.65	3.53	4.42	5.3	6.18	7.06	7.95	8.83	17.66	26.16	35.32	44.15
48" CSC	0.19	0.38	0.57	0.76	0.95	1.13	1.32	1.51	1.7	1.89	3.78	4.98	6.64	8.30
54" CSC	0.21	0.42	0.63	0.84	1.05	1.26	1.47	1.68	1.89					
60" CSC	0.24	0.48	0.72	0.96	1.2	1.44	1.68	1.92	2.16					

* PVC pipe shall be tested to DI pressures. GPH for CSC Pipe are manufacturer's maximum.

** DI pipe includes mechanical and push-on joints.

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TABLE 841-2										
Hydrostatic Test Leakage Allowances (Maximum) @ 200 PSI										
Nominal Pipe Diameter	Allowable Leakage in Gallons Per Hour (GPH)*									
	100 L.F.	200 L.F.	300 L.F.	400 L.F.	500 L.F.	600 L.F.	700 L.F.	800 L.F.	900 L.F.	1000 L.F.
6" DI**	0.13	0.25	0.38	0.51	0.64	0.6	0.89	1.02	1.14	1.27
8" DI**	0.17	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.7
12" DI**	0.26	0.51	0.77	1.02	1.28	1.53	1.79	2.04	2.3	2.55
16" DI**	0.34	0.68	1.02	1.36	1.7	2.04	2.38	2.72	3.06	3.4
20" DI**	0.43	0.85	1.28	1.7	2.13	2.55	2.98	3.4	3.83	4.25
20" CSC	0.08	0.16	0.24	0.32	0.4	0.47	0.55	0.63	0.71	0.79
24" DI**	0.51	1.02	1.53	2.04	2.55	3.06	3.57	4.08	3.59	5.1
24" CSC	0.1	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95
30" DI**	0.64	1.27	1.91	2.55	3.19	3.82	4.46	5.1	5.73	6.37
30" CSC	0.12	0.24	0.35	0.47	0.59	0.71	0.83	0.94	1.06	1.18
36" DI**	0.76	1.53	2.29	3.06	3.82	4.58	5.35	6.11	6.88	7.64
36" CSC	0.14	0.28	0.43	0.57	0.71	0.85	0.99	1.14	1.28	1.42
42" DI**	0.89	1.78	2.68	3.57	4.46	5.35	6.24	7.14	8.03	8.92
42" CSC	0.17	0.33	0.5	0.66	0.83	1	1.16	1.33	1.49	1.66
48" DI**	1.02	2.04	3.06	4.08	5.1	6.11	7.13	8.15	9.17	10.19
48" CSC	0.19	0.38	0.7	0.76	0.95	1.13	1.32	1.51	1.7	1.89
54" CSC	0.21	0.42	0.63	0.84	1.05	1.26	1.47	1.68	1.89	2.1
60" CSC	0.23	0.46	0.69	0.92	1.15	1.38	1.61	1.84	2.07	2.3

* PVC pipe shall be tested to DI pressures. GPH for CSC pipe are manufacturer's maximum.

** DI pipe includes mechanical and push-on joints.

End of Specification

Special Specification

ITEM NO. 844

Temporary and Permanent Blow-off Assemblies

844.1 DESCRIPTION: This item shall consist of blow-off assemblies installed in accordance with these specifications and as directed by the Engineer.

844.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 844 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 844, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specification for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 210 Use of Reclaim Water
 - b. Chapter 290 Rules and Regulations for Public Regulations for Public Water Systems
 - c. Chapter 213 Edwards Aquifer.
4. American National Standard Institute
 - a. ANSI A 21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. ANSI/NSF Standard 61 - Drinking Water System - Health Components. American Society for Testing and Materials (ASTM) International:
Pressure Pipe and Fittings.
 - a. ASTM A 36 - Standard Specification for Carbon Structural Steel.
 - b. ASTM A 536 - Standard Specification for Ductile Iron Castings.
 - c. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - d. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
 - e. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
 - f. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod and Bar.
 - g. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
 - h. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
 - i. ASTM E 709 - Standard Guide for Magnetic Particle Examination.

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- j. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
- 6. American Water Works Association (AWWA)
 - a. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inches through 144 Inches

844.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawing, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals and submittals shall be approved prior to delivery.

844.4 MATERIALS: The materials for blow-off assemblies, installation and adjustment shall conform to the specifications contained within the latest revision of SAWS' Material Specification.

844.5 CONSTRUCTION: Permanent and temporary blow-off assemblies shall be installed where shown on the plans and/or at locations designated by the Engineer and at the end of the all dead end mains in accordance with the Texas Administrative Code (TAC) rules to include 30 TAC § 290.44.(d)(5), (6).

- 1. The permanent blow-off shall consist of all galvanized iron pipe, valve, and fittings of the various sizes shown on the plans, six (6) inch valve box assembly and concrete collar around the valve box.
- 2. The temporary blow-off shall consist of all galvanized iron pipe, valve and fittings of the various sizes shown on the plans.
- 3. Valve box shall be raised or installed to finished grade and installed in accordance with Standard Drawing DD-844 Series.

844.6 MEASUREMENT: Permanent Blow-off assemblies will be measured by the required unit of each such assembly of the various sizes of permanent blow-offs installed.

- 1. Temporary Blow-off assemblies will be measured by the required unit of each such assembly of the various sizes of temporary blow-offs installed.
- 2. Measurement of "12" Pipe Drain Assembly and Structure", shall be by unit price per each assembly installed.

844.7 PAYMENT: Payment for Permanent and Temporary Blow-off will be made at the unit price bid for each such required assembly of the various types and sizes installed in accordance with the details shown in the Standard Drawing DD-844 Series.

- 1. "12" Pipe Drain Assembly and Structure," measured as provided above, will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

Special Specification

2. “Temporary Blowoff Assemblies,” will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

End of Specification

Special Specification

ITEM NO. 845

Gate, Fencing, and Property Marker Details

845.1 DESCRIPTION: This item shall consist of gates, fences, and property markers installed, replaced, or modified in accordance with these specifications and as directed by the Engineer.

845.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 845 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 845, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specification for Construction

845.3 SUBMITTALS: Contractor shall submit manufacturer's product data, installation instructions, recommendations, shop drawings, and any required installer certification(s). All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

845.4 MATERIALS: The materials for gate and fence installation and/or adjustment, as well as property marker installation shall conform to those as identified on drawings DD-903 Drawing Series.

1. Chain Link Fabric: 96" FABRIC, 1" PATTERN
 - a. Hot dipped Galvanized chain link conforming to ASTM A392-89, Class 2; galvanized after weaving (GAW).
 - b. Height: 96 inches, unless otherwise shown.
 - c. Wire Gauge: No. 9.
 - d. Pattern: 1"-inch diamond-mesh.
 - e. Diamond Count: Manufacturer's standard and consistent for fabric furnished of same height.
 - f. Loops of Knuckled Selvages: Closed or nearly closed with space not exceeding diameter of wire.
 - g. Wires of Twisted Selvages
 - h. Twisted in a closed helix three full turns.
 - i. Cut at an angle to provide sharp barbs that extend minimum 1/4-inch beyond twist top and bottom.
2. Do not install chain link until concrete has cured minimum 7 days.
3. PIPE POSTS and LINE POSTS
 - a. Steel pipe shall be galvanized and conform to ASTM F 1083-90 with strength and stiffness required by ASTM F 669-90a, Heavy Industrial Fence, except as modified herein.
 - b. End, Corner, Angle, and Gate posts shall have a 4 inch outside diameter and a weight of 9.11 pounds per foot, in conformance with ASTM F 900-84.

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- c. Line Post posts shall have a 2-3/8 inch outside diameter and a weight of 3.65 pounds per foot.
- 4. Installation of ground bonding shall be evaluated by the design engineer on a case-by-case basis.
- 5. Design engineer shall be responsible for determine when ground bonding will be required.
- 6. TOP RAILS, MIDDLE RAILS, BOTTOM RAILS AND BRACE RAILS
 - a. Galvanized steel pipe.
 - b. Protective Coatings: As specified for posts.
 - c. Strength and Stiffness Requirements: ASTM F1043-08, Top Rail, Heavy Industrial Fence.
 - d. Steel Pipe:
 - i. ASTM F1083-08.
 - ii. Outside Diameter: 1-5/8-inch.
 - iii. Weight: 2.27 pounds per foot.
- 7. FENCE FITTINGS: General: In conformance with ASTM F626-14, except as modified by this article. Post and Line Caps:
 - a. Designed to accommodate passage of top rail through cap, where top rail required.
 - b. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.
- 8. Rail Fittings: Provide the following:
 - a. Bottom and Top-Rail Sleeves: Pressed steel or round steel tubing not less than 7 inches long.
 - b. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line to line posts.
- 9. Tension and Brace Bands: Pressed steel, 0.105 inch thick, minimum 0.75 inch wide, with 2.0-oz/sq. ft. metallic (zinc) coating.
- 10. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric with 2.0-oz/sq. ft. metallic (zinc) coating. Minimum cross section of 1/4-inch by 3/8-inch. Provide one bar for each gate and end post, and two for each corner and pull post unless fabric is integrally woven into post.
- 11. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment. Minimum 5/16-inch diameter truss rod.
- 12. Barb Arms: 45-degree arms facing outward for supporting three strands of barbed wire.
- 13. Tie Wires, Clips, and Fasteners: According to ASTM F 626 and ASTM F 1916.
- 14. High-Security Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Metallic-Coated Steel: 9 gauge wire with galvanized coating thickness matching coating thickness of chain-link fence fabric.
 - b. Pre-formed steel post ties.
 - c. Install with Easy Twist tool.
- 15. Finish:
 - a. Metallic Coating for Pressed Steel or Cast Iron: Not less than 2.0-oz/sq. ft. metallic (zinc) coating.

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- b. Aluminum: Mill finish.
- 16. TENSION WIRE
 - a. Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire complying with ASTM A824 and the following: Metallic Coating: Type II, zinc coated (galvanized) hot-dip process, with the following minimum coating weight: Class 5: Not less than 2.0 oz./sq. ft. of uncoated wire surface.
- 17. BARBED WIRE
 - a. Zinc-Coated Barbed Wire: ASTM A121-13, Chain Link Fence Grade: Line Wire: Three (3) strands of No. 12-1/2 gauge.
 - b. Barbs:
 - Number of Points: Four.
 - Length: 3/8-inch minimum.
 - Shape: Round.
 - Diameter: No. 14-gauge.
 - Spacing: 5 inches.

845.5 TEMPORARY CONSTRUCTION FENCE

GENERAL:

1. Temporary construction fence shall be for the purpose of limiting ingress of livestock and deter unauthorized personnel.
2. The temporary construction fence shall be constructed of such quality to withstand installation and removal as necessary along the pipeline. If in the Owners judgement the fence can no longer serve stated purpose it is to be repaired or replaced by the Contractor.
3. Fence materials shall be as specified in 845.4.
4. Fence shall be installed and secured into the ground every 20 ft.
5. Fence shall be fitted with Top, Middle, Bottom and Brace Rails. Barbed Wire is not required
6. Fence shall follow the contour of the ground and be no more than 3 inches from the ground surface.

845.6 GATES (UNLESS OTHERWISE SPECIFIED ELSEWHERE)

GENERAL:

1. Gate Operation: Opened and closed easily by one person.
2. Welded Steel Joints: Paint with zinc-based paint.
3. Chain Link Fabric: Attached securely to gate frame at intervals not exceeding 24 inches.
 - Swing Gates: ASTM F900-84.
1. Hinges:
 - a. Furnished with large bearing surfaces for clamping in position. Designed to swing either 180 degrees outward, 180 degrees inward, or 90 degrees in or out, as shown, and not twist or turn under action of gate.
2. Latches: Plunger bar arranged to engage stop, except single gates of openings less

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than 10 feet wide may each have forked latch.

3. Gate Stops: Mushroom type or flush plate with anchors, suitable for setting in concrete.
4. Locking Device and Padlock Eyes: Integral part of latch, requiring production lock carousel for locking both gate leaves of double gates.
5. Hold-Open Keepers: Designed to automatically engage gate leaf and hold it in open position until manually released.

CHAIN LINK CANTILEVER SLIDE GATE ASTM F-1184.

1. Classification: Fabricate chain link cantilever slide gates in accordance with ASTM F 1184-05. Type II Cantilever Slide, Class 2 with internal roller assemblies.
2. Manufacturers:
 - a. The cantilever slide gate system shall be manufactured by Tymetal Corp., 2549 State Route 40 Greenwich, NY 12834. Ph. (800) 328-4283.
3. Certifications:
 - a. Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification
 - b. Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certifications of Welder Qualifications documenting successful completion of the requirements of the AWS D1.2 code shall be provided.
4. Dimensions: Per the Project Contract Plans.
5. Construction Details:
 - a. Gate Frame:

The gate frame shall be fabricated from 6063-T6 aluminum alloy extrusions. The top member shall be a 3 inch x 5 inch (76 mm x 127 mm) aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf (4.4 kg/m). To maintain structural integrity this frame member shall be “keyed” to interlock with the “keyed” track member. If fabricated as a single horizontal piece, the bottom member shall be a 2 inch x 5 inch (51 mm x 127 mm) aluminum structural tube weighing not less than 2.0 lb/lf (2.9kg/m). When the gate frame is manufactured in two horizontal pieces or sections, they shall be spliced in the field (the gate frame shall be fabricated in one or multiple sections depending on size requirements or project constraints).
 - b. Vertical Members:
 - i. The vertical members at the ends of the gate frame shall be “P” shaped in cross section with a nominal base dimension of no less than 2 inch x 2 inch (51 mm x 51 mm) and weighing not less than 1.1 lb/lf (2.3kg/m). Major 2 inch x 2 inch (51 mm x 51 mm) vertical members weighing not less than 1.1 lb/lf shall separate each bay and shall be spaced at less than gate height intervals.
 - ii. Intermediate 1 inch x 2 inch (25mm x 51mm) vertical members weighing not less than 0.82 lb/lf shall alternate between 2 inch x 2 inch major members.
 - c. Gate Track:

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- i. The gate frame shall have a separate semi-enclosed “keyed” track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, weighing not less than 2.9 lb./lf (4.2 kg/m). The track member is to be located on only one side of the top primary. Welds to be placed alternately along the top and side of the track at 9 inch (229) centers with welds being a minimum of 2 inch (51 mm).
- d. Welds:
 - i. All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code.
- e. Gate Mounting:
 - i. The gate frame is to be supported from the track by two (2) swivel type, self-aligning, 8-wheeled, sealed lubricant, ball-bearing truck assemblies.
 - ii. The bottom of each support post shall have a bracket equipped with a pair of 3 inch (76 mm) UHMV guide wheels. Wheel cover protectors shall be included with bottom guides to comply with UL325.
 - iii. Gap protectors shall be provided and installed, compliant with ASTM F 2200-05.
- f. Diagonal Bracing:
 - i. Diagonal “X” bracing of 3/16 inch (5 mm) minimum diameter stainless steel aircraft cable shall be installed throughout the entire gate frame.
 - ii. The gate shall be completed by installation of approved filler as specified.
- g. Chain Link: 1 inch x 1 inch, 9 gauge galvanized steel chain link fabric shall extend the entire length of the gate (if operated gate, counterbalance must also have fabric to prevent reach through and comply with ASTM F2200. Fabric shall be attached at each end of the gate frame by standard fence industry tension bars and tied at each 2 inch x 2 inch and 1 inch x 2 inch vertical members with standard fence industry ties at three different places each member. ASTM F2200 requires attachment method that leaves no leading or bottom edge protrusions (cannot exceed 0.5 inch). Chain link fabric must have a triple twisted selvage top and bottom with a cut at slant ¼ inch above twist.
- 6. Finish: Gate to be mill finish aluminum.
- 7. Warranty: The truck assembly shall be warranted against manufacturing defects by the manufacturer for a period of 5 years from date of sale.
 - a. Provide as specified in Section 03300 Cast-In-Place Concrete.

DOUBLE GATES

GENERAL:

Gates shall be lengths as required in scope constructed of 1½ inch diameter, galvanized 16

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gauge steel tubing with all joints welded. Gates shall comply with ASTM F 900-84.

1. Hinges shall be galvanized having large bearing surfaces for clamping in position and shall be designed to swing either 180 degrees outward, 180 degrees inward, or 90 degrees in and out, and not twist or turn during action of the gate. Bolt hooks shall be galvanized steel or stainless steel.
2. Installation of gatekeepers and padlock keepers are not required except for hardware at cantilevered gates. Upon beneficial completion of the gate installations, SAWS will install chains and combination locks. Refer to details and drawings for hardware on cantilever gate.
3. Gate Operation: Opened and closed easily by one person.
4. Welded Steel Joints: Paint with zinc-based paint.
5. Chain Link Fabric: Attached securely to gate frame at intervals not exceeding 15 inches.
6. Only Tubular steel swing gates as indicated on the plans will be allowed. No temporary gap-type gates or panel gates will be allowed.

845.7 CONCRETE & CONCRETE FOOTING DETAILS

1. Concrete shall achieve a 21 day compressive strength of at least 3,000 psi.
2. Installation of a continuous concrete footing throughout the entire length of the new fence with proper formwork continuous.
3. All fence posts (corner, line etc...) are to be centered and incorporated into the concrete footing.
4. Bottom of fencing shall be flush with proposed footing, fencing shall be secured to the footing by a galvanized rod at two foot intervals or as submitted by contractor and approved by the Owner.
5. Footing shall be a continuous "mow strip" 12"W x 6"D and flush with existing ground elevation. Any significant grade change will require a step in fencing and "Mow strip" footing shall step as required with fence. Contractor to verify any drops in existing grades and step in footing with owner prior to setting formwork.
 - a. When the potential for storm runoff entering the site exist, the "mow strip" shall be raised 8" above finish grade to provide a protection concrete barrier. Design engineer shall be responsible for adjusting dimensions to compensate for raised "mow strips" and to incorporate site draining means to prevent puddling within the site.
6. Concrete shall conform with the A - Classification for 3,000 PSI concrete as specified in SAWS specification for construction: 300 - "CONCRETE (NATURAL AGGREGATE)".
7. Footing shall have two number four (#4) rebar throughout the entire length, with #3 rebar at 10" o.c. as shown on attached drawings expansion joints shall be installed at forty foot intervals while dummy joints shall be placed every 10'.
 - a. When "mow strip" needs to be raised for storm runoff protection, the design engineer shall be responsible for determine any additional rebar to assure the raised mow strip has proper resistance to cracking.

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8. Check size and spacing of rebar and footing width and depth. Ensure that there is a minimum of 3" between earth and rebar. Rebar should be centered in footing as shown on drawings.
9. Rebar must be properly supported/tied to maintain its position during concrete placement operations through the use of wire ties (18 gauge or greater), chairs, spacers or other approved supporting devices. Do not allow the use of rocks, wood blocks, or other unapproved material as support for reinforcement. Reinforcement support chairs shall be spaced typically every 5 to 6 feet. Wire tie ends shall be twisted away from concrete surfaces (toward the interior of the footer.)
10. Formwork must be properly braced and supported to prevent "blowouts" or unacceptable deformation of the formed surfaces. All formed surfaces shall be coated with approved form oil before placement of reinforcement so as to avoid coating the reinforcement.
11. During hot weather (temperatures above 80 degrees F) or during high winds, care must be taken to prevent excessive moisture loss in the concrete which can lead to surface shrinkage cracking.
12. Top of concrete at continuous footing shall have a continuous crown to readily shed water before concrete sets.
13. Top of concrete at continuous footing shall be sloped to readily shed water away from base of posts before concrete sets.
14. Where mow-strip is installed through asphalt, the asphalt shall be saw cut to provide smooth edges. Any broken asphalt will require patching.
15. Mow Strip to be continuous across gate openings.

845.7 CONSTRUCTION:

Install chain link fences and gates in accordance with ASTM F567-14a except as modified in this section, and in accordance with fence manufacturer's recommendations, as approved by OWNER. Erect fencing in straight lines between angle points.

1. Provide all necessary hardware for a complete fence and gate installation.
2. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting.
3. Do not begin installation before final grading is completed, unless otherwise permitted by OWNER.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

1. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 100 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

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POST SETTING

1. Driven posts are not acceptable.
 - a. Post Hole Depth and Diameter :
 - i. Minimum 38 inches below finished grade.
 - b. 2 inches deeper than post embedment depth below finish grade.
 - c. Diameter SAWS standard 18".
 - d. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - e. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter. Blend with concrete mow strip.
2. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
3. Line Posts: Space line posts uniformly at 10 feet o.c.
4. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.
 - a. Locate horizontal braces at mid-height of fabric 6 feet or higher, on fences with top rail, and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
5. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
6. Tie Wires: Power-fastened or manually fastened ties configured to wrap a full 360 degrees around rail or post and a minimum of 1 complete diamond of fabric. Twist ends one and one-half machine twists or three full manual twists, and cut-off protruding ends to preclude untwisting by hand.
 - a. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
7. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
 - a. Do not install fabric until concrete has cured minimum 7 *calendar* days.
 - b. Install fabric with twisted and barbed selvage at top.
8. Barbed Wire
 - a. Install three strands of barbed wire on brackets, tighten, and secure at each bracket.
 - b. Brackets to be vertical facing outward.

GATE OPERATORS

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1. HySecurity
2. SlideDriver 50VF2/3
3. Operator Specifications
4. Duty Cycle Continuous
5. Travel Speed Field adjustable, 2.2 ft. /s (70 cm/s) or 3 ft. /s (91 cm/s).
Emergency Fast Operate 3 ft/s (91 cm/s)
6. Gate Length Limited only by weight
7. Gate Capacity up to 5,000 lb (2,268 kg)
8. Operator HP 2 hp
9. Drive Type Hydraulic
10. Pull Force 300 lb (136 kg)
11. UPS Optional 230V AC Power Supply w/HyInverter AC™ provides up to 3,000 ft (914 m) of gate travel after AC power loss.*
12. Standard voltage system shall be: Three Phase Voltages 230-Vac, 60-Hz. Other voltage systems will be accepted on a case-by-case basis.
13. Minimum branch circuit for gate operators shall be stranded copper 10-AWG, XHHW run within a 1-inch dedicated conduit. All discrete signal circuits shall be installed in a dedicated 1-inch conduit. Any analog signal, if used, shall be installed in a dedicated 1-inch conduit.
14. Gate Operator Disconnecting Means
15. Disconnecting means shall be provided at the gate operator, and one spare 1-inch conduit shall be provided from panelboard source to the disconnecting means.
16. Temperature Rating -40° to 158° F (-40° to 70° C) No heater necessary.
17. Communication RS-232, RS-485; Ethernet/fiber using optional HyNet™ Gateway accessory. Communication wiring from SAWS Security panel to gate operator board shall be installed in a dedicated 1-inch conduit. One spare 1-inch conduit from SAWS security panel to gate operator shall be provided.
18. User Controls Smart Touch Controller with 70+ configurable settings. Smart Touch keypad and 32 character, OLED display or a PC using S.T.A.R.T. software.
19. Relays three configurable user relays: one 30VDC, 3A solid state and two 250VAC, 10A electromechanical; Optional Hy8Relay™ for 8 additional relay outputs
20. App Class Usage Class III, IV
21. Enclosure N/A
22. Finish Type Zinc plated with powder coating
23. Warranty 5 year

* *The operator's normal duty cycle and the actual number of gate cycles available from battery depends upon gate length/weight, battery size, state of charge and health, ambient temperature, accessory power draw and frequency of gate cycles during power outage. The design consultant shall be responsible for evaluating how critical is accessibility to the facility, what is the expected peak gate cycles per day and to provide a recommendation.

845.5 MEASUREMENT:

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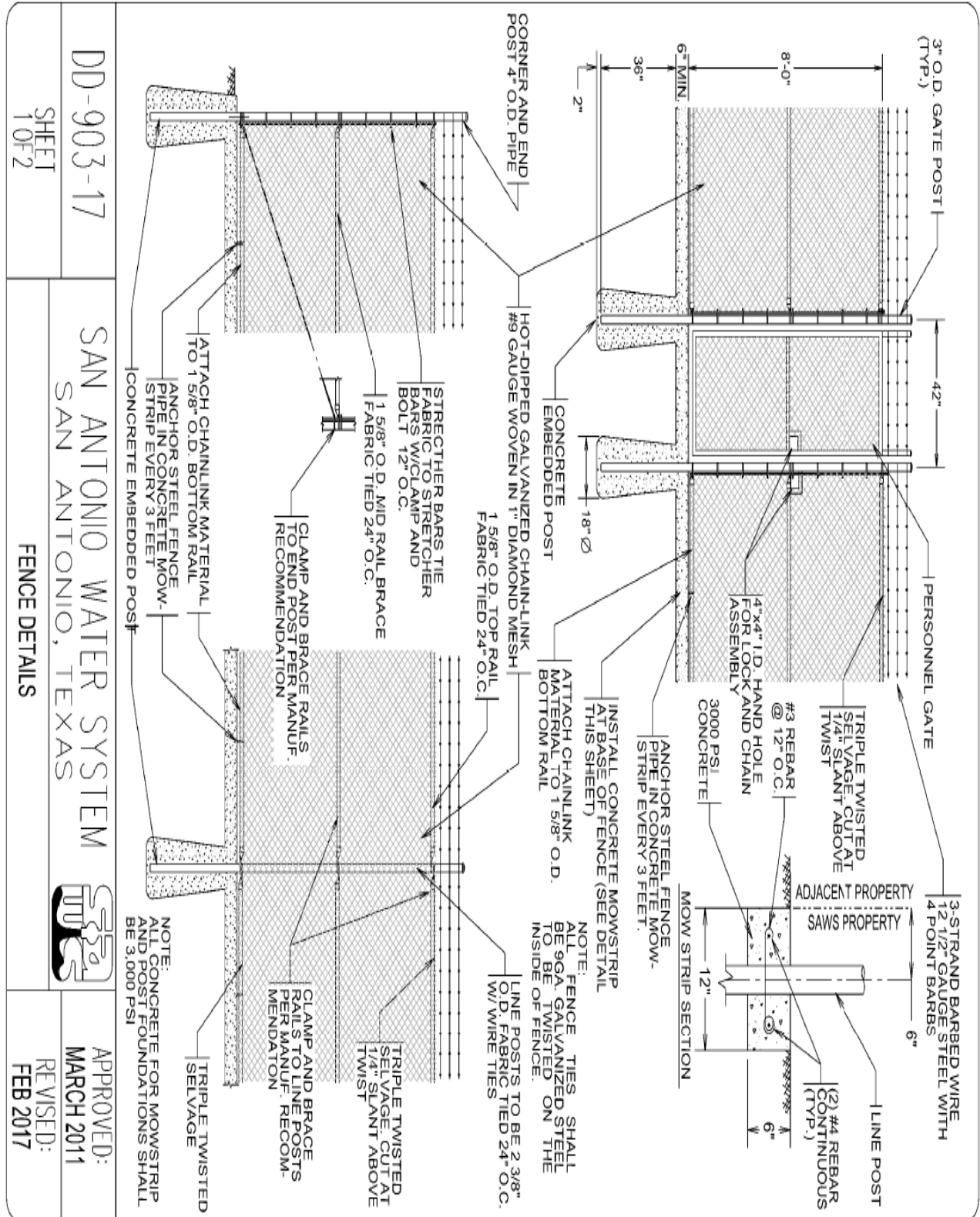
1. Measurement of “Type 1 Gate”, shall be by unit price per each installed.
2. Measurement of “Pipeline Markers”, shall be by unit price per each installed.
3. Measurement of “Temporary Construction fencing”, shall be by unit price per linear foot installed.
4. Measurement of “Chain Link Security Fencing”, shall be made by the unit price per linear foot installed.

845.6 PAYMENT:

1. “Type 1 Gate,” measured as provided above, will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
2. “Pipeline Markers,” will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
3. “Temporary Construction Fencing,” measured as provided above, will be paid for at the contract unit price per linear foot, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
4. “Chain Link Security Fencing”, measured as provided above, will be paid for at the contract unit price per linear foot, which shall be full compensation for work herein specified in the Contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

End of Specification

San Antonio Water System Special Specifications for Construction



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SHEET
1 OF 2

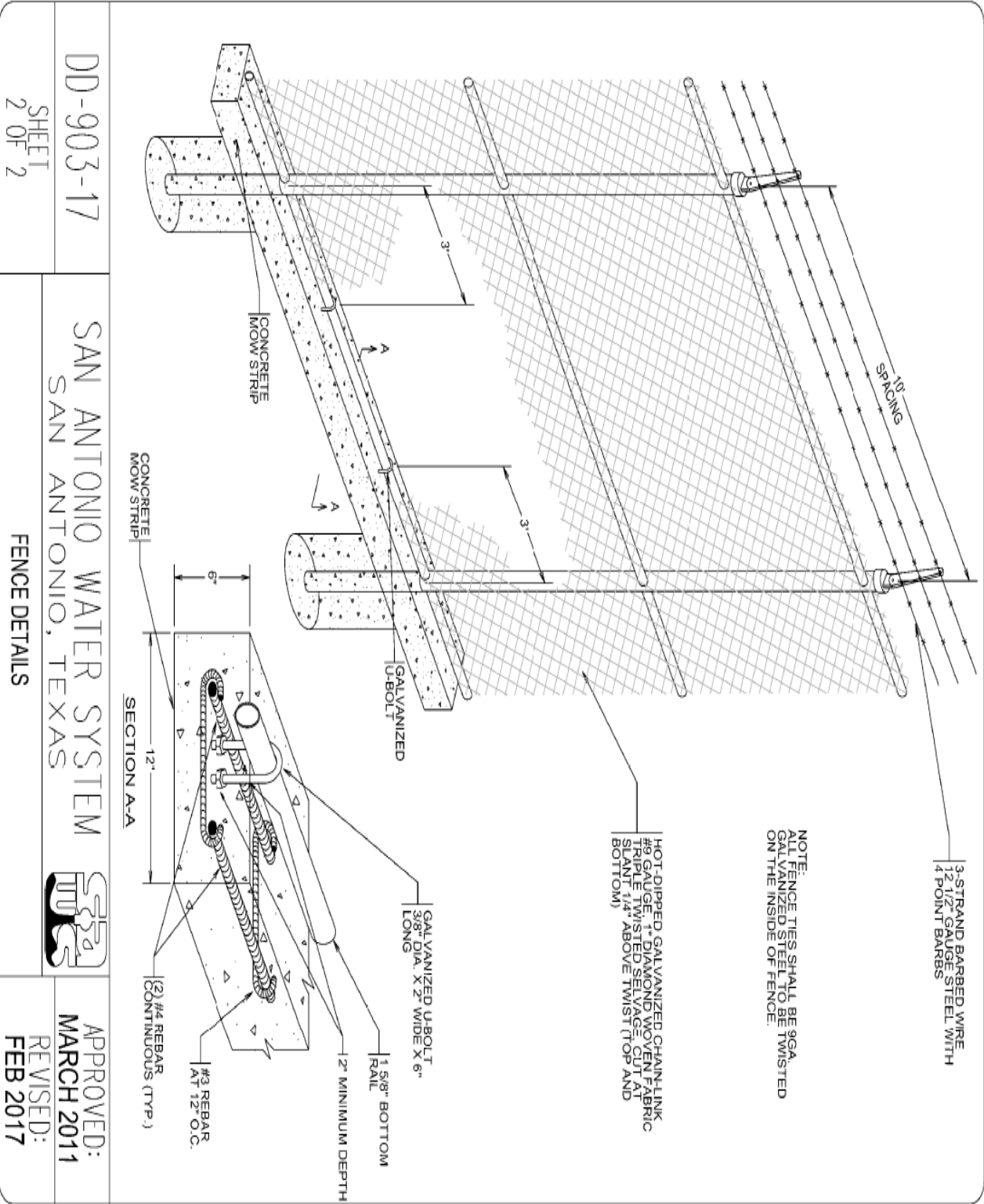
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

FENCE DETAILS



APPROVED:
MARCH 2011
REVISED:
FEB 2017

San Antonio Water System Special Specifications for Construction



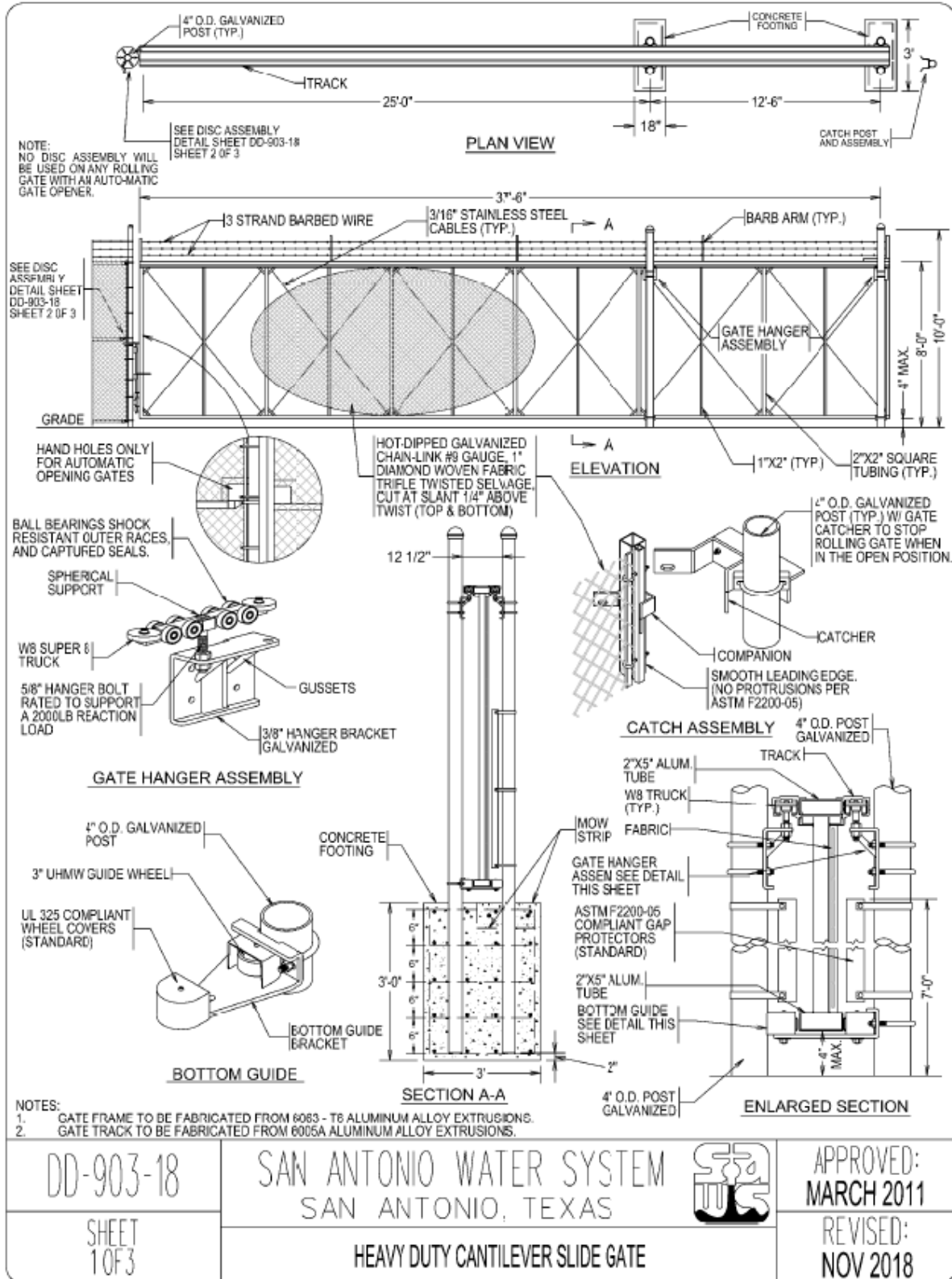
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2 OF 2

SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS
FENCE DETAILS

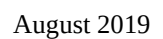


APPROVED:
MARCH 2011
REVISED:
FEB 2017

San Antonio Water System Special Specifications for Construction

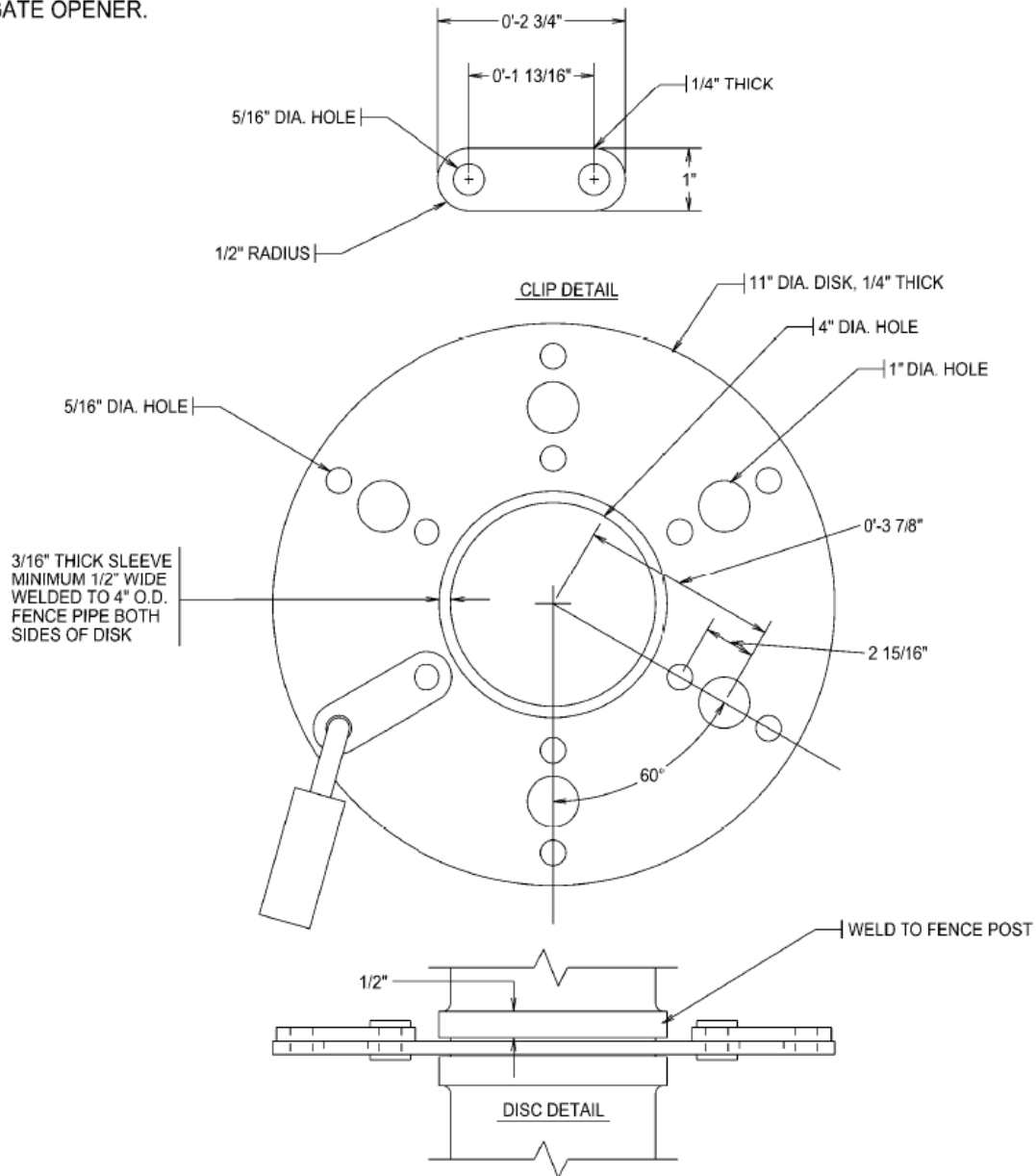


036_SP 845 Gate Fencing and Property Marker Details_RNJ



San Antonio Water System Special Specifications for Construction

NOTE:
NO DISC ASSEMBLY WILL
BE USED ON ANY ROLLING
GATE WITH AN AUTO-MATIC
GATE OPENER.



NOTE:

1. ALL SPARE CLIPS TO BE COMPLETELY WELDED ALL AROUND. TACK WELD WILL NOT BE ACCEPTED.

DD-903-18	SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	APPROVED: MARCH 2011
SHEET 3 OF 3	HEAVY DUTY CANTILEVER SLIDE GATE - DISC DETAIL	REVISED: FEB 2017

Special Specification

ITEM NO. 847

Disinfection

847.1 DESCRIPTION: This item shall consist of disinfection of new mains utilizing Calcium Hypochlorite in accordance with these specifications. Machine chlorination shall be performed by SAWS as specified in the contract documents. The Contractor is required to provide all appurtenances to the main(s) to allow machine chlorination.

847.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 847 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 847, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specification for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 210 Use of Reclaim Water
 - b. Chapter 290 Public Water Systems
 - c. Chapter 213 Edwards Aquifer.
4. American Water Works Association (AWWA)
 - a. AWWA C 651 - Standard for Disinfecting Water Mains

847.3 SUBMITTALS: All submittals shall be in accordance with most recent version of SAWS's General Conditions requirements. Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawing, and certifications. All submittals shall be in accordance with Owner's requirements and submittals shall be approved prior to delivery.

847.4 MATERIALS: The materials for disinfection shall conform to the appropriate specifications contained within the latest revision of SAWS' Material Specification Item No. 100-20.

847.5 CONSTRUCTION: After the new mains have successfully passed the pressure test specified in Specification Item No. 841, "Hydrostatic Testing Operations," the SAWS will disinfect only those mains shown in the contract documents or otherwise indicated as "Machine Chlorination by SAWS," and in accordance with the Drawing DD-847 Drawing Series. This disinfection shall include: chlorination, flushing, and placing the mains into service. All other disinfection requirements shall be accomplished by the Contractor. Disinfection by the Contractor is limited to sections of main less than 800 feet in length.

1. Operation of Valves: During and after disinfection of mains less than or equal to 16 inches in diameter, the Contractor shall be notified by the Inspector a

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minimum 2 work days in advance to enable the Contractor to have a competent

2. representative present whenever valves are to be operated that will affect the pressure in any part of the work for which the Contractor is responsible.
3. Contractor's Personnel and Equipment: The Contractor shall supply labor and equipment necessary to make all excavations required for chlorination, equipment connections, subsequent flushing, and placing the mains into service.
4. Safeguarding and Backfilling Open Holes: The Contractor shall be responsible for safeguarding any open holes excavated or left open for flushing and disinfection purposes. Following completion of disinfection, the Contractor shall backfill holes in accordance with appropriate provisions of Specification Item No. 804, "Excavation, Trenching and Backfill."
 - a. If an open hole is unsafe and does not have proper trench protection, SAWS Chlorination personnel will not disinfect the required pipe and related appurtenances until acceptable trench protection is provided.
5. General: Mains shall be disinfected with dry 70% Calcium Hypochlorite where shown in the contract documents or as directed by the Inspector, and shall not exceed a total length of 800 feet. This method of disinfection will also be followed for main repairs. The Contractor shall utilize all appropriate safety measures to protect his personnel during disinfection operations.
6. Dosage: The Contractor shall disinfect the new or replaced mains with dry 70% Calcium Hypochlorite furnished by the Contractor. Sufficient Calcium Hypochlorite shall be used to obtain a minimum chlorine concentration of 50 ppm. Table 847-1, "Chlorine Dosage," is included for the convenience of the Contractor.
7. Filling the Main: Those sections of main to which the dry HTH has been applied shall be filled slowly to allow for the even distribution of the disinfecting material. The manipulation of valves shall be under the supervision of SAWS Inspector in accordance with Specification Item No. 847, "Operation of Valves."
8. Holding Time: The length of time that sections of main disinfected with HTH shall be allowed to stand undisturbed will depend upon the particular job and Texas Commission on Environmental Quality (TCEQ) criteria.
 - a. When circumstances permit a shutdown with no customers out of service, the required minimum detention time will be 24 hours with a 50 ppm chlorine dosage.
 - b. When customers are out of service during a shutdown with no leakage past valves, the required minimum detention time will be 3 hours and the chlorine dosage will be 300 ppm.
 - c. When customers are out of service with some leakage past valves, the required minimum detention time will be 30 minutes with a 500 ppm chlorine dosage.
9. Flushing: Following the expiration of the specified holding time, the treated section of main shall be flushed thoroughly by the Contractor in accordance with the applicable provisions of Specification Item No. 841, "Hydrostatic Testing Operations." Flushing shall continue until no chlorine remains detectable by taste or odor or until the chlorine residual is less than 0.3 ppm.

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The Contractor must make provisions for the disposal and runoff of the flushing operations in order to minimize erosion or impact to residents.

10. If flushing requires entrance into water way, dechlorination must be performed.
11. **Preventing Reverse Flow:** Valves shall be manipulated so that the strong chlorine solution in the line being treated will be flushed out of the main and will not flow back into the line supplying the water.
12. **Supervision:** All disinfection of mains shall be done under the general supervision of the SAWS' Inspector.
13. **Additional Treatment:** Should the new main fail to meet minimum public health standards for bacteriological quality after flushing, further treatment shall be as directed by the Inspector. If further disinfection is required, chlorination shall be done in accordance with the SAWS guidelines for Disinfection of New Mains Utilizing Machine Chlorination. In no case, however, shall the new line be acceptable as complete and satisfactory until the bacteriological quality of the water taken from the main meets the standards of the TCEQ.

847.6 MEASUREMENT: Reference Supplementary Specification SS 847A for measurement requirements.

847.7 PAYMENT: Reference Supplementary Specification SS 847A for payment requirements.

TABLE 847-1	
CHLORINE DOSAGE	
Diameter of Pipe in Inches	To Obtain 50 ppm Chlorine Dosage
6	0.0138
8	0.0233
10	0.0400
12	0.0523
14	0.0708
16	0.0934
18	0.1175
20	0.1455
24	0.208
30	0.327
36	0.469
42	0.637
48	0.833

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54	1.0575
60	1.308

End of Specification

Special Specification

ITEM NO. 869

Project Signs

869.1 DESCRIPTION: This item shall consist of the providing, installing, maintaining and removing of two 4' X 8' project signs.

869.2 REFERNCED STANDARDS: Reference standards cited in this Specification Item No. 869 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 869, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction

869.3 MATERIAL: The signs shall be made of ¾" plywood, grade A-C or better and each shall be mounted on two 4" X 4" X 12'-0" posts.

869.4 CONSTRUCTION: The signs shall conform to the configuration and details indicated in Standard Drawing No. DD-869-01.

1. These signs shall be installed at locations to be determined by the SAWS Inspector.
2. Any additional signs required by other agencies (such as the City of San Antonio Public Works' Right-of-Way Division) shall also be installed as requested and directed by the SAWS Inspector.
3. The signs shall be erected at both ends of the project limits or as directed by the SAWS Inspector.
4. They shall remain in place until such time that the project has been accepted and finalized.
5. In cases of projects with multiple site locations, the signs shall be moved to subsequent sites after completion of work at each site, or two signs shall be installed at each work site.
6. The installation will require embedding all posts a minimum of 3 feet below the ground.

869.5 MEASUREMENT: Measurement of the Item, "Project Signs" as specified herein, will not be measured for payment.

869.6 PAYMENT: No direct payment will be made to the contractor for the work and materials required in providing, installing, maintaining and removing the signs.

1. Such work and materials shall be considered subsidiary to the several items of work for which unit prices are provided in the proposal.

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ITEM NO. 902

Construction Safety And Health Program

902.1 DESCRIPTION: This item shall govern the preparation and implementation of the contractor's Construction Safety and Health Program for the specified project. The guidance document is not intended to be an all-inclusive listing of safety and health procedures. This guidance document outlines safety management credentials, general safety activities, procedures, and reporting requirements for the contractor to prepare a project specific Safety and Health Plan. The contractor shall prepare and implement their approved project specific Construction Safety and Health Plan throughout the construction phase of the project.

The contractor shall submit the project specific Construction Safety and Health Plan to a SAWS safety representative prior to the beginning of the construction phase of the project. This plan will be reviewed for information outlined in the appendix of this specification in order to verify that the contractor recognizes the requirement to comply with OSHA regulations. The SAWS Safety Representative will review for compliance and issue a concurrence/nonconcurrence on the Construction Safety and Health plan. When the plan complies with the requirements the concurrence shall be sent to the project engineer/inspector and documented on the Contractor Safety and Health Plan Tracking Log by the SAWS safety representative. The Contractor shall be responsible for meeting or exceeding applicable OSHA requirements and implementing the plan during construction.

902.2 INTRODUCTION: This Construction Safety and Health Program for Contractor's has been written to direct and control the activities of all persons performing and managing construction projects for San Antonio Water System (SAWS), in order to prevent accidents, injuries including equipment and property damage.

The term "Contractor" in this document refers to the general or prime Contractor for the specific construction project. It shall be noted that while the Contractor is responsible for the project safety program, subcontractors are required to work under the conditions of the Contractor's Construction Safety and Health Program.

The term "Construction Safety and Health Program" in this document refers to the Contractor's Project Specific Safety Plan. It is expected that each contractor will utilize their company's Construction Safety and Health plan as a foundation for the site-specific program.

The Construction Safety and Health Program is not intended to be an all-inclusive listing of safety and health procedures. It is a guidance document which outlines general safety activities, procedures, and reporting requirements to be implemented by the Contractor.

Contractors working on SAWS construction projects shall have their own safety and health plan, which complies with the Occupational Health & Safety Administration's (OSHA) requirements of a Construction Safety and Health Program and with all applicable

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regulations. Individuals working on SAWS construction projects are responsible for knowing all safety rules, being alert and practicing good, sound judgment in the performance of their jobs, even if specific safety rules are omitted from the Construction Safety and Health Program. Subcontractors and their employees are responsible for following all requirements of the Construction Safety and Health Program. Guidance can be obtained at: <https://www.osha.gov/pls/publications/publication.AthruZ?pType=AthruZ>

Safety guidelines shall be understood and followed by all individuals while on the job site. Violation of these guidelines, either in job performance or in the letter of Construction Safety and Health Program, will result in work stoppage until safety requirements are properly fulfilled. The Contractor's project manager shall review the specific violation and identify/implement proper corrective action prior to continuance of the work activity for which the violation was identified.

The Contractor's Project Specific Construction Safety and Health Program shall be prepared and submitted to SAWS prior to the Pre-Construction Conference and will be reviewed prior to the issuance of a notice to proceed with Construction Phase Activities.

902.3 SAFETY RESPONSIBILITIES, AUTHORITY AND ACCOUNTABILITY:

The principal organizations involved in carrying out the Construction Safety and Health Program include the financing and regulatory agencies, the facility Owner/Operator, the San Antonio Water System (SAWS), and its representative, the preparer of the construction documents (the Engineer), the Contractor Project Manager, the Safety & Environmental Health Professional (Representative), the Construction Contractor, and all Subcontractors. The responsibilities for each of these organizations and representatives are presented in the following paragraphs.

902.4 REGULATORY AGENCIES: The primary agency with safety authority for the project is the Federal Occupational Safety and Health Administration (OSHA). OSHA requirements are published in 29 Code of Federal Regulations (CFR), Subtitle B, Chapter XVII, Part 1926, entitled, *Safety and Health Regulations for Construction*. The following sections describe regulations for most activities that will be conducted in constructing the water, sewer, chilled water, and recycled water systems:

1. Subpart A - General, Inspections, Administrative
2. Subpart B – General Interpretations, Rules
3. Subpart C – General Safety and Health Provisions
4. Subpart D - Health and Environmental Controls
5. Subpart E - Personal Protective Equipment and Life Saving Equipment
6. Subpart G - Signs, Signals and Barricades
7. Subpart H - Materials Handling, Storage Use and Disposal
8. Subpart I – Tools, Hand and Power
9. Subpart J – Welding and Cutting
10. Subpart K – Electrical
11. Subpart L – Scaffolding

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12. Subpart M – Fall Protection
13. Subpart N - Cranes, Derricks, Hoists, Elevators, and Conveyors
14. Subpart O – Motor Vehicles, Mechanized Equipment
15. Subpart P - Excavations, Trenching and Shoring
16. Subpart Q – Concrete and Masonry Construction
17. Subpart R – Steel Erection
18. Subpart S – Underground Construction
19. Subpart X – Ladders
20. Subpart Y – Commercial Diving Operations
21. Subpart Z – Toxic and Hazardous Substances

Also, 29 CFR, Subtitle B, Chapter XVII, Part 1910 covers safety activities related to health requirements, medical monitoring, and exposure limits to chemical substances. OSHA reserves the right to review any Construction Safety and Health Program and to accept or reject all or part of those documents. OSHA also has the authority to review safety records during or after construction to confirm that the project is being/was constructed in a safe manner and that it meets or exceeds all applicable safety standards requirements. Additional guidance can be obtained at:

<https://www.osha.gov/pls/publications/publication.AthruZ?pType=AthruZ>

Agencies with secondary responsibilities for the project include, but are not limited to, the Texas Commission on Environmental Quality (TCEQ), the City of San Antonio (CoSA), the Texas Water Development Board (TWDB), Bexar County, and the Texas Department of Transportation (TxDoT), where construction occurs within a state right-of-way. Construction in a TxDoT right-of-way shall follow the 2004 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, which generally references OSHA requirements. Also, the Texas Manual on Uniform Traffic Devices shall be consulted for traffic safety guidance when working in public roadways.

Any of the above agencies may send representatives to the job site, without prior notice, which may inspect, review, or comment on safety issues during their visits. SAWS requires that all Contractor job sites shall be immediately accessible to appropriate local, State, and Federal agency safety and environmental health officials.

1. SAWS: The Owner of the Water, Wastewater, and Recycle Water Systems and all associated design and construction is the San Antonio Water System (SAWS). SAWS requires that all Contractors have a project-specific safety and health plan and that it comply with OSHA regulations and this Construction Safety and Health Program. Once SAWS has accepted the Construction Safety and Health Program, the Construction Contractor shall implement the plan. The Contractor will assure that its Subcontractors comply with all safety requirements, as SAWS does not have a contractual relationship with the Subcontractors.
2. Contractor Project Manager: The Contractor Project Manager must be a “competent” person who has been designated as the field representative by the

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Contractor. A “competent” person is one that has been trained in excavation safety, work zone traffic control, confined space entry, and hazardous materials responsibilities and has the authority to take prompt, corrective measures to eliminate problems.

Competent person training and certification is required and is available by training programs such as the Texas Engineering Extension Service (TEEX) Construction Training Program, or similar programs offered by different agencies throughout the country. Additionally, this person must have authority to perform such duties as sign pay requests, negotiate change orders, etc.

The Project Manager’s primary responsibility is to conduct construction activities, in compliance with applicable OSHA safety regulations and SAWS safety and environmental health requirements, to assure completion of the project according to contract documents. The Project Manager is also responsible for regular review of safety documentation and reports and forwarding such documents to SAWS.

If the Project Manager observes a violation of a safe work practice, he or she shall take immediate appropriate corrective action and shall advise the SAWS Construction Observer/Inspector (C.O.I.), of all corrective actions implemented. All violations and corrective action shall be documented in accordance with contract documents. The Project Manager shall be present during all Construction Activities on the project site. The Contractor shall also provide a list of alternate competent persons at the project site.

3. Safety and Environment Health Representative: SAWS will designate a SAWS Safety and Environmental Health Representative for the project. The overall responsibility of the Safety and Environmental Health Representative is to ensure that the Contractor and Subcontractors are executing construction in accordance with appropriate safety and environmental health regulations, and to perform the safety and environmental health review activities specified in the Construction Safety and Health Program.

There may be more than one (1) such representative assigned by SAWS to a project. In such an event, the SAWS Contractor Safety and Environmental Health Liaison shall take the lead.

The Safety and Environmental Health Representative will be available to advise the Project Manager and/or SAWS "C.O.I." during random visits and/or by specific request. The Safety and Environmental Health Representative's duties include, but are not limited to:

- a. Performing safety evaluations of the work in-progress;
- b. Meeting and conferring in a supportive, inclusionary, manner with contractors regarding safe work-related matters;

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- c. Reporting on safety observations to the Contractor's on-site supervisor and to the SAWS Director of Safety & Environmental Health;
 - d. Providing safety reports to SAWS. Such reports will include results of observations with specified corrective measures;
 - e. Monitoring site operations of the Prime Contractor and Subcontractors for compliance with applicable OSHA safety regulations and SAWS requirements.
4. Construction Observer/Inspector: SAWS will designate a SAWS Construction Observer/Inspector - "C.O.I." for the project. The C.O.I. is the "Authorized Representative" of the owner (SAWS) and will be assigned by the owner to observe and inspect any or all parts of the project and the materials to be used therein. The responsibility of the C.O.I. is to observe the Contractor and Subcontractors during construction activities in accordance with SAWS directives, assuring completion of the project according to the plans and specifications, including the observation of the implementation and performance of the Project-Specific, OSHA-compliant, Construction Safety and Health Program.

If the C.O.I. observes a violation of a safe work practice, he or she shall immediately bring it to the attention of the Project Manager and/or the SAWS Safety and Environmental Health Representative as soon as is practical as required.

The C.O.I. has the authority to direct the Contractor to stop work, at no additional cost to the contract, if the activity appears to place any personnel (Contractor's, SAWS', subcontractors', or the general public) in a compromising and/or potentially dangerous situation.

902.5 CONSTRUCTION CONTRACTOR: It is the Contractor's responsibility to ensure that all construction is carried out in a safe manner; that does not pose a threat to personal health or property. The Contractor's specific responsibilities include, but are not limited to the following:

- a. Preparation of a project-specific safety and health plan to be submitted to SAWS for review;
- b. Providing a safe workplace for all personnel on-site;
- c. Enforcing the project-specific safety and health plan with all personnel and subcontractor personnel;
- d. Educating and training construction personnel on safety and health requirements, safe equipment and vehicle operation and ensuring that all subcontractor personnel are adequately trained and informed;

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- e. Conducting routine safety meetings with on-site personnel and subcontractors;
 - f. Recording all incidents and reporting them to SAWS;
 - g. Maintaining a drug-free workplace.
1. Safety and Health Activities – Administrative: Certain Safety and Environmental Health activities shall be routinely handled by the Contractor's representative. Safety supervision procedures such as conducting safety meetings, routine safe work inspection and reporting, training, education and notification of safety requirements and pre-qualifying employees based on physical capabilities shall serve to help prevent accidents, injuries, and property or equipment damage.
 2. Safety Meetings: Safety meetings shall be conducted to review past activities, plan for new or changed operations, review pertinent information on specific task-related hazards, and remind job personnel of the importance of working safely. A routine safety meeting schedule shall be specified in the Contractor's Construction Safety and Health Program.
 3. Safety Training and Education: Employees shall be afforded the appropriate safety and health training at the start of employment, and at intervals appropriate to maintain safety and health awareness in the performance of their jobs. This training is the responsibility of the Contractor and shall be administered by qualified personnel.

A minimum of two (2) employees at each job site, shall have certified First Aid and Cardio-Pulmonary Resuscitation (CPR) training to ensure adequate and immediate response to on-the-job injuries, illnesses and accidents. In addition, all training deemed necessary for the operation of equipment and performance of specific tasks shall be based on current manufacturers, OSHA, and SAWS requirements. All supervisors shall be trained with respect to their responsibility to maintain a safe working environment and preparation and maintenance of safety and health documents.

Safety and health education and awareness training shall be promulgated by the Contractor, including the posting of OSHA and other applicable safety and health regulations and requirements. Such information shall inform employees at a project site not only what the safety and health requirements are, but also of what rights they have to a safe work environment.

4. Safety and Health Inspections: The Construction Safety and Health Program shall provide for frequent safety reviews of the job site, equipment, and materials to ensure compliance with the site's approved safety and

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health plan. These reviews shall be conducted by qualified (Contractor) personnel and shall be documented.

In addition, the Contractor's quality assurance personnel shall perform daily safety and environmental health reviews, as a part of their quality assurance activities. If safety and health deficiencies are identified in a review, a follow-up review shall be accomplished by the contractor's management to ensure the deficiency has been corrected within a reasonable amount of time. All deficiencies shall be corrected as soon as possible. Specific circumstances which require a separate safety evaluation include:

- a. When persons are working in an excavation, the excavation, adjacent areas, and protective systems shall be monitored continually throughout the work shift and as needed after rain or other hazard-increasing events. This monitoring shall be detailed in the Project-Specific Safety and Health Plan as a routine activity;
- b. All motor vehicles and mobile equipment shall be inspected at regular intervals by a representative of the Contractor. These safety inspections shall be documented, and files maintained. Such documentation shall be regularly reviewed by the SAWS Safety and Environmental Health Representative, and may be reviewed by the SAWS C.O.I.

5. Reporting: The Project Manager is responsible for reporting all safety-related incidents and accidents to Contractor Management, SAWS C.O.I., and SAWS Safety and Environmental Health Representative. All such incidents and accidents must be reported by the Project Manager as soon as is possible; meaning without undue delay or hesitation. Major accidents, which are reportable to OSHA directly, include: 1. a fatal injury and/or 2. three (3) or more persons admitted to a medical facility. Such major accidents shall be reported immediately.

Such reporting procedures shall be outlined in the Contractor's Construction Safety and Health Program. This procedure shall identify personnel and their phone numbers for such reporting.

All incidents or accidents shall require the contractor to revise and resubmit their construction safety and health plan for review of how said incident or accident was taken into consideration for future avoidance.

6. Physical Qualifications of Employees: All persons shall be physically, medically and emotionally qualified to perform the essential functions of their job description. Appropriate medical monitoring shall be conducted when required by law and whenever an accident or injury has occurred.

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The provisions contained in 28 CFR, Part 36, entitled *The Americans with Disabilities Act*, prohibiting discrimination against any employee based on his or her disability, shall be adhered to.

7. Alcohol and Drug-Free Workplace: All persons working on SAWS job sites are required to maintain an alcohol and drug-free workplace. At no time while on the premises may employees use, or be under the influence of, alcohol, narcotics, intoxicants or similar mind-altering substances. Any Contractor or Subcontractor who is aware of a person using the aforementioned substances shall take action consistent with applicable laws and regulations. Texas workers compensation insurance does not cover incidents, injuries or illnesses caused by the use of alcohol, narcotics, intoxicants or mind-altering substances.

8. Safety and Health Activities - Job Site: Certain safety and health activities apply more to specific tasks at the job site and are appropriate for supervisors as well as technicians. These activities include knowledge of project-specific safety and health requirements, use of personal protective equipment, safe operation of vehicles, and other equipment and proper hazard communication (HAZCOM) and emergency response actions. Guidance on specific task-related safety and health activities may be found in selected sections of the SAWS Comprehensive Safety Program Policies and Procedures Manual, 29 CFR Parts 1926 and 1910, the Texas Hazard Communication Act, in the U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, and at:

<https://www.osha.gov/pls/publications/publication.AthruZ?pType=AthruZ>

9. Site-Specific Safety and Health Procedures: Safety and health procedures associated with specific activities (such as trenching, soil stockpiling, placement of pipe, tank installation, pump and other equipment installation etc...) shall be explicitly covered in the Contractor's Construction Safety and Health Program. The Contractor shall identify all activities associated with the construction of his/her project and describe safety and health procedures for any applicable activity. The minimum basic outline for a safety and health plan is provided in the Appendix. This safety and health plan will be reviewed and approved by SAWS and shall include:
 - a. The Construction Contractor's "competent" person shall oversee safe work practices at the project site in accordance with applicable OSHA regulations;
 - b. Procedures for trenching and related activities shall follow the requirements of 29 CFR 1926, Subpart P, and Item 402 of TxDOT's *2004 Standard Specifications for Construction and Maintenance of*

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Highways, Streets and Bridges to prevent trench cave-ins and related injuries;

- c. All crane operations and lifting of heavy or cumbersome objects, such as associated with tank installation, shall comply with 29 CFR 1926, Subpart N, to prevent personal injury and equipment damage;
- d. Persons entering confined spaces shall have completed all proper training and understand how and when to sample and identify confined spaces according to 29 CFR 1910.146. A confined space rescue plan shall also be identified in the project-specific safety and health plan. Contractors should refer to the SAWS' *Confined Space Entry Program* for Guidance;
- e. Lockout/tagout procedures for electrical and mechanical equipment and hazards at each job site shall be identified and described in the project-specific safety and health plan. Contractors should refer to the SAWS *Lockout/Tagout/Blankout Program* for guidance.
- f. Procedures for traffic control safety according to Item 502 of TxDOT's 2004 *Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges*. Contractors should refer to the SAWS *Work Zone Traffic Control Program* for guidance;
- g. Procedures related to storage and handling of hazardous materials;
- h. Procedures for utility awareness (including, but not limited to, the location and identification of utilities such as gas, electrical, telephone, water, sewer, recycle water, cable systems, etc.).

Personal Protective Equipment: The use of personal protective equipment (PPE) is an important step in preventing accidents, injuries and illnesses. PPE ranges from every day, mandatory protective equipment to fully-encapsulating equipment, depending on the specific task and job site. One circumstance which shall require a higher level of PPE is construction in areas of contaminated soils. Each Contractor, Subcontractor, and individual employee shall think through the job(s) to be performed and prepare a job hazard analysis (JHA) to identify the proper PPE. The project-specific Construction Safety and Health Program shall identify different types of PPE and how and when they will be used.

All persons working in, visiting and/or inspecting SAWS job sites shall wear the proper PPE, regardless of their actual participation in the work being conducted. Contractors should refer to the SAWS *Personal Protective Equipment Program* for guidance.

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In general, the following types of PPE shall be provided by the Contractor and made available to all persons working at the SAWS job sites:

- a. Head protection;
- b. Reflectorized vests or other clothing;
- c. Eye and face protection;
- d. Hearing protection;
- e. Safety-toed footwear;
- f. Hand and arm protection;
- g. Respiratory protection;
- h. Fall protection;
- i. Protective clothing and other special body protection.

Contractor shall post notices directing personnel to use specific PPE, such as in that listed above; i.e.:

- a. All construction sites shall have signs posted instructing the use of hard hats. All hard hats used at SAWS job sites shall conform with American National Standard Institute (ANSI) Code Z89.1;
- b. Areas where generators, jack hammers, etc., and other loud equipment or vehicles are in use, in excess of a potential exposure of 85 dBA, shall have signs posted requiring the use of the appropriate hearing protection.

- 10. Safe Operation of Construction Equipment: All vehicles and equipment shall be operated in a safe manner to prevent personal injury or equipment damage. The Contractor shall not permit untrained or unqualified personnel to operate any vehicles or equipment. Operators of any equipment or vehicles shall be able to read and understand the signs, signals and operating instructions in use. Seat belts shall be worn by vehicle operators and equipment operators if the equipment is so equipped.
- 11. Hazard Communication and Emergency Response: According to the Community Right-to-Know Act, 29 CFR 1910.1200, all persons on and off the job site must have access to information on hazardous materials and substances which are used or encountered in the workplace. Hazardous and

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regulated chemicals shall be labeled and material safety data sheets (MSDS) shall be available, if applicable. Contractors should refer to the SAWS *Hazard Communication Program* for guidance.

Emergency telephone numbers and reporting instructions shall be conspicuously posted at all job sites. A reliable means of communication shall be provided from each job site to outside emergency responders.

12. First-Aid and Medical Services: Each job site shall be equipped with a first-aid kit, and other emergency equipment, supplied by the Contractor and/or each Subcontractor. Medical services and first-aid required by OSHA are described in 29 CFR 1926.50. Proper equipment for emergency transportation of an injured employee to a doctor or hospital shall be available. Maps, telephone numbers, and street addresses of the nearest emergency medical facility and/or hospital shall be identified in the Project-Specific Construction Safety and Health Program. This information shall be posted in a clear, accessible location available to all personnel on-site. This material must also be included in all training for contractor personnel.
13. On-Site Fire Prevention: The Contractor shall specify a fire protection and prevention plan within the project-specific Construction Safety and Health Program, and shall provide for all appropriate firefighting equipment required by 29 CFR 1926, Subpart F. The Contractor shall ensure clear access to all available firefighting equipment and shall maintain equipment at all times. The Contractor shall ensure that all on-site equipment is conspicuously located. Contractors should refer to the SAWS *Hot Work Permit Program* for guidance.

Fire protection includes the provision of a water supply, extinguishers and other equipment, as well as, proper training and/or education. Fire prevention includes the identification of ignition sources, proper storage of equipment and materials which allows access to fire exits, storage and use of flammable and combustible liquids, and other activities to prevent fires from starting. Smoking shall be prohibited except in specifically-identified and posted locations on SAWS job sites.

14. Electrical Safety: Guidance for on-site electrical safety procedures may be found in the National Electric Code (NEC), 29 CFR 1926, Subpart K, and in the U.S. Army Corps of Engineers Safety and Health Requirements Manual. In general, before any work is done, the Contractor shall determine whether any part of an electrical power circuit, exposed or concealed, is located such that performance of work could bring any person or equipment into contact with it. Persons working in areas of electrical circuits shall be protected by clearance procedures and grounding. Live parts of wiring or equipment shall be guarded to protect all persons or objects from harm. The Contractor shall assure that proper lockout and tagout procedures are

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followed. Only qualified Contractors' personnel, specifically trained in electrical work, are allowed to handle "live", or "potentially live" electrical equipment. Please refer to the SAWS *Lockout/Tagout/Blankout Program* for guidance.

15. Safety Documentation: All safety and health activities shall be immediately documented by the Contractor. Copies of all documentation shall be maintained by the Contractor.
16. Routine Safety Inspections and Training: Routine safety and health inspections, and training activities, shall be recorded including the date, scope of the inspection or training, person performing the inspection or training, persons attending, and the name and signature of the person preparing the report. Forms for such reporting shall be developed by the Contractor. A current inspection and training file on each project shall be maintained by the Contractor.
17. Incident/Accident Reporting: All incidents/accidents that occur to persons or property shall be investigated and reported by the Contractor on an incident/accident report form (Report form to be provided by the Contractor in his/her Project Specific Construction Safety and Health Program). Exposures to toxic materials and harmful physical agents shall also be documented by the Contractor in accordance with applicable regulations. The Contractor shall provide copies of incident/accident reports to SAWS Construction Inspection Division and the SAWS Safety and Environmental Health Representative.
18. Workers Compensation Claims: The Construction Contractor must provide a "Certificate of Coverage" to the owner showing statutory worker's compensation insurance coverage for all employees who will be performing construction of the project, for the duration of the project. The Construction Contractor shall post, on each project site, a conspicuous notice, written in the form prescribed by the Texas Worker's Compensation Commission, informing all persons providing services on the project that they are required to be covered; and stating how a person may verify coverage and report lack of coverage.

These requirements are a condition of the contract general conditions. Failure to comply with these requirements is a breach of contract by the Construction Contractor.

All Subcontractors must also have a "Certificate of Coverage" verifying Workers Compensation coverage. These "Certificates of Coverage" shall be presented by the Contractor to SAWS prior to the beginning of any construction activities.

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The SAWS Risk Management Division must review and approve "Certificates of Coverage" prior to the beginning of construction.

902.6 MEASUREMENT: Measurement of the Item, "Safety and Health Program," as specified herein, will not be measured for payment.

902.7 PAYMENT: No direct payment shall be made for incidental cost associated with preparation and implementation of the Contractor's project specific Construction Safety and Health Program.

902.8 APPENDIX: MINIMUM BASIC OUTLINE FOR A CONTRACTOR'S SAFETY AND HEALTH PLAN

The following outline may be used to develop a project-specific Contractor Construction Safety and Health Program. All safety and health plans must comply with this overall Construction Safety and Health Program. A "plan" shall be job-specific and, in addition to expected features, shall address any unusual or unique aspects of the job or activity for which it is written.

1. Signature Sheet: Provide the title, signature, and phone number of the following:
 - a. Plan preparer (i.e. Contractor safety and health staff person, QC);
 - b. Plan approval by the Contractor (i.e., president, regional representative).
2. Background Information: List the following information:
 - a. Contractor;
 - b. Contract number;
 - c. Project name;
 - d. Brief project description, description of work to be performed, and location;
 - e. Contractor and Subcontractor's accident experience (actual lost time injury frequency for the last 12 months and their most recent Worker's Compensation Experience Modifier);
 - f. List of activities or areas which will potentially require hazardous materials analysis and management.
3. Responsibilities and Lines of Authorities:
 - a. Identification and accountability of personnel responsible for safety and health – at both corporate and project level – including both prime and sub-

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contractors (contracts specifically requiring safety and health, or industrial hygiene, personnel shall include a copy of their resume for acceptance by SAWS);

- b. Lines of authority and levels of authorization, including liaison with SAWS C.O.I.s and Safety and Environmental Health Representatives shall be specified.
4. Subcontractors and Suppliers: If any subcontractors will be used and for major material suppliers, please provide the following:
- a. Identification of subcontractors and suppliers;
 - b. Means for controlling and coordinating subcontractors and suppliers;
 - c. Safety and health responsibilities of subcontractors and suppliers.
5. Training:
- a. List subjects to be discussed with employees during project safety and health orientation;
 - b. List mandatory training and certifications which are applicable to this project (e.g., confined space entry, crane operator, vehicle operator, HAZWOPER training and certification, personal protective equipment, to name a partial list) and any other applicable requirements for periodic retraining/recertification;
 - c. Identify requirements for emergency response training;
 - d. Outline requirements (who attends, when given, who will conduct etc.) for supervisory and employee safety meetings.
6. Safety and Health Inspections:
- a. Discuss who will conduct safety and health inspections; when inspections will be conducted; how the inspections will be recorded; address the deficiency tracking system, follow-up procedures, etc.;
 - b. Discuss how any external inspections/certifications (such as by a third party) will be incorporated and responded to by the Contractor.
7. Safety and Health Expectations, Compliance and Incentive Programs:
Please discuss the following:

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- a. The Contractor's written safety and health plan goals, objectives, and incident / accident experience goals for this project;
 - b. Written Contractor policies and procedures for managers and supervisors safety and health accountability;
 - c. Policies and procedures regarding noncompliance with safety and health requirements (to include disciplinary actions for violation of safety and health requirements);
 - d. A brief description of the Contractor's safety incentive programs (if any);
 - e. Written Contractor and Subcontractor drug testing policies.
8. Accident Reporting: The Contractor shall designate the procedure (who, when, hows) for who completes the following:
- a. Exposure data (man-hours worked);
 - b. Incident / accident investigations, reports and logs;
 - c. Immediate notification of major incidents / accidents and equipment damage.
9. Medical Support: Outline on-site medical support and off-site medical arrangements (See Page 14, First-Aid and Medical Services for details).
10. Personal Protection Equipment: Outline procedures (who, when, how) for conducting hazard assessments to determine engineering resolution, followed by proper use of personal protective equipment if unable to resolve through design. List all personal protective equipment which is available and shall be used for the subject project. Also list the PPE requirements, which will be posted on the job site.

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CONSTRUCTION SAFETY AND HEALTH PROGRAM

RECEIPT AND ACKNOWLEDGMENT PAGE

I will learn the hazards of the construction project and follow all appropriate safety and health rules and procedures as stated in my company safety and health program.

I will immediately report unsafe behaviors (acts) and hazardous conditions to my supervisor and/or Contractor Project Manager.

I understand that violation of appropriate safety and health guidelines can result in work stoppage until safety and health requirements are met.

I will report all accidents and related incidents to my supervisor and or the Contractor Project Manager.

I will wear the proper personal protective equipment, regardless of my direct participation in the hazard's of work being conducted.

I will assist the overall construction safety and health effort by personally demonstrating a "safe attitude" and by forming good work habits.

I am responsible for my own safety and health and that of my fellow coworkers.

Employee's Name

Date

Supervisor's Name

Date

This RECEIPT AND ACKNOWLEDGMENT PAGE must be signed by both the Contractor employee and his/her supervisor. The supervisor will then remove the signed acknowledgment from the Construction Safety and Health Program, make a copy for the project safety file and forward a copy to the Contractor Project Manager.

- End of Specification -

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ITEM NO. 903

Construction QC/QA Program

903.1 DESCRIPTION: This item shall govern the preparation and implementation of the Contractor's Construction Quality Control/Quality Assurance (QC/QA) Program for the specified project. The enclosed guidance document, outlines general activities, procedures and reporting requirements for the contractor to prepare a project specific QC/QA Plan. The contractor shall prepare and implement their project specific QC/QA Plan throughout the construction phase of the project.

The contractor shall submit the project specific QC/QA Plan and receive approval of the plan by SAWS prior to the beginning of the construction phase of the project.

The contents and obligations of both the contractor and SAWS relative to the Quality Control and Quality Assurance Program, are further addressed below.

903.2 INTRODUCTION: This Construction Quality Control/Quality Assurance (QC/QA) Program has been written to define the activities of all persons performing, managing and administering construction for the San Antonio Water System (SAWS) and is intended to be a positive contribution toward obtaining quality construction.

This Construction QC/QA Program is only a guidance document which outlines general activities, procedures and reporting requirements of SAWS. Contractors shall have their own Quality Control (QC) Plan which complies with general requirements detailed in the Appendix.

903.3 QUALITY CONTROL: The primary function of Quality Control (QC) is to establish standards of quality for construction. The Contractor's plan defines procedures to manage and control his/her own activities, all Sub-contractor's activities, and all supplier's activities ensuring the completed project conforms to the intent of the Contract Documents.

The Contractor's QC plan is the foundation for quality work. It outlines the planned quality control procedures, and is vital to the SAWS Construction QC/QA Program. The plan must be comprehensive, detailed, and logical if the Contractor's quality control system is to be effective.

1. **Objective:** The Contractor has the contractual responsibility to manage construction quality and inspect the work. Control is an ongoing system of planning future activities. Inspection is the process by which on-going and completed work is

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reviewed. The objectives of work, to eliminate deficiencies, and to follow through in accomplishing the work in accordance with the Contract Documents. The objective of inspection is to see that the work is implemented in accordance with the intent of the Contract Documents.

The responsibility for quality control lies solely with the Contractor. The Contractor must continually strive to make improvements and to keep deficiencies from resulting in their finished work.

2. Contractor Responsibilities: As stated previously, QC is the Contractor's sole responsibility. This includes, but is not limited to, the following:
 - a. Providing the quality specified in the contract documents;
 - b. Implementing and maintaining an effective QC system;
 - c. Performance of all control activities and tests;
 - d. Completion of acceptable documentation of QC activities.

The Contractor shall place a "competent" person onsite to oversee the QC system. This person, along with an approved alternate, must have full authority to act for the Contractor on all QC matters and shall be on-site during all phases of Construction activities. The responsibilities include testing, materials, workmanship, methods, and techniques to provide that all work is constructed properly by qualified, competent, and professional craftsmen and/or tradesmen. A "competent" person is one that has been trained in excavation safety, work zone traffic control, confined space entry, and hazardous materials responsibilities. Additionally, this person must have authority to perform such duties as sign pay requests, negotiate change orders, etc.

Clear and effective communication between the Contractor, Engineer, and Inspector is vital to QC which is dependent on mutual cooperation. Effective QC requires the complete cooperation of the Contractor, Engineer, and Inspector.

The Contractor has the responsibility to make themselves totally familiar with the nature and location of the work by site visits and investigations. The Contractor shall evaluate all general and local conditions which may affect work and/or costs. The Contractor has the responsibility to review the contract documents and request clarification where necessary. All of this is accomplished by asking questions during the bidding phase or submitting Request for Information (RFI) documents during construction.

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3. Quality Control Plan: The Contractor shall develop a project specific Quality Control (QC) Plan. The Contractor's QC Plan will address all definable features of construction and unusual or unique aspects of the job or activity for which it is written. The primary function of the QC Plan is for a successful execution of a realistic construction plan, by control and inspection, to insure that the required standards of quality are met and to preclude problems resulting from poor quality and/or workmanship. The QC Plan will define procedures to manage and control the contractors' own operations, site conditions, workmanship and safety, as well as his subcontractors, suppliers, manufacturers, products, and services to produce work of a specified quality while completing a project that complies with the Contract Documents, on time, and within budget. The contractor has the contractual responsibility to control construction activities, quality, inspect the work, and prepare documentation as appropriate in a timely and efficient process.

The QC Plan shall be prepared in accordance with the following concepts. Quality Control should be divided into three sub-construction phases. Each control phase provides the opportunity to prevent problems, deficiencies and misunderstandings. The phases are as follows and are further detailed in the Appendix.

4. Preconstruction Phase: Those actions done in advance of construction; advance planning, shop drawings, lay out schedules, detailed sketches, test reports, mix designs, schedule of values (payment schedule for non-unit cost contracts), Contractor's Safety and Health program, and physical checks of materials on site comparing to approved submittals and contract requirements.
5. Construction Phase:
 - a. Initial Phase: The initial control of each separate feature or segment of work is made at the outset of the operation to assure a proper start-up of work and full compliance with all contract requirements. This is the phase in which the Contractor will establish acceptable standards of workmanship. The initial phase is the most logical time to resolve any difference of opinion or interpretation of plans, rather than when the work is in place.
 - b. Follow-up Phase: Inspection and testing is made to determine continuation of compliance and workmanship standards established during preconstruction and initial phases. Follow-up inspections are more productive when they are preceded by thorough Preconstruction and Initial Phases and workmanship standards have been established prior to construction.
6. Construction Completion Phase: The last follow-up, or when any segment of

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work is complete, the contractor is to carefully examine the work, prepare a deficiency list of anything not completed or not conforming to the contract requirements. Work yet to be accomplished could include:

paperwork/documentation, submittal of test results or other documents, certificates, diagrams, warranties, Operation and Maintenance Manuals, etc.

When deficiencies are found in the Contractor's quality control and/or implementation of the QC Plan, many actions can be taken depending on the circumstances. Such actions may include, but are not limited to: improving the QC Plan, correcting deficient management, removing incompetent QC personnel, correcting defective work, refusing to allow work to continue in defective areas, and/or disallowing payment for the defective work. An aggressive and effective application of the Contractor's QC Plan can minimize or eliminate the need to take these actions.

The Contractor shall develop and submit, for review by SAWS, a detailed project specific Quality Control Plan after receipt of Notice of Award and prior to the Preconstruction Conference. It shall be reviewed and formally accepted prior to the initiation of construction.

7. Documentation: The Contractor shall document all QC activities performed during the contract by the Contractor, subcontractors, testing laboratories, and vendors in accordance with the Contract Documents.

The Contractor shall prepare QC reports consisting of or considering the following items:

- a. Testing activities, control procedures, test results, nature of deficiencies, proposed remedial actions, and corrective procedures instituted;
 - b. Reports shall reference specification section;
 - c. Reports shall also include subcontractor work;
 - d. Reports should concentrate on work items that have been completed and provide evidence of control activities;
 - e. Reports shall be submitted on a weekly basis, but always before request for payment on completed work;
 - f. Reports shall reflect accurate and precise QC actions taken.
8. Submittals: It is imperative that the Contractor's QC representative review all submittals.

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- a. Typical types of submittals are:
 - (1) Testing Data;
 - (2) Shop Drawings;
 - (3) Work Schedules;
 - (4) Reports/Statements;
 - (5) Material or Product;
 - (6) Materials Samples;
 - (7) Materials Testing;
 - (8) Contractor's Safety and Health Program.
 - b. The primary responsibility for overall management and control of submittals lies with the Contractor.
 - c. All required submittals shall be provided in a timely manner, and according to Contract Documents, to allow for the review, approval, procurement, delivery, and QC preparatory phase of an item before it is needed for construction.
9. **Testing:** Testing procedures described in the Contract Documents are another form of quality control to be performed at the sole expense and responsibility of the Contractor, ensuring delivery of an end product which meets the requirements in the contract.

Testing requirements and procedures shall include, but not be limited to, the following:

- a. An outline of proposed testing procedures developed and submitted prior to construction;
- b. Provide a listing of all required tests as specified in the contract, in addition to providing a listing of all non-specified testing procedures pending approvals;
- c. Specify who will be performing all required testing and at what frequencies;
- d. ASTM D3740-96 - Minimum Requirement for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction.

903.4 QUALITY ASSURANCE: Quality Assurance (QA) is the means by which SAWS assures that the completed project complies with the quality established by the construction contract documents. SAWS assures that the Quality Control (QC) will be accomplished through reviews, observation and tests by QA personnel (SAWS Construction Observer/Inspector, Engineer, or any other authorized SAWS representative).

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1. Quality Assurance Plan: An important tool in the success of the Construction QC/QA Program which will result in a qualitatively completed project is "partnering," which provides for the development of trust and effective communication between the Contractor, Engineer, and SAWS. SAWS will initiate partnering on appropriate construction projects, shortly after the award of the contract.

Responsibilities of the QA personnel include, but are not limited to, the following:

- a. Respond to Contractor's requests for information (RFI) in a clear and timely manner;
 - b. Require the materials and standard of workmanship specified in the contract documents;
 - c. Require from the beginning that the Contractor maintain the quality specified in the construction contract documents and detailed in the Contractor's QC Plan;
 - d. Deal only with authorized Contractor's representatives;
 - e. Advise the Contractor of and document deficiencies as discovered;
 - f. Follow up with the Contractor to assure deficiencies are corrected;
 - g. Establish and maintain throughout the project clear and effective communications with the Contractor;
 - h. Designate a SAWS representative as the Contractor's single point of contact;
 - i. Identification and scheduling of training requirements for SAWS personnel;
 - j. Identification of pre-award activities;
 - k. Identification of any special project requirements;
 - l. Establish procedures for QA tests at random and unannounced intervals;
 - m. Review qualifications of Contractor's identified quality control laboratory.
2. Specific Activities: Specific activities associated with QA include, but are not limited to, the following:
 - a. QC Plan review and acceptance;
 - b. Pre-construction conference;
 - c. Partnering workshop (to be determined by SAWS);
 - d. Coordination meetings;
 - e. Issuance of approved meeting minutes;
 - f. Submittal reviews and acceptance;
 - g. Assurance testing;

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- h. Acceptance of completed work;
 - i. Implementing approved Construction QC/QA Program
 - j. Implementing approved Safety and Health Program
3. **QC's Plan Review and Acceptance:** QC plan review shall include, but is not limited to, the following:
- a. Evaluation of the QC plan with regard to the contract document's requirements and determine overall compliance;
 - b. Identification of any problem areas needing change or clarification;
 - c. Determination if QC plans provide adequate control of defined segments of work;
 - d. Evaluation of QC staffing and organization for compliance with the intent of the contract documents;
 - e. Check the qualifications, training (Excavation/Safety competent person, work zone traffic control, confined space entry, hazardous materials), responsibilities, and authority (sign pay request, negotiate change orders) of Contractor's/Subcontractor's QC "competent" person;
 - f. Determination that QC plan adequately addresses submittals process;
 - g. Check proposed QC documentation formats.
4. **Preconstruction Conference:** This conference is a specific contract requirement and shall be held soon after contract award and prior to start of actual construction, contingent on receipt of contract documents specified in the General Conditions, including Contractor's QC Plan. The conference will address contract clauses covering quality control, testing, warranties, safety, personnel, and procedural items with discussions on specific rules and procedures. Specific responsibilities and authorities shall be presented and agreed upon so that the Contractor, Engineer, and Inspector will share the same understanding of the project scope and conditions.
5. **Partnering Workshop:** Shortly after the award of contract, the Contractor, Engineer, and Inspector will participate in a Partnering Workshop (when deemed appropriate by SAWS) that will be directed by a qualified facilitator and will result in a Partnering Charter for the specific construction project.
6. **Coordination Meetings:** These meetings are scheduled and conducted by SAWS. They will be scheduled as required and/or prior to the start of a definable feature of work on the project. The primary purpose of these meetings is to establish a positive working relationship and to achieve a mutual agreement with the Contractor on the QC Plan and Safety Plan requirements.

The Coordination Meetings should address the following:

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- a. Responsibilities of the “Competent Person”;
- b. Quality control concepts;
- c. Definable segments of the physical work;
- d. Correction of the QC plan, if necessary;
- e. Procedures to be followed if deficiencies are discovered;
- f. Testing and documentation;
- g. Procedures for making changes;
- h. Safety plan;
- i. Review list of Contractor submittals.

SAWS is responsible for taking detailed conference minutes and for distribution of the minutes.

- 7. Submittal Review and Acceptance: SAWS' responsibilities regarding submittals include, but are not limited to, the following:
 - a. Review list of submittals, prepared by Contractor, against requirements of the Contract Documents;
 - b. Review Contractor's submittal control document for compliance with submittal schedules, review time and procurement lead times;
 - c. Check submittal control documents against construction schedule;
 - d. Continually monitor status of submittals;
 - e. Respond to submittals in accordance with contract documents;
 - f. Enforce submittal requirements of the contract documents.
- 8. Assurance Testing: Quality Assurance (QA) testing is necessary to assure a quality project. SAWS performs QA testing to verify that QC testing is accomplishing the specified objectives. QA testing can be performed by either SAWS personnel or an independent testing laboratory.

Specific scope and objectives include:

- a. Review Contractor's proposed QC testing methodology, quantity of tests, and laboratory or Contractor's equipment certifications contained in the QC plan;
- b. Review reports of QC tests performed and document corrective actions taken for any problem area;
- c. Verify QC testing by random and unannounced tests that repeat the Contractor's QC tests.

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903.5 COMPLETION OF WORK: In order to properly complete a quality project, defined procedures are necessary. Activities involving QC/QA personnel include, but are not limited to, the following:

1. Participation in preliminary and final inspections;
2. Prepare deficiency "punchlist";
3. Completion of "punchlist" deficiencies;
4. Review and approve Contractor's redline drawings;
5. Submittal of approved Operation and Maintenance manuals;
6. Completion of Operation and Maintenance training;
7. Submittal of specified spare parts;
8. Submittal of Contractor warranty information.

903.6 SAWS OPTIONS IN THE QC/QA PROGRAM: The QC/QA program will be successful only if all parties, the Contractor, Engineer, and SAWS, are committed to "Quality of Excellence." Preparation of high quality design documents by SAWS and the Engineer provide the basis for high quality construction. Contractor Quality Control is the key to providing an excellent product. SAWS' cost for providing, maintaining, and replacing its infrastructure continues to escalate. SAWS' core values dictate the pursuit of excellence and the elimination of poor quality, incompetency and unsafe processes and products.

Proper QC by the Contractor can prevent adverse SAWS actions. The contract documents contain clauses that provide means for enforcing contract compliance. Available means include, but are not limited to:

1. Require the Contractor to remove and replace deficient materials and/or workmanship;
2. Withhold payment;
3. Require removal of unqualified personnel;
4. Stop work until deficiencies are corrected;
5. Default the Contract;
6. Enforce liquidation damages;
7. Disqualification from bidding on future SAWS projects.

Such drastic actions are not desirous and would be necessary only when all other amenable avenues of partnering have failed. As originally stated, Quality is more than meeting the minimum requirements of the contract documents. Quality is also complying with SAWS core values and providing legendary service. And this requires the complete and full commitment to quality by all parties of this partnership.

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903.7 MEASUREMENT: Measurement of the Item, "Construction QC/QA Program," as specified herein, will not be measured for payment.

903.8 PAYMENTS: No direct payment shall be made for incidental cost associated with preparation and implementation of the Contractors project specific QC/QA Program.

903.9 APPENDIX: MINIMUM BASIC OUTLINE FOR A CONTRACTOR QC PLAN.

The following general outline shall be used by the contractor to develop a project specific QC Plan. All QC Plans must comply with the overall Construction QC/QA Program. This QC Plan must be approved by SAWS prior to the beginning of construction.

1. **PRECONSTRUCTION PHASE:**
 - a. **QC ORGANIZATION:**
 - (1) List of personnel / chain of authority;
 - (2) Qualifications of QC personnel (including sub-contractors, suppliers, manufacturers);
 - (3) Name and qualifications of "Competent Person," and alternate.
 - b. **DEFINABLE CONSTRUCTION FEATURES:**
 - (1) List of definable features / items (identified by SAWS specification numbers);
 - (2) Schedule of Values for all definable features shall be submitted and approved prior to submittal of first pay request.
 - c. **GENERAL ADMINISTRATIVE PROCEDURES:**
 - (1) Identify all responsible personnel (Contractor authorized representatives to sign Contract Documents, Pay Request, Change Orders, etc.);
 - (2) Identify all construction forms / procedures required (in accordance with SAWS Construction Phase Procedures guidance manual);
 - (3) Identify all SAWS personnel, Engineer, etc. responsible for the review or acceptance of submittals and construction activities.
 - d. **CONTRACTOR COORDINATION WITH OTHER AGENCIES:**

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- (1) Identify all agencies and a contact person from each agency, as appropriate (including but not limited to: City of San Antonio Departments, Bexar County Departments, Texas Department of Transportation, Texas Commission on Environmental Quality, San Antonio Water System, etc.);
- (2) Identify all existing utilities / field conditions as appropriate (including but not limited to: SAWS, CPS Energy, AT&T Telephone, Time Warner Cable, etc.).

e. **SUBMITTALS:**

- (1) Identify as appropriate, including but not limited to: all definitions, procedures, product data, shop drawings, samples, manufacturers certificates/warranties, etc.;
- (2) Prepare a schedule of specified submittals to be submitted for review/approval (verify all material and contract requirements);
- (3) Identify SAWS personnel, Engineer, etc. responsible for the review and acceptance of project submittals;
- (4) Prepare a Construction Safety and Health Program (contractor and sub-contractors) in accordance with SAWS Construction Safety and Health Program guidance document;
- (5) Testing laboratory services (to be used by contractor): submit data for review and approval of laboratory as specified in the contract documents;
- (6) Material testing:
 - (a) Attach testing analysis data of materials to be used on the project to the appropriate material submittal.
 - (b) Submit a QC testing plan (example backfill material, roadway construction material compaction testing, pipe testing, motors/pumps tests, other tests as required or appropriate).

2. **CONSTRUCTION PHASE:** Prepare written procedures with respect to issues including:

- a. **CONSTRUCTION SEQUENCING**
Construction Schedule: include, but not limited to: bar graphs, phasing plan, network diagrams, critical path item identification, equipment/material/supplies delivery impact, narrative reports, etc.).

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- b. SHOP DRAWING LOGS
 - c. SUBMITTAL LOGS
 - d. REQUEST FOR INFORMATION LOGS
 - e. TRAFFIC CONTROL PLANS
 - f. COORDINATE USE OF OWNERS PREMISES: Including, but not limited to, layout of temporary facilities, temporary utilities and controls, security, field office and storage facilities, operation of owners valves, facilities, tie-ins, by-pass pumping, flow diversion or interruption of owner's facilities. etc.
 - g. PREPARATION OF RIGHT OF WAY
 - h. TEMPORARY CONTROLS: Including but not limited to: erosion and sedimentation controls, dust control, construction noise control, etc.
 - i. SURVEYING
 - j. DELIVERY, STORAGE, INSPECTION AND INSTALLATION OF MATERIALS AND EQUIPMENT
 - k. TESTING OF ON-SITE MATERIALS AND EQUIPMENT
 - l. MANUFACTURERS FIELD SERVICES
 - m. TRAINING SCHEDULE
 - n. STARTING OF SYSTEMS
3. Construction Completion Phase: Prepare written procedures with respect to issues including, but not limited to:
- a. EQUIPMENT TRAINING
 - b. MANUFACTURERS INSPECTION/ACCEPTANCE REPORTS (as applicable).
 - c. DEFICIENCY PUNCH LISTS

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- d. REMOVAL OF UTILITIES, FACILITIES AND CONTROLS
Plan and coordinate with proper personnel and/or agencies.
- e. COORDINATE SYSTEM OPERATION TURN-OVER TO OWNER
- f. COMPLETE ALL POST CONSTRUCTION
DOCUMENTATION/ADMINISTRATION (as required by contract)
- g. PROJECT RECORD DOCUMENTS:
 - (1) Maintain records and documents throughout construction process.
 - (2) Prepare final submittals on items required (include but not limited to: as-built drawings, specifications and addenda, approved shop drawings, material samples, construction photographs, change orders, contract modifications, testing and analysis records, survey data, construction reports such as daily reports, monthly reports, payroll records, and safety data such as MSDS, safety meetings, incident reports, etc.).

- End of Specification -

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ITEM NO. 904

Construction Phase Procedures

904.1 DESCRIPTION: This item shall govern the implementation of the Construction Phase Procedures for construction projects. The Construction Phase Procedures is a guidance document written to help direct and control activities during the construction phase of projects. This Construction Phase Procedures manual is not intended to be a step-by-step procedure. Instead, it is a document which outlines general activities, procedures, and requirements by SAWS to be implemented by SAWS and the Contractor throughout the Construction Phase of a project

904.2 INTRODUCTION: Contractors and subcontractors working on SAWS Construction Projects are required to know all contract document requirements for their project. This manual was designed to cover most issues involved large construction projects. The size, scope, and/or technical complexity of the individual project will determine the extent the procedures in the manual are utilized. Many routine SAWS projects will not necessarily require use of every form listed in this manual. For projects being managed by Consultants, whether hired by SAWS or private entities, it is allowable to use their pre-established forms and documents, so long as they demonstrate adherence to the general format of this manual and meet the general intent of the requirement.

1. Quality Control/Quality Assurance: SAWS has established a Construction Quality Control and Quality Assurance (QC/QA) Program. The Construction QC/QA Program has been written and distributed to facilitate the direction and control of entities and persons performing and managing construction for the SAWS Construction Projects. The Contractor is herein directed to Item No. 903, "Construction QC/QA Program," for a summary of both the Contractor's and SAWS' respective expectations and responsibilities.
2. Partnering: SAWS is committed to promoting partnering with all parties associated with a Construction Project. Shortly after the award of the contract, SAWS will invite the Contractor and Consultants to participate in a Partnering Workshop Session, when considered in the best interest of the Construction Project.
3. Pre-Construction Meeting: A Pre-Construction Meeting will be sponsored by SAWS shortly after award of the project. The meeting is designed to review the various administrative procedures and actions required by all involved parties. Depending upon the project scope and technical requirements, the meeting may be conducted jointly with the Partnering workshop, or held separately. In order to ensure all pertinent issues are covered during the meeting, SAWS has developed a Pre-Construction checklist (Form 18).
4. Safety: SAWS is committed to ensuring that safety is a priority on SAWS Construction Projects. A Construction Safety and Health Program has been prepared and distributed to help prevent accidents, injuries, and damage to

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equipment and property. The Construction Safety and Health Program is not intended to be an all-inclusive listing of safety procedures, rather it is a guidance document. The Contractor is herein directed to Item No. 902, "Health and Safety Program," for a summary of both the Contractor's and SAWS' respective expectations and responsibilities

904.3 RESPONSIBILITIES AND COMMUNICATION: The Construction Observer/Inspector (COI) is the individual who has been designated as the field representative of SAWS. The COI's primary responsibility is to observe construction activities, in accordance with SAWS directives, to assure completion of the project according to the contract documents. The COI and/or their Supervisor are also responsible for regular review of safety documentation and reports and forwarding such documents to SAWS. If the COI observes or perceives an unsafe work practice, he or she shall bring it to the attention of the Contractor's representative, and the SAWS Safety Officer.

The COI is responsible for coordinating between the various parties involved in the project, including the various departments within SAWS, and is the Contractor's primary point of contact on the project. Consequently, all communications will be directed through the COI by all the project participants.

The matrix shown herein lists the general responsibilities of various construction phase activities. The procedures in this document are based on the matrix. The contract and construction documents for each individual project shall be reviewed and the procedures and responsibilities adjusted according to the specific contents therein.

Note: when the term "COI" is used in this document, it refers to the overall SAWS Construction Inspection office. The term collectively means a combination of the individual Construction Inspector assigned to this project, another Construction Inspector temporarily assigned to oversee the project during the absence of the designated Inspector, his/her Area Supervisor, personnel in the Construction Inspection Administrative office, the Construction Inspection Project Engineer, the Manager of Construction Inspection, etc. Internal SAWS policies and procedures dictate the appropriate individual referenced as the "COI."

1. Written Correspondence: General correspondence to the contractor will be signed by the COI and/or the appropriate Construction Inspection personnel pertaining to legal and contracting issues.

The routing of data and information to outside organizations, without the need of a cover letter, will have a Transmittal Form (Form 1). Written communications internal to SAWS will be prepared on the Memorandum Form (Form 2). Telephone conversations with the Contractor, Engineer, other SAWS Representative, Suppliers, Subcontractors, Vendors, etc. will be noted on the Telephone

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Conversation Record (Form 3).

Written inquiries or questions on the Contract Documents from the contractor should be written on a Request For Information Form (Form 4). If the Contractor asks a verbal question, the COI will either provide a verbal response or request the contractor submit a Request for Information Form (Form 4). The COI will determine where the question should be forwarded. All questions to the Engineer will be faxed, emailed, or delivered the same day. The COI will monitor or prepare responses to minimize delays to the Contractor by maintaining a log of all Requests For Information (Log 1). The COI will forward the response to the Contractor when complete. The Contractor is required to review the response and return a copy of the form and indicate whether extra compensation is due. If the Contractor indicates extra compensation is due, the Construction Inspection office will review the response again and determine if the response should be amended.

A complete set of files will be maintained at the job site and/or SAWS Construction Inspection office by the COI in accordance with the File Code System in the Appendix of this document. A copy of all sensitive documents will be forwarded to the SAWS Construction Inspection Manager.

2. Electronic Communication: Electronic communication in the form of electronic mail (e-mail) is acceptable and should be used for most unofficial correspondence. Unofficial correspondence may be defined as transmittals, which do not require a signature. If correspondence is made via e-mail, hard copies do not need to follow. Hard copies of e-mail messages may be retained by the sender and may be printed by the recipient so that a record of the unofficial correspondence can be maintained. The recipient shall also return confirmation of e-mail receipt to the sender.
1. Shop Drawings/Submittals: The Contractor is responsible for ensuring that all information is submitted in a timely manner to prevent construction delays. The Contractor will submit all submittals on CPMS using the prescribed cover sheet Transmittal of Contractor's Submittal Form (Form 5). The target date for the return of the documents from the Engineer shall be 10 calendar days from when the documents are submitted, even though contracts allows 20 calendar days.

Before any shop drawings requiring "re-submittal" are returned to the Contractor, the Engineer and/or SAWS may call the Contractor and give him/her an opportunity to correct the problems. The Engineer will denote their respective comment(s) to the submitted documents and return to the Contractor.

Contractor shall provide for SAWS and Engineer submittal review expenses under 3 limited and avoidable circumstances:

- a. Any resubmittal beyond the first resubmittal and any submittal or resubmittal not included on the initial schedule of specified submittals will

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be treated as requiring reimbursement of submittal review expenses.

- b. When an expedited review is requested by the Contractor for a submittal or resubmittal by the Contractor and/or required to avoid construction delays. In this case the expedited review period will be 7 working days and Engineer expense reimbursement will be required of the Contractor.
- c. When a required submittal is not initially substantially submitted within the first half of the original contract time or resolved within 30 days of that time. All submittals and resubmittals provided after this time will require Contractor's payment of said submittal review expenses. It is understood that the Contractor's reimbursement to SAWS and Engineer for their efforts required to accommodate submittal and resubmittal review and all associated management and tracking is requested and acknowledged with any submittal or resubmittal meeting the above circumstances.

It is understood that the Contractor's reimbursement to SAWS and Engineer for their efforts required to accommodate submittal and resubmittal review and all associated management and tracking is requested and acknowledged with any submittal or resubmittal meeting the above circumstances.

Reimbursement by the Contractor for submittal review expenses will be assessed on a per-each basis on a subsequent Contractor monthly pay estimate as decided upon by the Inspector and Engineer. The Submittal Review Expenses as extended will be tracked and deducted from the amount due at each monthly estimate. The value will be a set price of \$2,000 per each submittal or resubmittal. The total of all Submittal Review Expense items will be resolved against the original contract amount no later than with the final recapitulation change order.

The Contractor shall utilize a submittal log and update the log to track all submittals for weekly meetings.

904.4 MEETINGS: The COI will assure that minutes for all project meetings are prepared. The Conference Memorandum Form (Form 6) will be used to document the meeting. A copy of the Conference Memorandum will be distributed to each attendant within seven working days of that meeting. Monthly meetings will follow the standard agenda below:

- 1. Corrections to Previous Minutes;
- 2. Unresolved Items;
- 3. Administrative Items;
- 4. Change Orders;
- 5. Shop Drawings;
- 6. Problems, Conflicts, & Observations;

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7. Coordination With Owner and/or Other Contractors;
 - a. Bypasses and/or Shutdown
 - b. Other
8. Progress Since Last Meeting;
9. Planned Progress for Next Meeting;
10. Progress Schedule;
11. Other Business;
12. The latest copies of the Submittal Log and Request For Information Log will also be issued at each weekly meeting.

904.5 PROJECT REPORTS:

1. Daily Reports: The COI will prepare a Daily Construction Report Form (Form 7) by no later than 10:00 am the next working day. The reports will be maintained in the job files. The reports begin on the first contract day so that the report number will correspond to contract day. This means that a report is to be prepared for every day including Saturdays, Sundays and holidays even if the Contractor doesn't work. The SAWS Daily Log (Form FN016-4) is an allowable substitution. Consultant developed daily logs can be used if the same basic information is recordable.

The information recorded includes project title, contractor's name, SAWS job number, day (Monday, Tuesday, Wednesday, etc.), date, Contractor work hours, report number, and weather conditions. Information recorded in the boxes includes the number and class (operators, carpenters, laborers, superintendent, foreman, clerical, electrician, etc.) of personnel for the Contractor and his Subcontractors working on the job site. This information can normally be determined from field observation and the Contractor's Daily Construction Report (Form 8). The number, description, and hours operated for all of the Contractor's and Subcontractor's equipment on the project site will also be recorded. The hours of operation do not have to be exact but, by observing the work, a reasonable estimate can be made. When Contractor's equipment arrives or departs from the project site, record the size, model number, or capacity in the "Work Performed" section. The information that is to be recorded under "The Work Performed" section is as follows:

- a. Description and/or condition of materials and equipment delivered;
- b. Description of items rejected and reasons therefrom;
- c. Results of inspection tests which are not recorded on standard forms;
- d. Account of work accomplished during the day including location and quantity;
- e. Description of any deviations from plans and specifications, reasons for the deviations, and what was substituted;
- f. Record of specific instructions given to the contractor;

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- g. Details of discussions, or controversies with anyone connected with the work such as the contractor or their representatives, suppliers, property owners, city, county, state, or federal government personnel;
- h. List of visitors to the project and their business connection;
- i. Details of any personal or property damage that may have occurred as a result of the contractor's negligence;
- j. Observations of the condition of foundations and other items of work which will be covered;
- k. References to important phone calls. (Details of all phones calls should be recorded on telephone conversation forms.).

The above information could become invaluable if the project becomes involved in any type of claims. The number of employees and delays to equipment operation often are critical items involved with claims.

- 2. Contractor's Daily Reports: The Contractor is required to submit a Daily Construction Report (Form 8) to the COI. The Contractor may use his own form as long as it provides the same information as the form (Form 8) enclosed in the Appendix. The Contractor may submit these Daily Construction Reports on a weekly basis.
- 3. Contractor's Payroll Reports: The Contractor must submit weekly compliance statements and payroll records directly to the Contract Administration Division of SAWS so that they may be reviewed for compliance with Wage and Labor Standard Provisions.
- 4. Monthly Reports: Depending upon the scope, size, and/or complexity of the project, COI will prepare a Monthly Summary of Construction (Form 9) which will include a summary of progress payments, work progress, project work, delivery problems or delays, and potential modifications. The COI shall also review the record documents maintained by the Contractor and shall report completeness in the remarks section of the monthly report. The COI shall submit 2 copies of the report with the Contractor's pay request to SAWS.
- 5. Water Use Logs: The contractor shall prepare a monthly summary of water usage using the Unmetered Water Use Log (Log 8) and the Contractor Tank Truck Water Use Log (Log 9). These reports should accompany the monthly invoices and are required before SAWS will process any payments.

904.6 SAFETY: The SAWS Project Construction Program and Health and Safety Program is not intended to be an all-inclusive listing of safety procedures. It is a guidance document which outlines general safety activities, procedures, and reporting requirements to be implemented by the Contractor. Contractors working on SAWS Construction Projects shall have their own Project Specific Safety Plan which complies with the general requirements of the Safety and Health Program and all applicable regulations. Individuals

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working on SAWS Construction Projects are responsible for knowing all safety rules, being alert and practicing good, sound judgment in the performance of their jobs, even if specific safety rules are omitted from either this SAWS Construction Program and Safety and Health Program or the Contractor's project-specific safety and health plan. Subcontractors and their employees are responsible for following all requirements of the Contractor's project-specific safety and health plan.

Safety guidelines shall be understood and followed by all individuals while on the job site. Violation of safety and health guidelines, either in job performance or in the letter of the project-specific safety plan, may result in work stoppage until safety requirements are properly fulfilled.

904.7 QUALITY CONTROL/QUALITY ASSURANCE: An important tool in the success of construction projects is the implementation of a Construction QC/QA Program. Partnering will result in a quality completed project and provides for the development of trust and effective communication between the Contractor, Engineer, and SAWS.

1. Quality Control: Quality Control (QC) is the Contractor's means of assuring conformity with the contract documents by defining procedures to manage and control his/her own activities, all Subcontractor's activities, and all suppliers' activities during construction. These procedures will be outlined in the Contractor's project-specific QC Plan, the foundation for quality work. The Contractor's QC plan shall be received and formally accepted before any construction begins. In some cases, this requirement can be met by an interim plan. As part of its QC activities, the Contractor shall document activities performed by the Contractor, Subcontractors, testing laboratories and vendors in accordance with the contract documents. It is imperative that the Contractor's QC representative review all submittals to make sure all requirements are met.
2. Testing: Proper testing procedures, as described in the construction contract documents, are forms of quality control to be performed by the Contractor ensuring delivery of an end product which meets the requirements in the contract documents. Testing requirements and procedures shall include but not be limited to the following:
 - a. Outline proposed testing procedures prior to construction;
 - b. Provide a listing of all required tests as specified in the contract, in addition to providing a listing of all non-specified testing procedures pending approvals;
 - c. Specify whether the tests are to be performed by an independent, SAWS approved, certified testing laboratory or by the Contractor with approved certified equipment and procedures or by others (subcontractors or suppliers);

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- d. Follow ASTM D3740-96 - Minimum Requirement for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction;
- e. Pipe Testing events will be recorded on a Pipe Leak Test Record (Form 10) and entered on the Pipe Testing Log (Log 3). Other pertinent testing forms may apply. The COI will advise accordingly.

All QC-related activities and costs are the sole responsibility of the Contractor.

- 3. **Quality Assurance:** Quality Assurance (QA) is the means by which SAWS assures that the project work complies with the quality established by the construction contract documents. QA will be achieved through a QA Plan which serves as a management tool to establish processes and procedures involving the SAWS and Consultant organization, staffing, training, pre-award activities and construction observation. The QA Plan will identify Quality Assurance personnel, special project requirements and construction administration and observation tasks so as to assure that a consistent process is followed by QA personnel. SAWS COI will perform QA through a combination of routine and random site inspections.

The QA representatives will review and accept the QC Plan and arrange and coordinate construction conferences, partnering workshops and other overall project meetings. The QA representatives will also document and review quality control activities. While QC testing will be completed by the Contractor, QA testing will be conducted by SAWS through the COI. Finally, once all QC activities have been met and verified through the QA process, SAWS will start the acceptance process of the completed work.

All QA-related activities and costs are the sole responsibility of SAWS.

904.8 PHOTOGRAPHS: The COI will take photographs to document the progress of the project.

904.9 CONSTRUCTION PROJECT SIGNS: The Contractor will provide and erect two construction project signs in a visible area of the specific project. The location of the project signs will be approved by the COI. The construction project signs shall meet specifications and guidelines as outlined in Item No. 869, "Project Signs." The Contractor is herein referred to the San Antonio Water System Standard Drawing No. DD-869-01.

904.10 CHANGES:

- 1. **Change Orders:** Changes may be initiated by the Contractor, Engineer, or the COI. When SAWS or the Engineer initiates a change, a Request for Proposal Form (Form

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11) will be prepared which describes the nature and justification for the change. The RFP will be forwarded by the COI to the Contractor for pricing. Each RFP shall be sequentially numbered and its status shall be documented on the Change Order Proposal Log (Log 4). When the Contractor initiates the change, the Contractor shall request the next sequential number for the quotation and then submit the quotation to the COI.

Upon receipt of the quotation from the Contractor, the COI will record the appropriate information on the Change Order Proposal Log. The COI shall participate, with other SAWS representatives as appropriate, in negotiation of equitable Change Orders with the Contractor. After negotiations have been complete and the results accepted by SAWS management, a Change Order Form (Form 12) will be prepared for processing. The Change Order Log (Log 5) is used to record information pertaining to the status of each Change Order.

The COI will send 6 copies to the Contractor for processing. The Contractor shall return 5 executed copies to SAWS Construction Inspection for processing.

Change Orders for an aggregate amount greater than a positive or negative change of \$25,000.00 or that need additional contingency funds authorization, require approval by the SAWS Board of Trustees (Board). The Board normally meets twice a month on the first and third Tuesday of each month. During the summer, the Board typically meets once a month. Due to the required review procedures for changes that must meet the Board for approval, the entire process from final agreement on the scope and price to Board approval can take 6 to 8 weeks. Changes less than \$25,000.00 may be processed by SAWS staff without Board approval, if sufficient contingency funds are available. For change orders exceeding \$25,000.00 and requiring immediate action, SAWS staff may submit a ratification request through the engineering group so all affected additional work may proceed in order to prevent unnecessary delays.

2. Pricing Changes: For some changes, it may be advantageous for work to be performed on a time and materials basis. For this method, the Contractor will track all employee hours, equipment hours, and quantity of materials used. This information must be recorded each day on the Daily Time & Material Record Form (Form 14) or a similar form provided by the Contractor. The COI is required to monitor the work and check the forms submitted each day by the Contractor for accuracy. The General Conditions of the Contract Documents outline what type of overhead and profit that the Contractor may add for this type of charge. This method of pricing changes is not desirable because it places an extra administrative burden on the Contractor and COI and doesn't provide the Contractor with an incentive to work efficiently. Therefore, this pricing method must first be approved by the COI.

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904.11 PAYMENTS:

1. **Progress Payments:** During the latter part of each month as the work progresses the COI and Contractor shall determine the cost of the labor and materials and/or the quantities incorporated into the work during that month. They will also determine the actual invoiced cost of Contractor-acquired materials stored on the Project site and/or within off-site storage facilities either owned or leased by the Contractor and approved by SAWS. The COI will review the draft quantities and percentages (commonly called the “scratch sheet”) and determine if they are appropriate. The COI will also check the stored material list for new items and verify that materials are actually on site and that the invoice is attached to the estimate. The previous list of stored material items will be checked for consumption, and removal of items from the list. The COI and Contractor will meet to discuss the estimate and resolve any disputed items. When correct, the Contractor shall obtain signature from the Engineer and forward 8 sets of the Form 15 (Progress Payment) through SAWS for processing. SAWS will confirm that quantities, extensions, and totals are correct, and proceed with processing.

Upon receipt of the Payment Estimate Form (form 15), SAWS will process as follows: Construction Inspection will review, sign, and forward to Contract Administration and update the Contract Summary Sheet (form 16); Contract Administration will review, sign, and forward the payment estimate to the Accounting Department. Payment estimates received in the Accounting Department after Tuesday afternoon, will not be prepared until the following Friday; checks are printed on Friday, provided that there are no holidays in that time. In the contract document's General Conditions, it is stated that SAWS will make payment within 30 days of receipt of a complete and accurate invoice at Contract Administration's Office.

2. **Semi-Final Payments:** Upon completion of all work, an inspection will be performed by SAWS and an Inspection Letter of Conditional Approval will be issued. This letter will include a punch list of all items, if any, which must be completed before final acceptance of the work. The Contractor and COI will then prepare a semi-final payment request, which includes a recapitulation of project costs. The semi-final pay request will list the original contract amount, the total value of the work to date which was figured in the recapitulation of project cost, less the retainage and previous payments, and finally the total amount due for the semi-final payment. Payment procedures will follow the same protocol as the progress payment procedures outlined above.
3. **Final Payment:** Upon final completion of all work (including punch list items), a final Certificate of Acceptance will be issued by SAWS. The Contractor and COI will then prepare the Final Payment Request. Along with the Final Payment Request, the Contractor shall submit a notarized affidavit in duplicate stating under

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oath that all subcontractors, vendors, and other persons or firms who have furnished or performed labor or furnished materials for the work have been fully paid or satisfactorily secured. Such affidavit shall bear or be accompanied by a statement, signed by the surety company who provided the Payment Bond for the work, to the effect that said surety company consents to final payment to the Contractor being made by SAWS. SAWS will then release the retainage and make final payment to the Contractor. Payment procedures will follow the same protocol as progress payment and semi-final payment procedures described above.

904.12 SPARE PARTS: The Contractor will review the specifications and develop a list of all required spare parts and forward to the COI for verification. The list will be included on the Spare Parts Transfer Log (Log 6) prepared by the Contractor. Each package will have a tag or label with all the required information completed and placed on it. The Spare Parts Transmittal Form (Form 17) will be completed when the spare parts are ready to be turned over to the SAWS operations staff. Separate forms will be used for spare parts from each specification section. A package and Spare Parts Transmittal Form for all parts from a specification section must be completed before the parts will be accepted from the Contractor (no partial submissions for a specification section will be accepted). The COI will verify that each submission is complete and correct before it is turned over to SAWS operations staff.

904.13 PROJECT COMPLETION: When the Contractor is nearing completion of a phase of the project, the Contractor will develop a preliminary punchlist of the items that are deficient on the project. Items may be added to the list as additional review of the project continues. When all or most of the items on the preliminary punchlist are corrected, the Contractor will request the Substantial Completion Inspection. The Substantial Completion Inspection will be conducted with representatives from the Contractor, SAWS, Engineer, Texas Water Development Board (if applicable) and any other appropriate personnel. During this inspection, the final punchlist will be developed. No additional items will be added to the list after this inspection, unless agreed to by all parties. Any items discovered after the final list will be considered warranty items. The COI will list any known administrative items remaining such as warranties, bonds, Record Documents, etc. The final punchlist will be attached to the Certificate of Substantial Completion issued by SAWS.

When the Contractor has completed the items on the final punchlist, a final inspection will be scheduled for representatives of the Contractor, COI, Engineer, and any other appropriate organizations. The Final Inspection is intended to verify that the Contractor has corrected all of the items on the final punchlist. SAWS COI will use the Water Acceptance Checklist (Form 20) and Sewer Acceptance Checklist (Form 21) to ensure the work on these utilities meets the contract document requirements. The Contractor will submit his final pay estimate, request release of retainage, and lien release. The Engineer will review the information and make a recommendation to SAWS. The request for release

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of retainage will be forwarded within the timeframe established by the general conditions and through the same channels as the pay estimates. SAWS Contract Administration will issue final acceptance and payment. See the Project Closeout Process (Form 19) for the typical steps and actions necessary to close out the administrative requirements on the project.

904.14 START UP: Prior to initiation of start up of any new or rehabilitated facilities, the Contractor will review the contract documents and prepare a checklist of requirements for the facility's start-up operation. This checklist of requirements will be verified by the COI. This will include a Training Log (Log 7) of the training required by manufacturers. The COI will coordinate with SAWS operations staff and the Contractor for the date and time of the training. As the training is completed, it will be added to the log.

When the Manufacturer's Representative reviews the installation of his equipment, the representative must certify the installation in writing before SAWS personnel will accept responsibility for the operation of the equipment.

The Contractor is required to develop a Start Up Plan prior to placing the facility(ies) into operation. The plan must be submitted in advance of start up to allow review by the COI, Engineer, and SAWS operations staff. After all parties have reviewed the initial plan, a meeting will be held to discuss the plan and all parties' review comments, as appropriate. The Contractor will revise the plan, per the comments agreed upon at the meeting, and will then resubmit. After review of the revised plan another meeting may be appropriate. This process will continue until an acceptable plan is developed and accepted.

Before start up is to begin, another meeting will be held to discuss the final plan and assure that everyone understands the schedule and responsibilities for startup.

904.15 MEASUREMENT: Measurement of the Item, "Construction Phase Procedures," as specified herein, will not be measured for payment.

904.16 PAYMENT: No direct payment shall be made for incidental cost associated with preparation and implementation of the Construction Phase Procedures.

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904.17 APPENDIX

FILE SYSTEM	
1.0 CORRESPONDENCE (Letters, Memos, TCRs) 1.1 Contractor 1.2 Engineer 1.3 SAWS 1.4 Request for Information 2.0 MEETINGS 3.0 DESIGN REFERENCE DATA 4.0 PROGRESS PAYMENTS 4.1 Contractor 4.2 Engineer 4.3 Other Consultants 5.0 LEGAL (Contracts, Bonds, Insurance, Notice to Proceed, Sub Approval, EEO, etc.) 5.1 Contractor 5.2 Engineer 5.3 Other Consultants 6.0 PROGRESS REPORTS (CPM Schedule, Monthly Reports) 6.1 Contractor 6.2 Engineer 6.3 SAWS 7.0 CHANGES 7.1 Change Proposal Log 7.1.1 Change Proposal No. 1 7.2 Change Order Log 7.2.1 Change Order No. 1	8.0 TESTING REPORTS 8.1 Concrete 8.2 Soil 8.3 Piping 8.4 Miscellaneous 9.0 DAILY REPORTS 9.1 Daily Reports 9.2 Safety Reports 9.3 Photos 9.4 Materials Storage Recommendations 10.0 STARTUP 10.1 Schedules/Plans 10.2 Training 10.3 Manufacturer's certifications 10.4 Spare Parts 10.5 O & M Manual Transfers 11.0 PROJECT COMPLETION 11.1 Punch List 11.2 Guarantees/Warranties 11.3 Final Inspection/Approval (Lien Release, Substantial Completion, Final Acceptance) 11.4 Record Documents 12.0 ONE YEAR CORRECTION PERIOD 12.1 Work Orders 12.2 Completed Work Orders

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7.3 Directives 7.3.1 Directive No. 1 7.4 Claims Log 7.4.1 Claim No. 1	13.0 SHOP DRAWING SUMITTALS (Shop Drawings, O & M Manuals, Training Lesson Plans) 13.1 Submittal No. 1 14.0 LOGS

INDEX TO FORMS	
Form No. 1	Transmittal
Form No. 2	Memorandum
Form No. 3	Telephone Conversation Record
Form No. 4	Request For Information
Form No. 5	Transmittal of Contractor's Submittal
Form No. 6	Conference Memorandum
Form No. 7	Daily Construction Report
Form No. 8	Contractor's Daily Construction Report
Form No. 9	Monthly Summary of Construction
Form No. 10	Pipe Leak Test Record
Form No. 11	Request For Proposal
Form No. 12	Change Order
Form No. 13	Work Change Directive
Form No. 14	Daily Time & Material Record
Form No. 15	Payment Estimate
Form No. 16	Contract Summary Sheet
Form No. 17	Spare Parts Transmittal
Form No. 18	Pre-Construction Checklist

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Form No. 19	Project Closeout Process
Form No. 20	Water Acceptance Checklist
Form No. 21	Sewer Acceptance Checklist

INDEX TO LOGS	
Log No. 1	Request For Information
Log No. 2	Shop Drawing Submittal
Log No. 3	Pipe Testing
Log No. 4	Change Order Proposal
Log No. 5	Change Order
Log No. 6	Spare Parts Transfer
Log No. 7	Training
Log No. 8	Contractor Unmetered Water Use Log
Log No. 9	Contractor Tank Truck Water Use Log

End of Specification

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ITEM NO. 906 Water Use Accountability

906.1 DESCRIPTION: This item shall govern the preparation and implementation of the Contractor's water use accountability program for the specified project.

1. This specification is not intended to be an all-inclusive, but is a guide outlining the procedures to report water usage during a construction contract.

906.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 906, refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 906, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. COSA – City of San Antonio:
 - a. Utility Excavation Criteria Manual
 - b. City of San Antonio (COSA) Specifications for Construction

906.3 MEASUREMENT: Measurement of the Item, "Water Use Accountability" as specified herein, will not be measured for payment.

1. The Contractor shall submit the project-specific water use log each month along with the monthly invoice.
2. Forms are available at the SAWS website (see logs 8 and 9).
3. Each log shall record the estimated and/or actual use of water during that period.
4. Monthly construction invoices will not be processed unless accompanied by a water use log.
5. The forms include guidance on how to calculate the amount of water used. Include the estimated quantity of water used for: filling an empty water line, flushing through a fire hydrant, flushing through a blow-off, leaks, filling water tanks and trucks, curing an in-place pipe liner, etc.

906.4 PAYMENT: No direct payment shall be made for the incidental cost associated with preparation and submission of the Contractor's project specific water use logs.

1. Monthly logs of water usage are required.
2. The contractor is required to obtain a fire hydrant meter/backflow assembly from SAWS Customer Service.
3. A refundable deposit will be required.
4. For all non-SAWS work, the contractor shall be responsible for obtaining a fire hydrant meter from SAWS Customer Service and establish an account to pay for actual water usage.
5. Payment for these accounts are handled through normal SAWS customer account procedures.

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End of Specification

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ITEM NO. 1110

Progress Schedule

1110.1 DESCRIPTION: This item shall govern the Contractor's responsibility to provide monthly construction schedules as specified herein for the work under this Contract. These schedules shall be developed as time-scaled network diagrams. Schedules include bar graphs, phasing plans, network diagrams, and narrative reports.

1110.2 REFERENCE STANDARDS: Reference standards cited in this Specification Item No. 1110 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 1110, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction

1110.3 SUBMITTALS:

1. Contractor's Submittals:
 - a. A preliminary schedule shall be submitted to the Inspector prior to, or immediately after, the Pre-Construction Conference, in bar graph form, based on the date of the Authorization to Proceed.
 - b. The Contractor may submit to the Inspector a revised contractor phasing plan prior to the start of construction for review and approval. If the Inspector determines that the revised Contractor's Phasing Plan is not acceptable with respect to the best interest of SAWS, then the Contractor shall proceed with the work in accordance with the SAWS's Phasing Plan at no additional cost to the SAWS.
 - c. Within 10 days after receipt of Authorization to Proceed, Contractor shall submit for SAWS's review, a detailed construction schedule, reflecting sequence of operations, milestones and commencing and completion dates of each item of work.
 - d. Other work may be added to the progress schedule as requested or approved by the Inspector.
 - e. At a minimum, the chart shall be maintained current by coloring or cross-hatching a length of bar to indicate the weekly progress towards completion.
 - f. Three copies of the progress schedule shall be submitted each month with the monthly "scratch copy," until completion of the project. If updated progress schedules are not provided, monthly payments will be withheld.
 - g. Updated copies of the progress schedule shall be available at the established progress meetings for review.
 - h. Contractor shall submit a projection of estimated monthly payments

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through the life of the Contract. Initial projections shall be correlated

with and provided at the same time as the Schedule of Values (if required). Projections shall be updated when requested by the Inspector.

2. **Owner's Review:**

- a. Within 10 days of submission of the schedule by Contractor, Contractor shall meet with the Inspector to participate in reviewing and revising the schedule as necessary. If revision of either form or content is necessary, Contractor shall revise and resubmit the progress schedule within five calendar days.
- b. The progress schedule shall be used by the Contractor for planning, organizing, directing, and executing all completion of work and for reporting progress of all remaining work.

3. **Revisions and Updates:**

- a. After the Owner's review of the progress schedule, if the Contractor desires to make changes in his method of executing the work, he shall notify the Inspector in writing, stating the reasons for the changes. If SAWS considers these changes to be of a major nature, the Contractor may be required to revise and resubmit all the affected portions of the progress schedule.
- b. Updated progress schedules shall show all changes in activities and milestones including future changes that can be reasonably anticipated by the Contractor.
- c. At the established progress meetings, the most recently updated progress schedule will be reviewed by the Contractor and Inspector. The schedule and work will be reviewed:
 - 1) To identify those activities started and completed during the previous period;
 - 2) For a review of remaining durations for selected activities not yet started;
 - 3) For the addition of change orders and proposed sequencing changes to the network diagram;
 - 4) For the interfacing of the work under this Contract with the work of other Contractors' or the connection to in-place work.
- d. Following review of the progress schedule at the established meetings, the Contractor shall revise and resubmit the schedule, if any of the following conditions have developed:
 - 1) When a delay in completion of any work item or sequence of work items results in an indicated extension of the project completion;
 - 2) When delays in submittals or deliveries or work stoppages are encountered which make re-planning or rescheduling of the work necessary;
 - 3) When the schedule does not reasonably represent the actual

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prosecution and progress of the project.

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- e. The revised schedule shall be submitted to the Inspector within five calendar days and shall be accompanied by a written narrative report. The narrative report shall include a description of problem areas, current and anticipated delay factors and their estimated impact on performance of other activities and completion dates, and an explanation of corrective action taken or proposed.
 - f. All updated or revised schedules submitted after the original schedule shall be in the same detail as the original submittal.
4. **Monthly Report:** Contractor shall submit a copy of the current adjusted construction Progress Schedule showing the progress to the Work to date and a narrative report with every monthly "scratch copy." Failure to submit the progress schedule shall be considered cause for withholding any progress payments otherwise due under the Contract. See Section 7.2 of the GENERAL CONDITIONS for more information. The report shall list any construction activities that are behind schedule and discuss measures being taken to bring these activities back on schedule.

1110.4 EXECUTION:

1. **Network Diagram:**
- a. The network diagram shall show the order and interdependence of activities and sequence in which work is to be accomplished as planned by the Contractor. The diagram shall show how the start of a given activity is dependent upon completion of preceding activities and how its completion restricts the start of following activities.
 - b. The diagram shall be constructed in such a manner that sub- networks (relating to particular phases or portions of work) can be readily extracted or revised as required by the Owner. Sub- networks shall include, but are not limited to, the following portions of work:
 - 1) Shop drawings, received from Contractor, submitted to the Inspector, reviewed, and returned to the Contractor;
 - 2) Material and equipment order, manufacturer, delivery, installation, and check-out;
 - 3) Connection to the work of other Contractors' and to in- place work;
 - 4) Work requiring coordination with the work of other contractors;
 - 5) Performance tests and supervisory service activities;
 - 6) Piping activities;
 - 7) Construction of various facilities;
 - 8) Concrete placement sequence;
 - 9) Backfilling, grading, seeding, paving, etc;
 - 10) Plumbing activities;
 - (1) Subcontractor's items of work;

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- (2) Final cleaning.
 - c. The network diagram shall show the following information related to activities:
 - (1) Activity number or label;
 - (2) Brief description of activity;
 - (3) Estimated duration, in working days, of each activity.
 - d. In addition to showing all construction and coordination activities, the diagram shall show following events and milestones:
 - (1) Notice to Proceed;
 - (2) Connections to the work of other contractors and to in- place work;
 - (3) Ready for operation and Contract completion dates;
 - (4) Shutdowns;
 - (5) Intermediate milestones.
 - e. Detail of information shall be such that duration times of activities will generally range from 1 to 30 days with not over 2% of activities exceeding these limits. Activities which comprise separate portions of work shall be identified separately by coding.
 - f. Network diagram shall be drawn on 22 inch by 34 inch size sheets with flow of activities generally from left to right. Printing shall be suitable for half size (11" x 17").
 - g. The network diagram shall be time-scaled.
2. Mathematical Analysis:
- a. Contractor shall provide Owner with the following:
 - 1) The calendar used for the computation of dates specified showing the calendar dates of each working day. The calendar shall incorporate the Contractor's assumptions of working days with due consideration being given to legal statutory holidays, Saturdays and Sundays, and weather shutdowns;
 - 2) A listing of each submittal and update of Contractor's detailed construction schedule;
 - 3) List of representative symbols and codes used in preparation of the network diagram.
 - b. Analysis shall include:
 - 1) Calendar date and lists of activities in order of earliest start date;
 - 2) Separate lists of activities within a given sub-network grouped together and listed in order of their earliest start dates.
3. Narrative Report: The narrative report shall include:
- a. Contractor's transmittal letter;
 - b. Schedule narrative concerning completion and progress of all work according to the activity in the Contractor's construction schedule;
 - c. Description of any problem areas;

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- d. Current and anticipated delays, cause, corrective action to be taken, and impact of the delay on other activities, on milestones, and on completion dates;
- e. Status of pending items such as permits, Contract modifications, and time extensions;
- f. Progress relative to schedule and other project or scheduling concerns;
- g. A discussion of coordination efforts and problems.

4. Log of Shop Drawing Submittals:

- a. The log of shop drawing submittals shall consist of a complete listing of all shop drawings required by the Specifications with anticipated submission dates. Scheduled submission dates shall be consistent with the construction schedule.
- b. The Contractor shall update the log monthly indicating submittal status. Status shall include all dates submitted and whether the submittal was acceptable or if re-submittal is necessary. Anticipated re-submittal dates shall be indicated.

1110.4 DELAYS AND RECOVERY:

- 1. If it is determined by the Inspector that the Contractor is not maintaining anticipated progress, then the Owner may withhold approval of the monthly progress payment as outlined in Section 7.2 of the GENERAL CONDITIONS.
- 2. Wherever it becomes apparent from the current monthly progress evaluation and updated schedule data that any milestone interface completion dates and/or Contract completion dates will not be met, the Contractor shall take some or all of the following actions:
 - a. Increase construction manpower in such quantities and crafts as shall eliminate the backlog of work;
Increase the number of working hours per shift, shifts per day, work days per work week, or the amount of construction equipment, or any combination of the foregoing sufficient to eliminate the backlog of work;
 - b. Reschedule work items to achieve concurrency of accomplishment.
- 3. Under no circumstances will the addition of equipment or construction forces, increasing the working hours, or any other method, manner, or procedure to return to the current Contractor's construction schedule be considered jurisdiction for Contract modification, increased cost, or treated as an acceleration.

1110.5 MEASUREMENT: There will be no measurement for payment of the Progress Schedule, as specified herein.

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1110.6 PAYMENT: No direct payment shall be made of any incidental costs associated with preparing and submitting the Progress Schedule, as specified herein.

End of Specification

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ITEM NO. 1112

Project Record Documents

1112.1 DESCRIPTION: Contractor shall maintain and provide the Inspector with project record documents as specified below. Daily logging and transmittal of record drawing information by accurately identifying all completed work is considered incidental and not eligible for additional payment.

1. Maintenance of Documents:

- a. Maintain in Contractor's field office, in a clean, dry, legible condition, a complete set of the following: Contract Documents, including all addenda, approved Shop Drawings, Samples, Photographs, Change Orders, other Modifications of Contract, Test Records, Survey Data, and all other documents pertinent to Contractor's Work.
- b. Provide files and racks for proper storage and easy access.
- c. Make documents available at all times for inspection by Inspector and/or Engineer.
- d. Record documents shall not be used for any other purpose and shall not be removed from the office without Inspector's approval.

2. Recording:

- a. Label each document "PROJECT RECORD," in 2 inch high printed letters.
- b. Keep record documents current and updated daily.
- c. Do not permanently conceal any work until required information has been recorded.
- d. Contract Documents: Legibly mark to record actual construction including:
- e. The depths of various elements of manhole foundation in relation to datum. This shall include the inclusion of surveyed inlet/outlet elevations for each structure installed;
- f. Specifications and Addenda - Legibly mark up each Section to record:
 - 1) Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed;
 - 2) Changes made by Change Orders or Field Change Directives;
 - 3) Other dimensions and details not in original contract documents.
- g. Shop Drawings - Maintain as record documents and legibly annotate drawings to record changes made after review.
- h. Record Documents are subject to submittal, review, and acceptance by the Inspector on a monthly basis and failure to accurately keep these documents current will result in the Inspector withholding the Contractor's monthly payment.

3. Record Drawings:

- a. Record drawings shall reflect completion of the installation of all equipment, piping, and other work by the Contractor. The drawings shall

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show the Work in plan and sections as required for clarity with reference dimensions and elevations for complete record drawings. The monthly record drawings shall be furnished to the Inspector at the time that the "scratch copy" stage of the pay estimate effort is conducted. If the Contractor does not furnish an accurate and approved progress record drawing, the monthly pay estimate will not be processed and payment will be withheld.

4. The Contract Drawings may be used as a starting point in developing these drawings. Subcontractor and manufacturer drawings may be included in this drawing package. The drawing package must be fully integrated and include the necessary cross references between drawings. The drawing package shall include interconnection and termination details to equipment furnished under this Contract Submittal:
 - a. At each monthly "scratch copy" stage of the pay estimate, the Contractor shall deliver a complete set of reviewable and approvable monthly record drawings to the Inspector. Place all letter-sized material in a 3 ring binder which is neatly indexed by process and division number. Bind Contract drawings and shop drawings in rolls of convenient size for ease of handling.
 - b. Accompany the submittal with a transmittal letter in duplicate containing the following:
 - 1) Date;
 - 2) Project title and job number;
 - 3) Contractor's name and address;
 - 4) Title and number of each record document;
 - 5) Certification that each document as submitted is complete and accurate;
 - 6) Signature of Contractor, Engineer, and Inspector.

1112.2 MEASUREMENT: There will be no measurement for payment of the Project Record Drawings, as specified herein.

1112.3 PAYMENT: No direct payment shall be made of any incidental costs associated with preparing and submitting the Project Record Drawings, as specified herein.

- End of Specification-

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ITEM NO. 1114

Pre- And Post Construction Video

1114.1 DESCRIPTION: The Contractor shall furnish all labor, materials, equipment, and incidentals to provide videos recorded in MPEG-1 format. All inspections shall be in accordance with SAWS requirements shall be submitted and uploaded onto SAWS Contracting and Project Management System (CPMS) or SAWS most current program management system. All digital video files shall be color, closed-circuit TV in MPEG-1 format. The contractor shall provide all inspection data written to a single storage device

1114.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 1114 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 814, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
 - a. Specifications for Water and Sanitary Sewer Construction
 - b. SAWS Materials Specifications
2. COSA – City of San Antonio:
 - a. Utility Excavation Criteria Manual.
 - b. City of San Antonio (COSA) Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 217 Design Criteria for Domestic Wastewater Systems
 - b. Chapter 213 (“Edwards Aquifer Recharge Zone”)

1114.3 SUBMITTALS: All submittals shall be in accordance with most recent version of SAWS’s General Conditions requirements. Submit the following prior to performing any work.

- a. Certifications: Per General Conditions section 5.12.2 all Contractor submittals for all pipe and other products or materials furnished under this specification shall be marked as reviewed and approved by Contractor for compliance with Contract Documents and the referenced standards
- b. Contractor is to coordinate the pre-video procedures with the Inspector prior to commencement of any work, including mobilization and preparation of right-of-way effort.
- c. The Contractor shall provide a diagram and identify the limits of the project area and video the condition of all existing surface features within the project limits including adjoining ROW features such as curbing, sidewalk, fencing, mailboxes, driveways, and trees and shrubs/grass.
- d. Contractor shall provide a copy of the pre-construction video prior to commencement of the project by identifying the condition of all existing surface features within the project limits, including adjoining right-of-way features such as curbing, sidewalk, fencing, mailboxes, driveways, and trees/shrubs/grass

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- e. Contractor to provide a pre and also maybe requested to provide a post construction video upon request.
- f. Contractor is to coordinate the post-video procedures with the Inspector at completion of the project, and prior to close out.

1114.4 EQUIPMENT:

- 1. Equipment:
 - a. The television unit shall have capability of displaying in color, on the video, surfacefeature locations, and any other relevant physical attributes.
 - i. Each video shall be permanently labeled with the following:
 - ii. Project name / SAWS Job # / Work Order #;
 - iii. Date of television inspection;
 - iv. Street/easement location;
 - v. Name of Contractor;
 - vi. Date video submitted;
 - vii. Video number;
 - viii. SAWS Inspector Name.
- The Contractor shall be required to have all materials, equipment, and labor force necessary to complete all videotaping on the job site prior to beginning videotaping operations.
- 2. If the Contractor provides a video of such poor quality that it cannot be properly evaluated, the Contractor shall re-video as necessary and provide a video of good quality at no additional cost to SAWS.
 - 3. If the Contractor cannot provide a video of such good quality that can be reviewed by SAWS, SAWS may elect to televise the site at the Contractor's expense.
 - 4. Equipment:
 - 5. Television inspection shall be done one area at a time.

1114.5 MATERIALS: All videos shall be recorded in MPEG-1 format and uploaded onto SAWS Contracting and Project Management System (CPMS) or most current acceptable media. The video shall include good sound quality; identification of area being videoed, to include cross streets references, addresses, time and date. Each video shall be marked with the name and contract number, name of Contractor, and a description and location of view being recorded.

1114.6 EXECUTION: Prior to beginning the project, the contractor shall submit one copy of the completed video for the entire project prior to submission of request for mobilization for review and approval. Failure to submit video will result in denial of any request for payment under the Mobilization line item or Preparation of Right-of-Way.

- a. If requested by SAWS Inspector, post construction video shall be submitted prior to project closeout concurrent with project redlines.
- b. Failure to submit video will result in denial of request for payment.

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1114.7 MEASUREMENT: There will be no measurement for payment of the Pre-Construction Video or post construction video, as specified herein.

1114.8 PAYMENT: No direct payment shall be made of any incidental costs associated with preparing and submitting the Pre-Construction Video or post construction, as specified herein. Contractor is responsible for any features damaged.

End of Specification

Special Specification

SECTION 520A

REVEGETATION

PART 1 GENERAL

1.01 SCOPE

This section shall govern the following:

- A. Requirements for soil preparation including subgrade preparation.
- B. Requirements for planting seeded and sodded grass.
- C. Requirements for all trees, plants and ground covers.
- D. Restoration of grass, trees, and shrubs damaged or removed by construction operations associated with the installation of the pipeline, as identified in the contract documents for this project.
- E. Requirements for soil erosion and sedimentation controls in the project area.

1.02 DEFINITIONS

- A. Optimum Moisture Content:
As defined in Section SS 804C, Excavation, Backfill and Trenching.
- B. Prepared Ground Surface:
Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.
- C. Compaction:
As defined in Section SS 804C, Excavation, Backfill and Trenching.
- D. Subgrade:
Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, roadway structure or base for floor slab.

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E. Weeds:

Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.03 SUBMITTALS

A. Shop Drawings: Product labels/data sheets.

B. Submit the following materials certification:

1. Topsoil source and pH value.
2. Shredded Pine Bark.
3. Plant Fertilizer.
4. Grass and sod source and species.
5. Tree and shrub source and species.

C. Provide plant material record drawings:

1. Legibly mark drawings to record actual construction.
2. Indicate horizontal and vertical locations, referenced to permanent surface improvements.
3. Identify field changes of dimension and detail and changes made by Change Order.

D. Provide preconstruction inventory:

1. Resources to be salvaged and transplanted, including topsoil, rare plant species and trees.
2. Include selected areas designated for storage and stockpiling.
3. Indicate locations and samples of future watering and planting areas.
4. Identification and mapping of erosion control structure required.

E. Provide the following seed certifications:

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1. Certify that each lot of seed has been tested by a testing laboratory certified in seed testing, within 6 months of date of delivery. Include the following with certification
 - a. Name and address of laboratory.
 - b. Date of test.
 - c. Lot number for each seed specified.
 - d. Test Results: i) name, ii) percentages of purity and of germination, and iii) weed content for each kind of seed furnished.
 2. Mixtures: Proportions of each kind of seed.
 3. Seed Inoculant Certification: Bacteria was prepared specifically for legume species to be inoculated.
 4. Sod: Source and species
- F. Contract Closeout Submittals: Description of required maintenance activities and activity frequency, including maintenance instructions, cutting method, minimum and maximum grass height, types, application frequency, and recommended coverage of fertilizer.

1.04 SEQUENCING AND SCHEDULING

- A. Rough grade areas to be planted or seeded - Perform Work specified in Section 101 Preparing Right of Way.
- B. Complete applicable Work specified in Section SS 804C, Excavation, Backfill and Trenching., prior to subgrade preparation.
- C. Notify OWNER at least 3 days in advance of:
 1. Each material delivery.
 2. Start of planting activity.
- D. Planting season for seeded and sodded grass is March 15 through September 15. At all times, perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.
- E. Prepare subgrade at a time when unfrozen and free of ice and snow.

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- F. Performance Requirements: In the designated areas for grass establishment, it shall be the sole responsibility of the CONTRACTOR to establish uniform stand of grass which is defined as not less than 85 percent of grass coverage per total area of the seeded area, regardless of adverse climatic or other conditions. The OWNER may stop work if unfavorable conditions are likely until favorable conditions are present.

1.05 QUALITY ASSURANCE

- A. Notify OWNER when subgrade is ready for compaction or whenever compaction is resumed after a period of extended inactivity. Tests for density will be made within 24 hours after compacting operations are completed.
- B. Plant names shall comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed shall conform generally with names identifiable by the nursery trade. Provide stock true to botanical name and legibly tagged.
- C. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be dimensioned as it stands in its natural position.
- D. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two (2) years, provided disturbed indigenous plants cannot be preserved by transplanting and subsequent replant.
- E. Stock furnished shall be at least the minimum size indicated. Larger stock is allowable at no additional cost, and providing that the larger plants will not be cut back to sizes indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size and 75% are of the maximum size indicated.
- F. Provide "specimen" plants with a special height, shape or character of growth. Tag specimen trees or shrubs at the source of supply. When specimen plants cannot be purchased locally, provide sufficient photographs of the proposed specimen plants for review.
- G. Plants may be observed at the place of growth, for compliance with specifications requirements for quality, size, and variety.
- H. Sod shall comply with the American Sod Producers Association (ASPA) classes of sod materials and shall be as near identical to native specimens as possible.
- I. Seeds shall meet the requirements of the Texas Seed Law (Texas Administrative Code, Title 4; Chapter 9) and shall be as near identical to native samples present on or near the disturbed area of soil.

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- J. All planting of grasses, sods, shrubs, and trees shall be completed as soon as practical to avoid erosion of topsoil and damage incurred as a result of siltation and flooding unless otherwise directed by the OWNER.
- K. Trees and shrubs moved from the area disturbed by the construction of the pipeline shall be transplanted to an adjacent area where possible and practical in lieu of planting of new specimen in that area.
- L. Provide seed in containers showing name and type of seed, year of production, net weight, date of packaging, date of germination test, and location of packaging.
- M. Provide fertilizer in containers bearing the name, trademark warranty of producer, the weight and analysis, and form of constituents.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Seed and Hydroseeding Mulch:
 - 1. Furnish in standard containers with seed name, year of production, date and location of packaging, lot number, net weight, percentages of purity, germination, and hard seed and maximum weed seed content, clearly marked for each container of seed.
 - 2. Keep dry during storage. Seed in damaged, wet, or moldy packaging is not acceptable.
- B. Sod: Cut, deliver and install sod within a twenty-four (24) hour period. Do not harvest or transport sod when moisture content may adversely affect sod survival.
- C. Deliver fertilizer materials in original, unopened and undamaged containers showing weight, analysis and name of manufacturer. Store in a manner to prevent wetting and deterioration and to assure maximum effectiveness. Store in dry location not in contact with runoff.
- D. Take all precautions customary in good trade practice in preparing plants for transplanting and moving. Workmanship failing to meet the highest standards will be rejected. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and, on arrival, the certificate shall be filed with the Owner. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in an acceptable manner to the OWNER. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.
- E. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

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- F. Provide dry, loose topsoil from the original disturbed construction when possible or furnish topsoil of equal value for planting bed mixes. Frozen or muddy topsoil is not acceptable.

1.07 PROJECT CONDITIONS

- A. Work notification. Notify OWNER at least seven (7) work days prior to installation of plant materials, seed and sod.
- B. A complete list of plants, including a schedule of sizes, quantities, identification of rare species and other requirements is shown on the plans.
- C. Protect existing utilities, paving and other facilities from damage caused by landscaping operations and incurred during transplanting and restoration.
- D. Perform sodding or seeding work only after planting and other work affecting ground surface has been completed.
- E. Restrict traffic from lawn areas until grass is established. Erect signs and barriers as required.
- F. For areas where establishment is required per the plans and per paragraph 1.04F, maintain the revegetation areas for 60 days beginning immediately after placement and watering as required until grass is well established and exhibits a vigorous growing condition. Coordinate water requirements with availability of water from OWNER and areas to be seeded at one time.
- G. The CONTRACTOR shall coordinate with SAWS on approved locations of water connections for revegetation.
- H. The CONTRACTOR shall coordinate with SAWS regarding approved water operations and the timing of obtaining water. The CONTRACTOR shall note any SAWS drought limitations and plan accordingly.

1.07 WARRANTY

- A. Warrant plant material to remain alive and to be in healthy, vigorous condition for a minimum period of one (1) year after completion and Final Acceptance of entire Project. Observation of plants will be made by the OWNER at completion of planting.
- B. Replace, in accordance with the plans and specifications, all plants that are dead or, as determined by the OWNER, are in an unhealthy or unsightly condition, or have lost their natural shape due to dead branches, or other causes due to the CONTRACTOR's negligence. The cost of such replacement(s) is at the CONTRACTOR's expense. Warrant all replacement plants for one (1) year after installation.

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- C. Warranty shall not include damage or loss of trees, plants or ground covers caused by fires, floods, freezing rains, lightning storms, or winds over 75 mph, winter kill caused by extreme cold and severe winter conditions not typical of planting area; acts of vandalism or negligence on the part of the OWNER.
- D. Remove and immediately replace all plants, as determined by the OWNER to be unsatisfactory during the initial planting installation.
- E. During the grass establishment period, it shall be the CONTRACTOR'S responsibility to ensure that the grass is continuing healthy growth. This care shall include the following:
 - 1. Watering: Keep surface moist.
 - 2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
 - 3. Mulch: Replace wherever and whenever washed or blown away.
 - 4. Mowing: Mow to 2 inches after grass height reaches 3 inches, and mow to maintain grass height from exceeding 3 1/2 inches.
 - 5. Fences: Repair and maintain until satisfactory stand of grass is established.
 - 6. Reseed and/or resod unsatisfactory areas or portions thereof immediately at the end of the maintenance period if a satisfactory stand has not been produced.
 - 7. Reseed and/or resod during next planting season if scheduled end of maintenance period falls after September 15.
 - 8. Reseed and/or resod entire area if satisfactory stand does not develop by July 1 of the following year.
- F. Water application shall be accomplished each week from March through October, and as necessary during other periods of the year. An even application of one-inch minimum of water shall be required over all sodded or seeded areas weekly or less, depending on rainfall frequency. The rate and frequency of water application may be changed, as directed by the OWNER, depending on weather, and soil conditions.

PART 2 PRODUCTS

2.01 TOPSOIL

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- A. General: Natural, friable, sandy loam, obtained from well-drained areas, free from objects larger than 1-1/2 inches maximum dimension, and free of subsoil, roots, grass, other foreign matter, hazardous or toxic substances, and deleterious material that may be harmful to plant growth or may hinder grading, planting, or maintenance.
- B. Organic Matter: Minimum 1.5 percent by dry weight as determined in accordance with USBR 514.8.7-82.
- C. pH: Range 6.0 to 7.2.
- D. Textural Amendments: Amend as necessary to conform to required composition by incorporating sand, peat, manure, or sawdust.
- E. Source: Stockpile material onsite, in accordance with Section 02200, SITE PREPARATION. Import topsoil if onsite material fails to meet specified requirements or is insufficient in quantity.

2.02 SAWDUST OR GROUND BARK

- A. Nontoxic, of uniform texture, and subject to slow decomposition when mixed with soil. Nitrogen-treated, or if untreated mix with minimum 0.15 pounds of ammonium nitrate or 0.25 pounds of ammonium sulfate per cubic foot of loose material.

2.03 PEAT

- A. Composition: Natural residue formed by decomposition of reeds, sedges, or mosses in a freshwater environment, free from lumps, roots, and stones.
 - 1. Organic Matter: Not less than 90 percent on a dry weight basis as determined by USBR 514.8.7-82.
 - 2. Moisture Content: Maximum 65 percent by weight at time of delivery.

2.04 FERTILIZER

- A. Fertilizer shall be a commercial product uniform in composition, free flowing, and suitable for application with standard equipment. The fertilizer shall comply with the applicable State fertilizer laws and shall be delivered in bags or other convenient containers, each fully labeled and bearing the name, trademark, and warranty of the producer. Fertilizer applied during the initial planting shall have analysis ratio of 10-10-10 also containing traces of sulfur, iron and zinc. Fertilizer used in the second application shall have an analysis ratio of 12-4-8. The figures in the analysis represent the percent of nitrogen, phosphorus, and potash nutrients, respectively as determined by methods of the Association of Official Agricultural Chemists. Fifty percent or greater of the nitrogen required shall be in the form of nitrate nitrogen. The remaining nitrogen may be in the form of urea nitrogen.

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- B. In the event it is necessary to substitute a fertilizer of a different analysis or form, the total amount of nutrients applied per 1000 square feet shall equal or exceed that specified for each nutrient.
- C. Fertilizer which has become caked or exposed to excess humidity or mixture will not be acceptable.

2.05 SAND

Fine Aggregate: Clean, coarse, well-graded, ASTM C33-90.

2.06 SEED MIXTURE

- A. Seed Quality: All seed shall be meet the requirements of the Texas Seed Law including labeling requirements for showing pure live seed (PLS = purity x germination), name and type of seed. All seed shall be treated with an approved fungicide by commercial or state laboratory not more than 6 months prior to the date of planting. Seed, which has become wet, moldy or otherwise damaged in transit or storage, will not be acceptable. Seed shall be new crop seed (harvested within 1 year prior to planting), free of other weed seed to the limits allowable under the Texas Seed Law. The seed shall have a germination and purity that will produce a pure live seed content of not less than 85 percent.
- B. Seed Type: Native Seeding Mix, contractor shall submit proposed Native Seed Mix for approval prior to application. The following are approved Seeding mixtures:

- 1. Permanent Rural Mix (Feb. 1 - May 1)

CLAY OR SANDY SOILS

<u>Species and Rates</u>	<u>(10 lb.PLS/ac.)</u>
Green spangle top	0.75
Sideoats gramma	3.0
Little bluestem	2.0
Plains bristlegrass	1.2
Illinois bundleflower	1.0
Curly mesquite	1.0
Sand lovegrass	1.0

- 2. Temporary Cool Season Seeding (Sept. 1 – Nov. 30)

<u>Species and Rates</u>	<u>(lb.PLS/ac.)</u>
Tall Fescue	4.5
Oats	24
Wheat	34

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3. Temporary Warm Season Seeding (May 1 - Aug. 31)

<u>Species and Rates</u>	<u>(lb.PLS/ac.)</u>
Foxtail Millet	34

- C. During periods that require temporary seeding the CONTRACTOR shall also apply permanent seeding and apply half of the required fertilizer during the temporary seeding operation and the other half during the permanent seeding operation.

2.07 STRAW MULCH

Threshed straw of oats, wheat, barley, or rye, free from (i) seed of noxious weeds or (ii) clean salt hay. Straw mulch shall be free of Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be molted or rotted.

2.08 HYDROSEEDING MULCH

Hydromulch material for areas requiring grass establishment shall be Second Nature Wood Fiber Mulch as manufactured by Central Fiber Corporation, or approved equivalent. Mulch shall be manufactured of natural fiber stock free of plastics and foreign materials. Mulch shall have a green non-toxic dye, disperse rapidly in water to form homogeneous slurry and shall remain in suspension.

2.09 HAY MULCH

Hay mulch shall be prairie grass, Bermuda grass or other hay as approved by the OWNER. The hay mulch shall be free of Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be molted or rotted.

2.10 WOOD CELLULOSE FIBER MULCH

Wood cellulose fiber mulch shall be natural cellulose fiber mulch produced from grinding clean, whole wood chips, or fiber produced from ground newsprint with a labeled ash content not to exceed 7%. The mulch shall be designed for use in conventional mechanical planting, hydraulic planting of seed or hydraulic mulching of grass seed, either alone or with fertilizer and other additives. The mulch shall be such that when applied, the material shall form a strong, moisture-retaining mat without the need of an asphalt binder. The mulch material will also be dyed with a green color to assist in determining coverage and to provide an immediate pleasing appearance. The wood cellulose fiber is also required to be dispersed rapidly in water to form a homogeneous slurry and remain in such state when agitated in the hydraulic mulching unit with the specified materials.

2.11 TACKIFIER

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- A. Derived from natural organic plant sources containing no growth or germination-inhibiting materials.
 - 1. Capable of hydrating in water, and to readily blend with other slurry materials.
 - 2. Wood Cellulose Fiber: Add as tracer, at rate of 150 pounds per acre.
 - 3. Manufacturers and Products:
 - a. Chevron Asphalt Co.; CSS 1.
 - b. Terra; Tack AR.
 - c. J Tack; Reclamare.

2.12 SOD

- A. Sod shall be identical to sod and grasses native to the area disturbed by construction of the recycled water transmission line where possible and practical. Where erosion control and flooding are of concern, Bermuda grass sod and other introduced grass sod species shall be used in lieu of native grass sod.
- B. Bermuda grass sod (*Cynodon Dactolyn*) shall be healthy grass with adhering soil of uniform thickness obtained from allowable sources where the sod is heavy and thickly matted. The presence of nut grass (*Cyperus Rotundus*) or other objectionable grass or weeds or other material which might be detrimental to the development of turf will be cause for rejection of sod. The Contractor shall not use sod from areas where the grass is thinned out, or where the roots have been dried out by exposure to the air and sun to such an extent as to damage its ability to grow where transplanted.
- C. Provide well-rooted, healthy sod, free of disease, nematodes and soil borne insects. Sod shall have a healthy virile root system of dense, thickly matted roots throughout the soil of the sod for a minimum thickness of one-inch (1"). Provide sod uniform in color, leaf texture, density and free of weeds, undesirable grasses, stones, roots, thatch and extraneous material. The sod shall be viable and capable of growth and development when planted.

2.13 ADDITIONAL VEGETATION RESTORATION MATERIALS

- A. Plants: Provide plants typical of those required by the plans or those damaged by construction and in need of replacement, with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall

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have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage.

- B. Provide tree species to replace those in kind removed by construction or as indicated on the construction plans.
- C. Shrubs and small plants shall match the spread and height of those removed due to the work.
 - 1. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
 - 2. Single stemmed or thin plants will not be accepted.
 - 3. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
 - 4. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.
- D. Sulfur shall be commercial floured.
- E. Herbicide: Herbicide used shall be an easy to apply, effective in a short term, chemical agent to inhibit or destroy weed growth, while being harmless to seed and grass being implanted.
- F. Water shall be furnished by the Contractor and shall be free of substances harmful to plant growth and shall be of equal or greater quality to existing water in the areas disturbed by construction of the recycled water transmission line. Hoses or other methods of transportation shall be furnished by Contractor.
- G. Stakes for Staking. Hardwood, 2" x 2" x 8'-0" long.
- H. Stakes for Guying. Hardwood, 2" x 2" x 36" long.
- I. Guying/Staking Wire. No 10 or 12 gauge galvanized wire. Turnbuckles shall be of galvanized steel of size and gauge required to provide tensile strength equal to that of the wire. Turnbuckle opening shall be at least 3".
- J. Staking and Guying Hose. Two-ply, reinforced garden hose not less than ½ inches inside diameter.
- K. Tree Wrap. Standard waterproofed tree wrapping paper, 2 ½ inches wide, made of 2 layers of crepe kraft paper weighing not less than 30 lbs per ream, cemented together with asphalt.

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- L. Twine. Two-ply jute material.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. Keep subgrade free of water, debris, and foreign matter during compaction.
- B. Apply lime at the rate of 50 pounds per 1,000 square feet to subgrade before tilling.
- C. Scarify subgrade to minimum depth of 6 inches where topsoil is to be placed.
- D. Limit preparation to areas which will receive topsoil within 2 days after preparation.
- E. Bring subgrade to proper grade and cross-section and uniformly compact surface.
- F. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- G. Maintain prepared ground surface in finished condition until next course is placed.
- H. Compaction Under Earthfill: Compact the upper 6 inches to minimum of 90 percent maximum dry density as determined in accordance with TxDOT Test Method TEX 113-3. Subgrade materials shall be compacted by approved mechanical tamping equipment.
- I. Moisture Conditioning:
 - 1. Dry Subgrade: Add water, then mix to make moisture content uniform throughout.
 - 2. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.
- J. Testing:
 - 1. Compact subgrade with equipment specified in Article E - COMPACTION to detect soft or loose subgrade or unsuitable material, as determined by OWNER.
- P
- K. Correction:
 - Soft or Loose Subgrade: (i) Adjust moisture content and recompact, or (ii)

Special Specification

Over excavate as specified in Section SS 804C, Excavation, Backfill and Trenching, and replace with suitable material from the excavation, as specified in Section SS 804C, Excavation, Backfill and Trenching.

3.02 TOPSOIL PLACEMENT

- A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the Work.
- B. Mix soil amendments, lime, and fertilizer with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay mixing of fertilizer if planting or seeding will not occur within 3 days.
- C. Place 1/2 of total depth of topsoil and work into top 4 inches of subgrade soil to create a transition layer. Place remainder of topsoil to depth of 8 inches after compacting to 75 percent where seeding and planting are scheduled.
- D. Uniformly distribute to within 1/2-inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- E. Remove stones exceeding 1-1/2 inches, roots, sticks, debris, and foreign matter during and after topsoil placement.
- F. Remove surplus subsoil and topsoil from site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

3.03 SEEDING AND SODDING PREPARATION

- A. Grade areas to smooth, even surface with loose, uniformly fine texture.
 - 1. Roll and rake, remove ridges, fill depressions to meet finish grades.
 - 2. Limit such Work to areas to be planted within immediate future.
 - 3. Remove debris, and stones larger than 1 1/2 inches diameter, and other objects that may interfere with planting and maintenance operations.
- B. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry off before seeding. Do not create muddy soil.
- C. Restore prepared areas to specified condition if eroded or otherwise disturbed after preparation and before seeding.

3.04 FERTILIZER

Special Specification

- A. Apply evenly over area in accordance with manufacturer's instructions. Mix into top 2 inches of top soil at a minimum rate of 15 lb per 1000 sf with hydromulch mixture.
- B. A second application of fertilizer shall be applied to the establishment areas between 45 and 60 days from seeding at a rate of 8 pounds per 1000 sf.

3.05 SEEDING

- A. Perform seeding in all areas disturbed by construction, except for those locations where sodding is conducted.
- B. Start within 2 days of preparation completion.
- C. The seeding method for all areas shall be by drill seeding, except: 1) where sod or other method is called for on the plans or otherwise authorized; 2) on steep slopes defined as being steeper than 3:1; or 3) where the contractor opts to seed by hydromulch in accordance with applicable specifications at no additional cost. For slopes steeper than 3:1, hydromulch seeding is the specified seeding method.

D. Hydromulch Seeding:

- 1. For hydromulch areas, hydromulch mixture containing the seed, fertilizer, mulch and water shall be prepared in accordance with the following quantities. Mixture shall be applied to planting area using conventional Hydromulch equipment. For seeded areas, seed and fertilizer shall be spread with mechanical spreaders to obtain the specified rates.

<u>Component</u>	<u>Rate per 1000 sf</u>
Grass seed	2.5 pounds
Fertilizer	15 pounds
Water	As Needed
Wood Fiber Mulch	As recommended by Manufacturer

- 2. Planting Season: Seeding shall be done during periods as listed in Subsection 2.01-B.
- 3. For areas to be established, apply water with a fine spray immediately (within 24 hours) after each area has been seeded and mulched and shall irrigate in such a manner so as not to erode the topsoil or promote soil and seed migration. Saturate to 4 inches of soil. Water daily as often as necessary for 4 weeks or until a uniform stand of grass has been established. After a uniform stand of grass has been established, the CONTRACTOR shall water as necessary for the remainder of the 60 days to maintain the uniform stand of grass.

Special Specification

F. Broadcast Seeding

1. The seed or seed mixture, in the quantity specified, shall be uniformly distributed over the areas shown on the plans or where directed by the OWNER. If the sowing of seed is by hand, rather than by mechanical methods, the seed shall be sown in two directions at right angles to each other. If mechanical equipment is used, all varieties of seed as well as fertilizer, may be distributed simultaneously provided that each component is uniformly applied at the specified rate. When seed and fertilizer are to be distributed as a water slurry, the mixture shall be applied to the area to be seeded within 30 minutes after components are placed in the equipment. After planting, the planted area shall be rolled with a light corrugated drum roller or another type of roller approved by the OWNER. All rolling of the sloped areas shall be along the contour of the slopes.
2. Broadcast seeding is only allowed in areas where hydromulch seeding or drill seeding is not practical.

G. Drill Seeding

The seed or seed mixture, in the quantity specified, shall be uniformly distributed over the areas shown on the plans or where directed by the OWNER. All varieties of seed, as well as fertilizer, may be distributed simultaneously provided that each component is uniformly applied at the specified rate. Seed shall be drilled at a depth of from $\frac{1}{4}$ inch to $\frac{3}{8}$ inch utilizing a pasture or rangeland type drill. All drilling shall be along the contour of the slope. After planting, the area shall be rolled with a roller integral to the seed drill, or a light corrugated drum roller or with another type of roller approved by the OWNER. All rolling of sloped areas shall be on the contour of the slopes.

H. Mulching

1. Mulch tree and shrub planting pits and shrub beds with required mulching material 2" deep immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.
2. Straw or Hay Mulching. Mulch shall be spread uniformly over the area indicated on plans or as designated by the OWNER at the rate of approximately 1.5 to 2.0 tons of hay mulch or 2.0 to 2.5 tons of straw mulch per acre. When used, a mulching machine approved by the OWNER shall be equipped to inject a tacking agent into the straw or hay mulch uniformly as it leaves the equipment at a rate of 0.05 to 0.10 gallon of tacking agent per square yard of mulched area. If the straw or hay mulch and tacking agent are placed by hand, then the rate of application for the tacking agent shall be approximately 0.15 gallon per square yard.

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- I. Tackifier: Apply over mulched areas with slopes steeper than 25 percent at rate of 5 gallons per 1,000 square feet in accordance with the manufacturers recommended requirements.
- J. Water: Apply with fine spray after mulching to saturate top 4 inches of soil.

3.06 SODDING

- A. Limit preparation to areas which will be immediately sodded.
- B. Loosen topsoil of lawn areas to minimum depth of 4". Remove stones over 1" in any dimension and sticks, roots, rubbish and extraneous matter.
- C. Grade lawn areas to smooth, free draining and even surface with a loose, uniformly fine texture. Roll and rake; remove ridges and fill depressions as required to drain (roller shall be a light corrugated drum roller).
- D. Apply fertilizer at the rate equal to 300 pounds per acre unless otherwise indicated on the plans. Apply fertilizer by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with the soil to a depth of 3" by dicing or other approved methods. Fertilize areas inaccessible to power equipment with hand tools and incorporate it into soil.
- E. Dampen dry soil prior to sodding.
- F. Restore prepared areas to specified condition if eroded, settled or otherwise disturbed after fine grading and prior to sodding.
- G. Sod shall be thoroughly watered immediately after planting and subsequently at such intervals to promote growth or as directed by the OWNER.

3.07 FIELD QUALITY CONTROL OF SEEDED AREAS

- A. 8 weeks after seeding is complete and on written notice from CONTRACTOR, OWNER will, within 15 days of receipt, determine if a satisfactory stand has been established.
- B. If a satisfactory stand has not been established, OWNER will make another determination after written notice from CONTRACTOR following the next growing season.

3.08 PROTECTION OF SEEDED AREAS

- A. Protect from pedestrian traffic by erecting temporary fence around each newly seeded area.

Special Specification

- B. Cover seeded slopes where grade is steeper than 3:1 with erosion control matting (See Subsection 2.06-B). Roll fabric onto slopes without stretching or pulling. Cover hydromulched areas as recommended to obtain establishment of grass.
- C. Lay fabric smoothly on surface, bury top end of each section in 6-inch deep excavated topsoil trench. Provide 12-inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.
- D. Secure outside edges and overlaps at 36-inch intervals with stakes.
- E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.
- G. No heavy equipment shall be moved over planted area unless area is to be retilled and reseeded.

3.09 INSTALLATION

- A. Security of stored materials will be the sole responsibility of the CONTRACTOR at no additional expense to the OWNER.
- B. It is the CONTRACTOR's responsibility to verify the location of all utility lines, electric cables, sprinkling systems and conduits so that the proper precautions must be taken not to disturb or damage any subsurface improvements. Should obstructions be found, the CONTRACTOR will promptly notify the OWNER. Any damage caused by the CONTRACTOR shall be repaired by himself at no cost to the OWNER. Any such repairs shall be subject to approval the by OWNER.
- C. Examine proposed planting areas and conditions of installation including finished surfaces, grades, topsoil quality and depth. Do not start planting, seeding or sodding work until unsatisfactory conditions are corrected.
- D. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.
- E. Locate plants as indicated or as directed in the field after staking by the CONTRACTOR. If obstructions are encountered that are not shown on the plans, do not proceed with planting operations until alternate plant locations have been selected. The OWNER shall be notified of the alternate plant locations selected prior to planting.
- F. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in bed. Provide shrub pits at least 12" greater than the diameter of the root system and 24" greater for trees. Depth of pit shall

Special Specification

accommodate the root system. Scarify the bottom of the pit to a depth of 4". Remove excavated materials from site.

G. Guying/Staking

1. Stake/guy all newly installed trees immediately after sodding operations and prior to acceptance. When high winds or other conditions which may affect tree survival or appearance occur, the OWNER may require immediate staking/guying.
2. Stake deciduous trees under 3" caliper. Stake evergreen trees under 8' - 0" tall.

H. Pruning. Prune branches of deciduous stock, after planting, to balance the loss of roots and preserve the natural character appropriate to the particular plant requirements. In general, remove ¼ to 1/3 of the leaf bearing buds, proportion in all cases. Remove or cut back broken, damaged, and asymmetrical growth of new wood.

3.10 MAINTENANCE

Maintain planting until completion and Final Acceptance of the entire Project.

- A. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
- B. Tighten and repair guy wire and stakes as required.
- C. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.
- D. Water trees and plants within the first twenty four (24) hours of initial planting, and not less than twice per week until Final Acceptance.
- E. Maintain sodded and seeded lawns until completion and Final Acceptance of the entire project by the OWNER.
- F. Maintain sodded and seeded lawn areas until a full, uniform stand of grass free of weed, undesirable grass species, disease and insects is achieved and accepted by the OWNER.
- G. Revegetated Areas:
 1. The CONTRACTOR shall mow grass as required.
 2. CONTRACTOR shall water as required to establish grass and to prevent grass and soil from drying out for the initial 60-day period.

Special Specification

3. CONTRACTOR shall control growth of weeds. Apply herbicides (Post emergent herbicide Round-Up by Monsanto Corp., or approved equal) in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
4. Prior to the second fertilizer application, CONTRACTOR shall reseed areas which show bare spots of 2 square feet or larger. Minimum of 85 percent coverage shall be required for OWNER acceptance.
5. CONTRACTOR shall maintain grass and reseed as required to establish 85 percent coverage (within a minimum of 60 days).
6. Protect seeded areas with warning signs during maintenance period, if necessary.

3.11 ACCEPTANCE

- A. Field observation to determine recommendations on acceptance of planted areas will be made by the Construction Observer/Inspector, upon the CONTRACTOR's request. Provide notification at least ten (10) working days before field observation date.
- B. Planted areas will be acceptable to the OWNER provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy, vigorous condition.
- C. Upon acceptance, the OWNER will assume plant maintenance.
- D. Field observations to determine recommendations on acceptance of sodded lawns will be made by the Construction Observer/Inspector upon CONTRACTOR's request. Provide notification at least ten (10) working days before requested field observation. Seeded and sodden areas will be acceptable to the OWNER provided all requirements, including maintenance, have been complied with and a healthy, even colored viable lawn is established, free of weeds, undesirable grass species, disease and insects.
- E. Upon acceptance, the OWNER will assume lawn maintenance.

3.12 FINISHING

Where applicable, the shoulders, slopes, and ditches shall be smoothed after planting has been completed and shaped to conform to the cross-section previously provided and existing at the time sodding operations were begun. Any excess dirt from the planting operations shall be spread uniformly over adjacent areas or disposed of as directed by the OWNER so that the completed surfaces will present a sightly appearance.

Special Specification

3.13 CLEANING

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess material, soil, debris and equipment. Repair damage resulting from planting operations.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Measurement of acceptable “Revegetation,” complete in place, shall be made by the linear foot along the pipeline alignment of the new pipeline and only for those areas designated on the plans, or for other areas disturbed by Contractor’s construction activities or directed by the Inspector. Fertilizers, wood cellulose fibers, seeds, sodding, herbicide, and water will not be measured for payment.
- B. No additional payment for grass Revegetation will be made to the CONTRACTOR if CONTRACTOR is required to perform multiple installations of seeding in order to establish the required grass coverage.

4.02 PAYMENT

- A. “Revegetation,” measured as provided above, will be paid for at the contract unit price bid per linear foot along the pipeline alignment, which price shall be full compensation for furnishing, hauling and placing all materials, for all fertilizer and water required and for all labor, tools, equipment and incidentals necessary to complete the work.

-END OF SECTION-

Special Specification

SECTION 01030

SPECIAL PROCEDURES

PART 1 GENERAL

1.01 CONSTRUCTION SEQUENCE

- A. Perform the work as required to complete the entire project within the contract time.
- B. Boring and tunneling may proceed ahead of pipe laying operations.
- C. Consider the sequences, duration limitations, and governing factors outlined in this Section and in the contract documents to prepare the schedule for the work.
- D. Perform the work not specifically described in this Section as required to complete the entire project within the contract time.

1.02 TIE-INS AND PLANS OF ACTION

- A. Tie-ins to other pipelines must be planned and scheduled.
 - 1. Submit a written plan of action for approval for tie-ins to other pipelines. These include:
 - a. Tie-in at Old Pearsall Road Pump Station Site at Station 699+97
 - b. Tie-in at the Anderson Pump Station Site at Station 2698+93
 - 2. The CONTRACTOR shall coordinate with the WRIP Pump Station CONTRACTOR for the tie-ins at Old Pearsall Road Pump Station and at Anderson Pump Station.
 - 3. Describe the following in the Plan of Action:
 - a. Construction necessary.
 - b. Utilities, piping, or services affected.
 - c. Length of time for the tie-in, testing, and completion work
 - d. Procedures to be used to carry out the work
 - e. Plan of Action to handle emergencies

Special Specification

- f. Contingency plan that will be used if the original schedule cannot be met
- 4. Tie-ins may require disposal of water in pipelines where isolation valves are not available. The CONTRACTOR shall be responsible for determining a plan of action to dispose of water and make the tie-in. Others will refill the pipeline, if necessary.
- 5. Plan must be received by the OWNER two (2) weeks prior to beginning the work.

1.03 SPECIAL REQUIREMENTS

The project is authorized under Nationwide Permit No. 12 for stream crossings and wetland areas. These permits and accompanying requirements are included and made a part of the requirements for this project. The CONTRACTOR shall not disturb more than 1/10th of an acre within the water way and must restore all ground surface elevations. It is the CONTRACTOR'S responsibility to meet these requirements.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION [NOT USED]

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Special Procedures will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with Special Procedures. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

END OF SECTION

Special Specification

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 GENERAL CONDITIONS

- A. The CONTRACTOR shall include in the Price Proposal all labor, equipment, material, tools, supplies, and incidentals necessary to complete all work required by this Contract in accordance with the latest Standard Specifications for Water Works Construction.
- B. All work done under this Contract shall conform to all local ordinances. CONTRACTOR shall arrange and pay all cost of permits and inspection fees, and shall confine his operations to the limits set by law.
- C. The CONTRACTOR shall take care to protect existing trees indicated in the plans in accordance with the latest requirements of the City of San Antonio Tree Preservation Ordinance No. 85262 (dated May 6, 2010, or latest revision). CONTRACTOR shall provide the required tree protection plan to avoid damage to mature trees and native brush and shall replace any vegetation that requires removal with equivalent vegetation unless such vegetation is specifically noted for removal on the Construction Plans.
- D. It is the intent of the OWNER to award this project to one CONTRACTOR.
- E. Portions of this project may be subject to review and acceptance by various agencies. The CONTRACTOR will be required to coordinate with these agencies for such items as issuance of permits or work orders, inspections during construction, and final acceptance. The agencies for this project that may require coordination include but are not limited to the following:
 - 1. City of San Antonio Department of Public Works
 - 2. City of San Antonio Development Services Department
 - 3. San Antonio River Authority
 - 4. CPS Energy
 - 5. Bexar County Infrastructure Services

Special Specification

6. Texas Department of Transportation
7. Texas Commission on Environmental Quality
8. San Antonio Water System
9. Bexar County Commissioners Court

1.02 EXISTING CONDITIONS:

- A. Project Location:
 1. Pipeline Segment 2C: Installation of approximately 14,888 LF of 48-inch steel water transmission main by open cut and trenchless methods on the southwest and western side of San Antonio.
 2. Pipeline Segment 3: Installation of approximately 69,881 LF of 48-inch steel water transmission main by open cut and trenchless methods on the southwest and western side of San Antonio.
- B. Existing Utilities: Locate and protect all existing utilities impacted by this project.

1.03 DESCRIPTION OF WORK:

- A. The Work covered under this contract includes, but is not limited to, the following:
 1. Construction of 48" Steel water transmission main by open cut and trenchless methods.
 2. All appurtenant structures, including but not limited to combination air valves, drain structures and butterfly valves.
 3. Hydrostatic testing; disinfection and all other testing required.
 4. Easement clearing, tree protection, and site restoration.
 5. TxDOT crossings.

1.04 CONTRACTOR'S USE OF PREMISES:

- A. CONTRACTOR shall limit his use of the premises for Work and for storage, to allow for work by other Contractors, the Owner and/or to preserve environmental conservation easements.
- B. Coordinate use of premises under direction of OWNER.
- C. CONTRACTOR assumes full responsibility for the protection and safekeeping of products under this Contract stored on the site.

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- D. Move any stored products, under CONTRACTOR's control, which interfere with operations of the OWNER or separate contractor. No Separate Pay Item.
- E. CONTRACTOR to obtain and pay for the use of additional storage or work areas needed for operations.
- F. Limit activities and Work on individual tracts in accordance with easement requirements, supplementary conditions if applicable, and others as indicated in these Contract Documents.
- G. Use of public Right of Way shall be in strict accordance with applicable laws, ordinances, permits, easement documents, and as indicated herein.
- H. Maintain access to all premises throughout the Contract.
- I. Provide copies of all written agreements with all property and utility owners.
- J. CONTRACTOR to obtain and pay for the use of additional storage or work areas as needed for operations.
- K. The CONTRACTOR will provide temporary electric power to the WRIP Phase 2 Segment 3 rectifier location sites by CPS Energy. The cost of said temporary Electric power shall be the CONTRACTOR's responsibility. The running of electric line(s) within the site, from the CPS Energy power source to the project site, shall be the responsibility of the CONTRACTOR. The cost of temporary power is incidental to the various bid items. CONTRACTOR shall be responsible for power until such time as SAWS accepts the project and all related operations and maintenance manuals.

PART 2 PRODUCTS

- A. All products incorporated into the work area shall be new, unused, and first quality.

- END OF SECTION -

Special Specification

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

This Section describes the requirements for temporary construction facilities and controls that are necessary for the execution of this Contract. Requirements within the following subject areas are included:

- A. Temporary Construction Facilities
- B. Project identification
- C. Temporary utilities
- D. Barriers
- E. Protection of existing work
- F. Temporary controls
- G. Traffic Control
- H. Security
- I. Field offices and storage facilities
- J. Hazardous material identification and material safety data
- K. Water for pipeline, pressure and leakage testing
- L. Removal of temporary utilities, facilities and controls

1.02 TEMPORARY CONSTRUCTION FACILITIES

- A. CONTRACTOR'S Storage and Staging Area:
 - 1. The OWNER will designate and arrange for the CONTRACTOR'S use, potential staging areas within the easement. At completion of the Work, the CONTRACTOR shall return these areas to their original condition, including grading and landscaping.

Special Specification

2. If additional space is required, the CONTRACTOR shall make arrangements for any necessary off-site storage or shop areas required for the proper execution of the Work at the CONTRACTOR's expense. If the CONTRACTOR needs off-site storage, they must provide a copy of any property use agreements to SAWS.
3. The CONTRACTOR shall provide temporary fencing around the construction and staging area to restrict livestock from entering the area.
4. Hazardous Materials Storage:
 - a. The CONTRACTOR shall designate and use an area for hazardous materials used in construction of the Work.
 - b. For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.
 - c. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.
 - d. The CONTRACTOR shall develop and submit to the CONSULTANT a plan for storing and disposing of the materials above.
 - e. The CONTRACTOR shall obtain and submit to the CONSULTANT a single EPA number for wastes generated at the Site.
 - f. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.

B. Field Offices:

1. The CONTRACTOR shall provide and maintain a temporary field office on the jobsite at the staging area, subject to approval by the OWNER. A separate trailer will be required for the OWNER'S on-site representative.

Special Specification

A sign identifying the CONTRACTOR and listing emergency telephone numbers shall be posted outside of the CONTRACTOR'S field office.

2. The CONTRACTOR shall provide a table and chairs to accommodate a minimum of 8 personnel for progress and other required meetings.
3. The CONTRACTOR will provide a desk and chair in CONTRACTOR'S field office for exclusive use by the OWNER or his representative.
4. The CONTRACTOR shall provide all office equipment required by the OWNER'S Representative for normal business including a copy machine, a fax machine , and scanner.
5. The CONTRACTOR shall provide telephone service to the office trailer. The CONTRACTOR will furnish one working telephone line with a telephone for the exclusive use of the OWNER or his representative. The CONTRACTOR shall pay all costs associated with local and long distance calls.
6. Maintenance and janitorial service shall be provided by the CONTRACTOR.
7. The CONTRACTOR'S field office shall be provided with complete sanitary facilities either attached or adjacent thereto.
8. The office shall present a neat business-like appearance and shall be of substantial construction, all satisfactory to the OWNER. Field offices may be prefabricated buildings on skids or mobile trailers.

C. Parking:

1. The CONTRACTOR will provide temporary parking areas to accommodate construction personnel. When on-site space is not available, the CONTRACTOR will make arrangements for satisfactory space off-site. Vehicle parking on existing pavement or roads is not authorized.
2. The CONTRACTOR shall provide temporary parking areas at each well site.
3. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The CONTRACTOR shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

D. Security:

Special Specification

1. The CONTRACTOR will provide barriers to prevent unauthorized entry to construction, storage and office areas and to protect existing facilities and adjacent properties from construction operations.
2. The CONTRACTOR will initiate a security program to protect the Work and OWNER'S facilities from theft, vandalism, and unauthorized entry for the duration of the construction period.
3. The CONTRACTOR shall maintain a secure environment in the work area and establish procedures to prevent theft, vandalism, and unauthorized entry. The CONTRACTOR will employ as needed a uniformed guard service to provide watchmen at the construction site during all non-working hours.
4. Locking Gates:
 - a. The CONTRACTOR shall be responsible for providing and maintaining combination locks at all required site access points.
 - b. The CONTRACTOR shall keep construction entrances closed and locked at all times except for vehicle passage. The CONTRACTOR will be fined \$1,000 for each instance of violation of this paragraph.
5. All CONTRACTOR and subcontractor personnel shall carry with them at all times while on site security badges with a recent photograph, full name, and name of the employer. Personnel who do not abide by this requirement may be escorted off the site at the discretion of the OWNER.
6. Refer to Section 01110, Summary of Work for additional security requirements.

E. Layout of Temporary Facilities:

1. The CONTRACTOR will submit for approval working drawings that show the proposed location and size of offices, sanitary facilities, temporary construction roads, shops, storage areas, fencing, temporary stationary equipment, temporary power service and distribution, and other similar facilities.
2. The CONTRACTOR will take care to ensure that the location of any temporary facility does not impede the performance or inhibit the operation of adjacent facilities.
3. The CONTRACTOR shall provide for the access of residences and all businesses during all phases of the Work.

Special Specification

F. Temporary Facilities Along the Pipeline Route:

1. The CONTRACTOR shall locate and obtain suitable space along the pipeline route to adequately contain temporary facilities specified within this section. Such space will be centrally located along the route and have easy access into and out of designated work areas.
2. The CONTRACTOR will submit for approval working drawings that show the proposed location and size of offices, sanitary facilities, temporary construction roads, shops, storage areas, fencing, temporary stationary equipment, temporary power service and distribution, and other similar facilities.
3. The CONTRACTOR will take care to ensure that the location of any temporary facility does not impede the performance or inhibit the operation of any building or equipment, both public or private, adjacent to the temporary facility.

G. Removal of Temporary Facilities:

1. Remove temporary buildings, sheds, and utilities at the conclusion of the project and restore the site to original condition or finished in accordance with the drawings.
2. Remove informational signs upon completion of construction.
3. Remove project identification signs, framing, support, and foundations upon completion of the project.

1.03 PROJECT IDENTIFICATION

- A. The CONTRACTOR shall provide eight (8) signs (Consultant shall indicate location of signs on plans and adjust quantity accordingly) with the dimensions of 8'-0" in width by 4'-0" in height by 3/4-inch thick exterior grade plywood, Grade A-C or better, mounted on two 4-inch by 4-inch by 12-foot posts, painted with exhibit lettering by a professional sign painter to OWNER's design and colors. Detailed specifications of the signs can be found in SAWS Special Specification Item No. 869.
- B. List the Project title, Project cost, Project CONSULTANT, Project number, CONTRACTOR and contact information.
- C. Erect on site at a location established by the OWNER.
- D. No other signs are allowed without the OWNER'S permission, except those required by law.

Special Specification

- E. OWNER will provide color photograph to establish color scheme for Project identification.

1.04 TEMPORARY UTILITIES

A. General

1. Provide and maintain temporary and interim utility services necessary for the performance of the Work. All costs associated with these services shall be included in the CONTRACTOR's price for mobilization.
2. Install and maintain utilities to comply with applicable code, safety, and utility company requirements.
3. Use of permanent utilities or equipment during construction shall not constitute start of warranties or guaranties.
4. Inspect and test each service before placing temporary utilities in use. Arrange for all required inspections and tests by regulatory agencies and obtain required certifications and permits for use.

B. Electricity

1. The CONTRACTOR shall provide connections sized to provide service for power and lighting. Feeder and branch wiring with area distribution boxes (if deemed necessary) shall be so located so that power is available throughout the shop/office compound by use of power cords. Terminations shall be provided for each voltage supply complete with circuit breakers, disconnect switches and other electrical devices as required to protect the power supply system. Electrical pole and service shall comply with OSHA and other safety requirements and the requirements of the power company. Provide junction boxes in such an arrangement that distribution boxes are available within 75 feet of any part of the structure.
2. The CONTRACTOR shall provide and maintain lighting for construction operations.
3. Temporary electrical power for use during construction shall not interfere with or adversely affect the normal operation of any of the OWNER's facilities or adjacent facilities.

C. Temporary Ventilation

Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

Special Specification

D. Water Service

1. CONTRACTOR shall provide water service, as needed, for all temporary office facilities and for general construction operations.
2. The CONTRACTOR will obtain a separate water meter and provide an approved backflow prevention device in accordance with the plumbing code.

E. Sanitary Facilities

1. CONTRACTOR will provide temporary sanitary facilities and will service, clean, and maintain these facilities for the duration of construction.
2. Fixed or portable chemical toilets shall be provided wherever needed for the use of employees including the field office area and active construction sites.
3. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.
4. At no time shall the toilet facilities be further than 300 feet from the active project site.

F. Fire Protection

1. The CONTRACTOR shall provide temporary fire protection equipment for the protection of personnel and property during construction. Debris and flammable material shall be removed weekly to minimize potential hazards.
2. Fires shall be reported immediately to the OWNER.

G. Telephone Service

1. The CONTRACTOR will furnish on-site telephone service for himself during the period of construction of the contract.

H. Internet Service

1. The CONTRACTOR shall provide wireless internet connection with a minimum of 100 Mbps.

1.05 BARRIERS

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- A. The CONTRACTOR shall provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from construction operations.
- B. The CONTRACTOR shall provide barriers to protect plant life designated to remain.
- C. The CONTRACTOR shall establish temporary fencing to exclude livestock from work areas at all times.

1.06 PROTECTION OF EXISTING FACILITIES, PROPERTY AND RESOURCES

- A. General: The CONTRACTOR shall be responsible for protection and costs for repairs or replacement if necessary for:
 - 1. Existing work and products.
 - 2. OWNER'S and surrounding property.
 - 3. Vegetation and plant life.
 - 4. Existing facilities and utilities.
 - 5. Cultural resources as described herein.
- B. Trees and Shrubs:
 - 1. General: Except where trees or shrubs are indicated to be removed, the CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. Existing trees and shrubs that are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. CONTRACTOR shall avoid damage to mature trees and native brush and shall replace any vegetation which requires removal with equivalent vegetation.
 - 2. Limits of Clearing: For pipelines, clearing of trees necessary for construction shall be within the existing easement. If in specific areas, additional clearing (exceeding the 60' clearing width) is required, a clearing and grubbing plan shall be provided by the CONTRACTOR and approved by the OWNER. Clearing shall be limited to only what is necessary for construction.

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3. Trimming: Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. Cuts over 1-1/2 inches in diameter shall be coated with a tree paint product that is waterproof, adhesive, elastic, and free from kerosene, coal tar, creosote, or other material injurious to the life of the tree.
4. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree or shrub is damaged by the CONTRACTOR'S operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree or shrub at its own expense. The tree or shrub shall be of a like size and variety as the one damaged, or, if of a smaller size, the CONTRACTOR shall pay to the OWNER of said tree a compensatory payment acceptable to the tree or shrub OWNER, subject to the approval of the jurisdictional agency or OWNER. The size of the tree or shrub shall be not less than 1-inch diameter nor less than 6 feet in height. Planting of replacement trees and shrubs shall be in accordance with the recommendations of the nursery furnishing the plants. Unless otherwise indicated, the CONTRACTOR shall water and maintain the replacement trees and shrubs for 6 months after planting.
5. The CONTRACTOR shall take care to protect existing trees that are outside of the 60' clearing width. CONTRACTOR shall avoid damage to mature trees and native brush and shall replace any vegetation that requires removal with equivalent vegetation. CONTRACTOR shall comply with tree protection details provided in the Drawings.

C. Utilities

1. The CONTRACTOR shall locate and protect all existing utilities and improvements impacted by the Project and not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, in accordance with the Contract Documents. The CONTRACTOR shall protect underground Utilities and other improvements whether or not the Utilities are indicated on the Drawings. The CONTRACTOR shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.
2. The CONTRACTOR shall be responsible for exploratory excavations as it deems necessary to determine the exact locations and depths of Utilities that may interfere with its work. All such exploratory excavations shall be performed no later than 45 days after Notice to Proceed or prior to production of any pipe and, in any event, a sufficient time in advance of

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construction to avoid possible delays to the CONTRACTOR'S progress. When such exploratory excavations show the Utility location as shown on the Drawings to be in error, the CONTRACTOR shall so notify the CONSULTANT by submitting a RFI.

3. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the Utility.
4. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified to move such property within a specified reasonable time. When Utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the CONSULTANT a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
5. Utilities to be Removed: Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the CONSULTANT and the OWNER of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
6. OWNER'S Right of Access: The right is reserved to the OWNER and to the OWNERS of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.
7. Underground Utilities Indicated: Existing Utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all Utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR, unless otherwise repaired by the OWNER of the damaged Utility. If the OWNER of the damaged facility performs its own repairs, the CONTRACTOR shall reimburse said OWNER for the costs of repair.
8. Underground Utilities Not Indicated: In the event that the CONTRACTOR damages existing Utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a

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verbal report of such damage shall be made immediately to SAWS and the CONSULTANT and a written report thereof shall be made promptly thereafter. The CONTRACTOR shall also notify the Utility OWNER of the damage. If directed by the CONSULTANT, repairs shall be made by the CONTRACTOR under provisions for changes and extra work.

9. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement OWNER before being concealed by backfill or other work.
10. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the CONSULTANT are made with the OWNER of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.
11. Notification by the CONTRACTOR:
 - a. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the OWNERS or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said OWNERS or agencies can be present during such work if they so desire. The CONTRACTOR shall also notify the regional notification center at 1-800-669-8344 at least 2 days, but no more than 14 days, prior to such excavation.

D. Right-of-Way

1. The CONTRACTOR shall not do any Work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified that the OWNER has secured authority therefore from the proper party. (Copies of encroachment

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agreements for work in existing rights of way are included in the Contract Documents.) The CONTRACTOR shall implement actions required by those agreements.

2. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace the same.

E. Pavement and Roads

1. Paved areas and roads that are cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit.
2. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base and pavement.
3. Temporary and permanent pavement shall conform to the requirements of the affected pavement OWNER.
4. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.
5. The CONTRACTOR shall repair the damaged areas within 72 hours.
6. Wherever sidewalks or private roads or driveways have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling.
7. The CONTRACTOR shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.
8. Protection of Street or Roadway Markers:
 - a. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations

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have been properly referenced. Survey markers or points disturbed by the CONTRACTOR shall be accurately restored after street or roadway resurfacing has been completed.

9. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.
10. Permanent Resurfacing: To obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

F. Cultural Resources:

1. The CONTRACTOR'S attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 that provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called "cultural resources").
2. The CONTRACTOR shall conform to the applicable requirements of the National Historic Preservation Act of 1966 as it relates to the preservation of cultural resources.
3. In the event potential cultural resources are discovered during subsurface excavations at the site of construction, the following procedures shall be instituted:
 - a. SAWS will issue a Field Order directing the CONTRACTOR to cease all construction operations at the location of such potential cultural resources find.
 - b. Such Field Order shall be effective until such time as a qualified archaeologist can be called to assess the value of these potential cultural resources and make recommendations to the State Historic Preservation Office.
4. If the archaeologist determines that the potential find is a bona fide cultural resource, at the direction of the State Historic Preservation Office, the

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CONTRACTOR shall suspend work at the location of the find under the provisions for changes contained in the General Conditions.

1.07 TEMPORARY CONTROLS

A. Drainage , Erosion and Sedimentation Controls

Provide drainage, erosion and sedimentation controls per CoSA Item No. 540, Temporary Erosion, Sedimentation and water Pollution Prevention and Control.

B. Traffic Control Plan

1. For the protection of traffic in public or private streets and ways, the CONTRACTOR shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of the Manual of Uniform Traffic Control Devices, Part VI – Traffic Controls for Street and Highway Construction and Maintenance Operations, published by U.S. Department of Transportation, Federal Highway Administration (ANSI D6.1).
2. A Traffic Control plan conforming to the requirements of the Texas Manual on Uniform Traffic Control Devices shall be provided by the CONTRACTOR to the governing R.O.W. agency and the OWNER when the proposed construction affects, or is located within the limits, or R.O.W. of a local, or state or federal maintained R.O.W.
3. The CONTRACTOR shall not begin construction of the Project or close any streets until all traffic control devices are properly installed and maintained at the job site in accordance with the Texas Manual on Uniform Traffic Control Devices.
4. The CONTRACTOR shall notify the OWNER forty-eight (48) hours in advance of closing any street to through traffic.
5. CONTRACTOR shall provide for the access of residents and businesses within all phases of work. This may include, but not be limited to, providing steel plates as temporary trench crossings at entrances to businesses or residences. Flagmen to control traffic at these crossings shall be used as necessary.
6. The CONTRACTOR shall take all necessary precautions for the protection of the Work and the safety of the public. Barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The CONTRACTOR shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions.

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Signs, signals, and barricades shall conform to the requirements of the OSHA Safety and Health Standards for Construction.

7. The CONTRACTOR shall submit 3 copies of a traffic control plan to SAWS and the CONSULTANT for approval a minimum of 2 weeks prior to construction. The CONSULTANT shall be allowed access to observe these traffic control plans in use and to make any changes as field conditions warrant. Any changes required by the ROW Owner, SAWS, or the CONSULTANT shall supersede these plans and be done solely at the CONTRACTOR'S expense.
8. The CONTRACTOR shall remove traffic control devices when no longer needed, repair all damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.

C. Dust Control

1. The CONTRACTOR shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity.
2. The CONTRACTOR shall be responsible for any damage resulting from dust originating from its operations.
3. The dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the OWNER.
4. Execute work by methods that minimize the creation of dust.
5. Provide positive means, appropriate amounts of water or other appropriate substances, to prevent dust from dispersing into the atmosphere.

D. Construction Noise Control

1. The CONTRACTOR shall conduct all of his work in such a manner as to maintain noise that emanates from the construction site to levels that are consistent to levels specified in the applicable local codes and SAWS General Conditions.
2. The CONTRACTOR shall submit to the OWNER plans that identify how construction noise will be mitigated for the Project. These plans will include method of construction, the equipment to be used, and types of required acoustical treatment.

E. Access to Businesses and Residences

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The CONTRACTOR shall provide for the access of residences and all businesses during all phases of the Work.

F. Rodent and Pest Control

1. The CONTRACTOR shall at all times keep the work area and storage area free from rodents, pests, and other vermin.
2. The OWNER shall notify the CONTRACTOR of any non-compliance with this requirement. This notice, when delivered to the CONTRACTOR, shall be deemed sufficient notice and that immediate corrective action is required.
3. If the CONTRACTOR fails to take effective action to eliminate the vermin problem, then the OWNER may have the necessary extermination work performed and charge the cost to the CONTRACTOR.

1.08 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA

- A. Submit a Material Safety Data Sheet (MSDS) (Department of Labor Form OSHA-20), as prescribed in 29CFR 1926, OSHA 2079, Construction Standards and Interpretations, for hazardous material 5 days before delivery of the material, whether or not listed in Appendix A of the Standard. This obligation applies to materials delivered under this Contract which will involve exposure to hazardous materials or items containing these materials.
- B. "Hazardous Material", as used in this clause, is as defined in 29CFR 1926, in effect on the date of this Contract.
- C. The CONTRACTOR shall comply with applicable Federal, State, and local laws, codes, ordinances, and regulations including the acquisition of licenses and permits in connection with hazardous materials.

1.09 CHEMICALS

- A. All chemicals used during project construction or furnished for the project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture.
- B. Use of all chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in the general conditions.

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1.10 EXPLOSIVES AND BLASTING

The use of explosives on the Work will not be permitted.

1.11 WATER FOR PIPELINE, PRESSURE AND LEAKAGE TESTING

- A. The CONTRACTOR shall be responsible for providing water for testing of the first section of pipeline and make up water for all subsequent sections as required in the General Conditions.
- B. Potential water sources for CONTRACTOR's use in the pipeline, pressure and leakage testing are identified in Section SS 841A Hydrostatic Testing Operations.

1.12 REMOVAL OF TEMPORARY UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials and controls prior to final payment.
- B. Remove underground installations to a depth of 2 feet.
- C. Clean and repair damage caused by installation or removal of temporary facilities.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION [NOT USED]

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Construction Facilities and Temporary Controls will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with Construction Facilities and Temporary Controls. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

- End of section

Special Specification

SECTION 02271

RIPRAP AND BEDDING MATERIAL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, tools and incidentals necessary to produce and place the riprap and bedding material.

1.02 SUBMITTALS

- A. Submittals shall include soundness, gradation, and unit weight.

1.03 STANDARDS

- A. Sampling and testing of material shall be in compliance with the latest revision of the following except where specifically modified:

1. American Society for Testing and Materials (ASTM) Standards:

ASTM C88	Standard Specification for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium sulfate
ASTM C127	Standard Specification for Specific Gravity and Absorption of Coarse Aggregates
ASTM C136	Standard Specification for Sieve Analysis of Fine and Coarse Aggregates

1.04 DELIVERY AND STORAGE; RIPRAP STOCKPILE

- A. Riprap temporarily stockpiled for construction purposes shall be located in an area approved by the Owner. Riprap materials shall not be located so as to block or restrict equipment and vehicle access to existing structures.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bedding Material:

1. Bedding material shall be crushed stone, gravel or a blend of crushed stone and gravel. Bedding material shall be composed of tough durable particles; shall be reasonably free from thin, flat, and elongated pieces; shall be well graded between the prescribed limits; and shall contain no organic matter or soft, friable particles in quantities considered objectionable by the Owner.

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2. Bedding material shall have a loss of less than 18 percent weighted average at five cycles when tested for soundness in magnesium sulfate in accordance with ASTM C88 using particles passing a 2-1/2-inch sieve and retained on a 1-1/2-inch sieve. After final drying, the material shall be screened over the 1-1/4-inch sieve. A minimum of one soundness test shall be performed on materials delivered to the site.
3. Bedding material gradation **shall be per TXDOT Standard Specifications as listed below.** The material shall not be skip graded, scalped of certain sizes, or have other irregularities which would be detrimental to the proper functioning of the bedding. Acceptance of bedding material shall be based on in-place gradations.
 - a. Common Riprap – maximum 3” to minimum 1-1/2” per TXDOT Item 432

B. Riprap:

1. Stone for riprap shall be durable and of a suitable quality to insure permanence in the structure and in the climate which it is to be used. The stone shall be free from cracks, seams, and other defects which would tend to increase unduly its deterioration from natural causes and shall be reasonably well graded between the prescribed limits as specified herein.
2. Riprap shall have a loss of less than 18 percent after five cycles when tested for soundness in magnesium sulfate in accordance with ASTM C88. The test shall be run using particles passing a 2-1/2-inch sieve and retained on a 1-1/2-inch sieve. After final drying, the material shall be screened over the 1-1/4-inch sieve. A minimum of one soundness-in-magnesium sulfate test shall be performed on riprap material delivered to the site.
3. Riprap gradation **shall be per TXDOT Standard Specifications as listed below.** The material shall not be skip graded, scalped of certain sizes, or have other irregularities which would be detrimental to the proper functioning of the bedding. Acceptance of bedding material shall be based on in-place gradations.
 - a. Type R Riprap – maximum 6” to minimum 1-1/2” per TXDOT Item 432

2.02 MANUFACTURED PRODUCTS

- A. Filter Cloth: Filter cloth shall be Tytar manufactured by DuPont, Supra manufactured by Phillips Fibers Corporations, Bidim manufactured by Monsanto, or other approved equal. The weight of the material shall be at least 6 ounces per square yard. The material shall be manufactured by a spinning process and shall have 85 percent of its pore sizes smaller than 0.15 mm.

PART 3 EXECUTION

3.01 FOUNDATION PREPARATION

- A. Trim and dress areas on which bedding and riprap are to be placed to conform to cross sections shown on the drawings within an allowable tolerance of plus or minus 2 inches from the theoretical slope lines and grades. Where such areas are below the allowable

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minus tolerance limit, bring areas to grade with compacted fill similar to the adjacent material in accordance with Section SS 804C, Excavation, Trenching and Backfill or with well compacted bedding material.

3.02 FILTER CLOTH

- A. Store and place filter cloth as specified by the Manufacturer. Place the filter cloth after the foundation is prepared and cover immediately with bedding material. Make a minimum 24-inch lap on all joints. Repair or replace any damaged filter cloth as specified by the Manufacturer.

3.03 BEDDING PLACEMENT

- A. Uniformly spread bedding material on the prepared surface, in a satisfactory manner, to the slope lines and grades indicated on the drawings. Placing of material by dumping from top of slope or by any method which tends to segregate particle sizes within the blanket shall not be permitted. Repair any damage to the prepared surface or filter cloth during placing of the blanket before proceeding with the work. Compaction of the blanket will not be required, but it shall be finished to present a reasonably even surface free from mounds or windrows.

3.04 RIPRAP PLACEMENT

- A. Place stone for riprap on the blanket in such manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids, and construct within the specified tolerance to the lines and grades shown on the drawings or staked in the field. A tolerance of plus 6 or minus 0 inches from the slope lines and grades shown on the drawings shall be allowed in the finished surface of the riprap. Place riprap to its full course thickness at one operation and in such a manner as to avoid displacing the blanket material. Distribute the larger stones evenly and conform the entire mass of stones in their final position to the specified gradation.
- B. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Place riprap loads along horizontal rows and progress up the slope. Place each load against previously placed riprap. Placing riprap in layers shall not be permitted. Placing riprap by dumping from top of slope, dumping into chutes, or by similar methods likely to cause segregation of the various sizes shall not be permitted. The desired distribution of the various sizes of stones throughout the mass shall be obtained by methods of placement which produces the specified results. Rearrange individual stones by mechanical equipment or by hand to the extent necessary to obtain a reasonably well graded distribution of stone sizes. Maintain the riprap protection until accepted and replace any material displaced by any cause to the lines and grades shown on the drawings.

3.05 FIELD QUALITY CONTROL; TESTING

- A. The Contractor shall be responsible for providing all testing to demonstrate compliance with the requirements of the Contract Documents. Gradation testing of the riprap and bedding materials shall be performed on all the materials within a 10-by-10-foot square

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area designated by the Engineer. Gradation tests shall be representative of no greater than one-third of the material placed. The Contractor shall bear all costs, including additional testing, of the correction of materials which fail to meet the requirements of the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Rock Rip Rap including bedding material and all other materials, incidentals and work as shown in the project plans and details shall be measured by the square yard.

4.02 PAYMENT

- A. Payment for Rock Rip Rap including bedding material and all other materials, incidentals and work as shown in the project plans and details shall be made at the contract unit price per square yard. Payment shall not be made until the riprap and bedding material has been installed and accepted in compliance with requirements of the contract documents and SAWS.

END OF SECTION

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SECTION 02273

CONCRETE CABLE MATS

PART 1 GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all labor, materials, equipment, and incidentals required and perform all operations in connection with the installation of articulated concrete blocks or cable concrete erosion control mats in accordance with the lines, grades, design and dimensions shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

The contractor shall be able to demonstrate at least three jobs where similar installation has occurred. If experience is not available, the supplier shall have a technician experienced in the installation of the Cable Concrete available at the start of an installation to assist in any special techniques needed to assure a proper installation. Documentation of this experience shall be provided to the Engineer.

1.03 SUBMITTALS

Submittals shall include:

- A. Submit to the Owner's Representative all manufacturer's performance research results and calculations in support of the concrete mat system and geotextile proposed for use. All calculations must be made in accordance with PART 2 of this specification.
- B. Furnish manufacturer's certificates of compliance for concrete blocks/mats, revetment cable, and any revetment cable fittings, anchors and connectors to the Owner's Representative prior to the start of mat fabrication.
- C. Furnish to the Owner's Representative all manufacturer's specifications, literature, shop drawings for the fabrication of the mats, anchor layouts and any recommendations, if applicable, that are specifically related to this project, 14 days prior to assembly of the cable mats.
- D. Submit experience of the installer as described in paragraph 1.02.

1.04 STANDARDS

The applicable provisions of the following standards shall apply as if written herein in their entirety:

ASTM C33 Specification for Concrete Aggregates

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ASTM C39	Compressive strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C150	Specification for Portland Cement
ASTM C207	Specification for Hydrated Lime Types
ASTM C595	Specification for Blended Hydraulic Cements
ASTM C618	Specification for Fly Ash and Raw or Calcined Natural Pozzolans for use in Portland Cement Concrete
ASTM D18.25.04	Specification for Articulated Concrete Block Systems (In Design)
ASTM D698	Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D3786	Hydraulic Burst Strength of Knitted Goods and Nonwoven Fabrics
ASTM D4355	Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water
ASTM D4491	Water Permeability of Geotextiles by Permittivity
ASTM D4533	Trapezoidal Tearing Strength of Geotextiles
ASTM D4632	Breaking Load and Elongation of Geotextiles (Grab Method)
ASTM D4751	Determining Apparent Opening Size of a Geotextile
ASTM D4833	Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
ASTM D5101	Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio
ASTM D5567	Hydraulic Conductivity Ratio Testing of Soil/Geotextile Systems
AASHTO T88	Determining the Grain-size Distribution of Soil
AASHTO M288-96	Standard Specification for Geotextiles

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FHWA-RD-89-199 November 1989 – Standard Testing for Hydraulic Stability of Concrete Revetment System During Overtopping Flow

FHWA-RD-88-181 Minimizing Embankment Damage During Overtopping Flow
(Replaced by FHWA-RD-89-199 in November of 1989)

2.00 PRODUCTS

2.01 MATERIALS

A. CABLE CONCRETE

All cellular concrete mats shall be pre-manufactured as an assembly of concrete blocks, with specific hydraulic capacities, bound into mats by the use of stainless steel cables.

1. Certification (Open-Channel Flow): All articulated concrete mats will only be accepted when accompanied by documented hydraulic performance characteristics, derived from tests under controlled flow conditions. Testing guidelines should conform to U.S. Federal Highway Administration and U.S. Bureau of Reclamation Testing Protocol as documented in “November 1989 – Standard Testing for Hydraulic Stability of Concrete Revetment System During Overtopping Flow”, Report No. FHWA-RD-89-199. In addition, system restraints (such as mechanical anchors) and ancillary components (such as a synthetic drainage medium) used in the full-scale testing program must be incorporated in field installations in an identical manner.
2. Performance (Overtopping Flow): The design of the articulated concrete mats shall be in accordance with the Factor-of-Safety design methodology as described in "Sediment Transport Technology" by D. B. Simons and F. Senturk, Water Resources Publication, 1977. The articulated concrete mats shall be designed to a minimum safety factor of 2.0 for a design shear stress of 2.0 lbs/ft². The analysis shall be performed based upon the stability of the mat due to gravity forces alone, neglecting forces which may be due to cabling, mechanical anchorage, contact with adjacent blocks, or other restraint not attributable to gravity based forces. The analysis must account for a subgrade variation of up to 0.5. (For a level surfaced block this would result in a 0.5 inch block projection height). The individual blocks comprising the mat shall have an open area of not less than 10% and not more than 20%. Extrapolation of tested shear stress values to the performance of thicker units may be considered only for units within the same “family” of blocks having the same geometric dimensions (length and width) and interlock of the tested units.

- B. CONCRETE: The minimum required concrete strength should be 4000 PSI. The mix used shall be in accordance with CoSA Item No. 300, Concrete. Air entrainment of

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- 4% to 7% shall also be added. All ASTM standards will be met in the production of the concrete.
- C. CABLES: The cables shall be made of stainless steel aircraft cable of type 304. The cable shall be of type 1 X 19 construction. Size varies with block size. Manufacturer's recommendation for size shall be used.
 - D. GEOTEXTILE: Geotextile material to be used shall be Geotex™ 801, made by Synthetics Industries, and/or 8-oz. equivalent needle punched nonwoven fabric. The geotextile shall be attached to the base of the concrete block mats. An overlap of 2 ft to 3 ft shall be incorporated on three sides of the mat. The overlap shall provide an area for the adjoining mats to be placed upon and prevent undermining of the erosion control system. An extra layer of geotextile fabric shall be placed under the concrete block mats. It shall be the same or equivalent to the fabric which is attached to the concrete block mats.
 - E. CLAMPS: Sufficient stainless steel wire rope clamps shall be used to secure loops of adjoining Cable Concrete mats. The type of clamp needed shall be determined by the manufacturer. The number of loop connections is based on project specifics, and shall be shown in the shop drawings. Clamping in field must follow project layout details to be acceptable.
 - F. ANCHORING: Cable Concrete mats are designed to take velocities in certain slope and bedding situations. Manta Ray anchors by Foresight Products, Commerce City, Colorado or equivalent shall be used. All anchors shall be stainless steel. At a minimum, the anchor is placed at perimeters of individual mats. The anchor is attached to the loops of the mat after placement. There shall be no slack in the driven anchor cable when it is attached to the loops of the mat. Anchoring must follow project layout details to be acceptable.

2.02 VISUAL INSPECTION

- A. All units shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction. Surface cracks incidental to the usual methods of manufacture, or surface chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.
- B. Cracks exceeding 0.25 inches (.635 cm) in width and/or 1.0 inch (2.54 cm) in depth shall be deemed grounds for rejection.
- C. Chipping resulting in a weight loss exceeding 10% of the average weight of the blocks shall be deemed grounds for rejection.
- D. Blocks rejected prior to delivery from the point of manufacture shall be replaced at the manufacturer's expense. Blocks rejected at the job site shall be repaired with structural grout at the expense of the contractor.

Special Specification

2.03 SAMPLING AND TESTING

The purchaser or his authorized representative shall be accorded proper access to facilities to inspect and sample the units at the place of manufacture from lots ready for delivery. Additional testing, other than that provided by the manufacturer, shall be borne by the contractor.

2.04 MANUFACTURER

Articulated concrete blocks shall be ARMORFLEX® as manufactured and sold by ARMORTEC, 9025 Centre Pointe Drive West Chester, OH 45069, Phone: (513) 645-7000, (800) 305-0523, or approved equal.

3.00 EXECUTION

3.01 FOUNDATION PREPARATION

- A. General. Areas on which filter fabric and cellular concrete blocks are to be placed shall be constructed to the lines and grades shown on the Contract Drawings and to the tolerances specified in the Contract Documents, and approved by the Owner's Representative.
- B. Grading. The slope shall be graded to a smooth plane surface to ensure that intimate contact is achieved between the slope face and the geotextile (filter fabric), and between the geotextile and the entire bottom surface of the cellular concrete blocks. All slope deformities, roots, grade stakes, and stones which project normal to the local slope face must be regraded or removed. No holes, "pockmarks", slope board teeth marks, footprints, or other voids greater than 1.0 inch in depth normal to the local slope face shall be permitted. No grooves or depressions greater than 0.5 inches in depth normal to the local slope face with a dimension exceeding 1.0 foot in any direction shall be permitted. Where such areas are evident, they shall be brought to grade by placing compacted homogeneous material. The slope and slope face shall be uniformly compacted, and the depth of layers, homogeneity of soil, and amount of compaction shall be as required by the Owner's Representative. A 6-inch layer of aggregate fill shall be placed on the compacted subgrade prior to placement of the geotextile and cellular concrete mat with attached geotextile.
- C. Excavation and preparation for anchor trenches, side trenches, and toe trenches or aprons shall be done in accordance to the lines, grades and dimensions shown in the Contract Drawings. The anchor trench hinge-point at the top of the slope shall be uniformly graded so that no dips or bumps greater than 0.5 inches over or under the local grade occur. The width of the anchor trench hinge-point shall also be graded uniformly to assure intimate contact between all cellular concrete blocks and the underlying grade at the hinge-point.
- D. Inspection. Immediately prior to placing the filter fabric and cellular concrete blocks, the prepared area shall be inspected by the owner's representative, and by the manufacturer's representative. No fabric or blocks shall be placed thereon until that area has been approved by each of these parties.

Special Specification

3.02 INSTALLATION

- A. **GENERAL:** Cable concrete block/mats, shall be constructed within the specified lines and grades shown on the Contract Drawings.
- B. **Placement.** The cable concrete blocks shall be placed with the filter fabric in such a manner as to produce a smooth plane surface in intimate contact with the filter fabric. No individual block within the plane of placed cable concrete blocks shall protrude more than one-half inch or as otherwise specified by the Owner's Representative. To ensure that the cable concrete blocks are flush and develop intimate contact with the subgrade, the blocks shall be "seated" with a roller or other means as approved by the Owner's Representative.
- C. If assembled and placed as large mattresses, the cable concrete mats shall be attached to a spreader bar or other approved device to aid in the lifting and placing of the mats in their proper position by the use of a crane or other approved equipment. The equipment used should have adequate capacity to place the mats without bumping, dragging, tearing or otherwise damaging the underlying fabric. The mats shall be placed side by side and/or end to end, so that the mats abut each other. Mat seams or openings between mats greater than two (2) inches shall be filled with grout or lean concrete. Anchor holes shall be covered with lean concrete or grout. Pipe penetrations shall be grouted in place. Whether placed by hand or in large mattresses, distinct changes in grade that results in a discontinuous revetment surface in the direction of flow shall require a grout or lean concrete seam at the grade change location so as to produce a continuous surface.
- D. Anchor trenches and side trenches shall be backfilled and compacted flush with the top of the blocks. The integrity of a soil trench backfill must be maintained so as to ensure a surface that is flush with the top surface of the cable concrete blocks for its entire service life. Toe trenches shall be backfilled as shown on the Contract Drawings. Backfilling and compaction of trenches shall be completed in a timely fashion.
- E. Anchors shall be placed at a minimum on adjoining mats along the sides. A minimum of one anchor is needed along the short side of the mat and a minimum of 3 anchors are needed along the long side of the mat. A minimum of two (2) extra anchors shall be placed at the upstream edge of the cable mat. Other anchoring shall be recommended by the manufacturer. Anchors shall be placed perpendicular to the mat.
- F. **Backfill.** The cable concrete mats shall be backfilled as shown on the drawings. Backfill materials shall consist of crushed stone aggregate on the driving surfaces, channel bottoms, and topsoil and Bermuda grass seed on the other slopes.
- G. **Finishing.** The openings in the cable concrete blocks shall be backfilled and compacted as specified immediately with suitable material to assure that there are not voids and so that compacted material extends from the filter fabric to the surface of the cellular concrete block.

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3.03 FIELD QUALITY CONTROL [NOT USED]

3.04 CLEAN AND ADJUST [NOT USED]

3.05 SCHEDULES [NOT USED]

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Concrete cable mats and all other materials, incidentals and work as shown in the project plans and details shall be measured by the square yard.

4.02 PAYMENT

- A. Payment for concrete cable mats and all other materials, incidentals and work as shown in the project plans and details shall be made at the contract unit price per square yard. Payment shall not be made until the concrete cable mats have been installed and accepted in compliance with requirements of the contract documents and SAWS.

END OF SECTION

Special Specification

SECTION 02400

JACKING, BORING, OR TUNNELING PIPE

PART 1 GENERAL

1.01 SCOPE

This section shall govern for furnishing and installing pipe by the methods of tunneling, jacking or boring to the lines and grades shown on the plans and in conformity with the provisions and requirements of this specification.

Contractor shall be responsible for the final constructed product, materials, and tools, used, and for furnishing the labor and qualified operators and/or superintendents necessary for the selected method of construction. Contractor shall be responsible for the means, methods, construction techniques, and sequences of construction selected.

The Contractor shall furnish all items, including but not limited to, the tunneling equipment, remote control system, pipe jacking equipment, grout equipment, spoils transportation system, hoists, signal system safety equipment and survey controls, necessary to excavate and advance the tunnel and construct the water line.

Contractor is fully responsible for providing dewatering as required to maintain excavation stability and prevent ground loss and settlement in accordance with the tolerances of the Specifications.

Some of the bored casing is to be installed in bedrock. Contractor is fully responsible to provide excavation equipment capable of efficiently excavating bedrock and advancing casing while maintaining excavation stability and preventing ground loss. Blasting is not allowed.

1.02 RELATED SECTIONS

The work of the following Sections is related to the work of this Section. Other sections not referenced below may be related to the proper performance of this work.

Section SS 804B Control of Groundwater and Surface Water

1.03 SUBMITTALS

The CONTRACTOR will submit the following for approval by the OWNER 30 days prior to the installation of the work:

- A. Qualifications of tunneling contractor and operator(s).
- B. Submit detail drawings and manufacturer's information for the casing

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isolators/spacers that will be used. Include dimension and component materials.

- C. Grout mix design and detailed grouting plan for contact grout to be placed between steel casing pipe and excavation. Include planned grout port locations and spacing.
- D. Complete layout drawings that clearly indicate the location of the jacking pit and receiving pit. Tunneling, jacking, and boring equipment details need to be included as part of the tunneling, jacking, and boring action plan. The plan shall include anticipated loads including hydrostatic calculations, diagrams, and structural program print outs. Submit tunneling, jacking, and boring safety plan.
- E. Traffic control plan developed in accordance with the latest edition of the Manual of Uniform Traffic Control Devices adopted by the Texas Department of Transportation.
- F. Groundwater control plan that indicates how groundwater is to be managed during jacking or boring operations.
- G. Certifications issued by an independent laboratory regarding the ability of CONTRACTOR personnel to perform welding operations to standards presented in these specifications.
- H. Settlement monitoring plan in accordance with Section 02401 Geotechnical Instrumentation that shows all points that will be monitored for settlement during installation and the frequency at which readings will be made.
- I. Contingency Plan outlining the procedures followed if the following events occur: surface settlement/surface heave at the threshold and limits established in Section 02401 Geotechnical Instrumentation, existing utility damage and/or removal of obstructions encountered during tunneling operations.
- J. Certificates of compliance demonstrating compliance of steel casing pipe with ASTM A-36, ASTM A-570, ASTM A-135, ASTM A-139, or approved equal. Steel casing pipe shall have a minimum yield strength of 35,000 psi.
- K. Record data for the structural steel plate and fasteners from the structural steel plate manufacturer. Record data shall include calculations for the design of the structural steel plate signed and sealed by an engineer registered in the State of Texas.
- L. Shop drawing detailing the connection between steel casing pipe and the open-cut casing.
- M. Daily Report. Contractor shall submit a written or electronic daily report to Engineer no later than twelve (12) hours after each shift detailing at a minimum the following:

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1. Supervisor name, hours worked, quantity of crew members, quantity of materials used, and a brief summary of daily activities.
2. A detailed log recording at a minimum: supervisor name, jack and bore operator name, date, daily progress, jacking pressures, spoil volume and other information deemed necessary by Engineer.
3. Quantity of muck removed. Contractor to provide an assessment of the actual spoil volume removed during excavation and the theoretical volume required for the excavation.

1.01 QUALITY ASSURANCE

A. Design Criteria

1. Casing Insulators

Casing insulators shall be designed by the Manufacturer to adequately support and electrically isolate the carrier pipe within the casing pipe under all conditions. Number and location of spacing insulators shall be determined by the Manufacturer to protect carrier pipe from damages. One insulator shall be placed within 2' of ends of casing.

B. Lines and Grades

The CONTRACTOR shall establish adequate survey control to ensure that the variations in final horizontal and vertical placement of the casing pipe is maintained within 1 inch in 10 feet of the lines and grades shown on the plans, provided that such variation shall be only in the direction that will not detrimentally affect the function of the carrier pipe. Line and grade shall be checked at the end of each working day and corrected before pressure grouting the void space between the outside of the casing pipe and the excavation. A copy of the line and grade record shall be provided to the inspector on a weekly basis.

C. Installer's Qualifications

The Contractor or pipe jacking Subcontractor shall demonstrate successful completion of at least five (5) previous projects within the past five (5) years using similar methods with casing/carrier pipe at least as large as that proposed. Qualifications of the Contractor or pipe jacking Subcontractor shall be submitted to the Engineer for review and approval.

The Operator(s) shall be a trenchless specialist who shall remain on the project site during the duration of the tunneling operation. The Operator shall have a minimum of five (5) years' experience in supervising tunnel operations utilizing

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similar methods. Qualifications of the Operator shall be submitted to the Engineer for review and approval.

1.02 DELIVERY, STORAGE AND HANDLING

Deliver, store and handle products in accordance with manufacturer's latest published requirements and specifications.

1.03 STANDARDS

AWWA C-202 "Steel Water Pipe 6 inches and Larger"

AWWA C-206 "Field Welding of Steel Water Pipe"

AWWA C-210 "Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines"

AASHTO M-167 "Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches"

AASHTO M-190 "Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches"

AASHTO Standard Specifications for Highway Bridges, 1989.

ASTM A-36 "Structural Steel"

ASTM A-123 "Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products"

ASTM A-135 "Electric - Resistance - Welded Steel Pipe"

ASTM A-139 "Electric - Fusion (Arc) - Welded Steel Pipe"

ASTM A-153 "Zinc Coating (Hot Dip) on Iron and Steel Hardware"

ASTM A-307 "Carbon Steel Bolts and Studs, 60,000 PSI Tensile"

ASTM A-449 "Quenched and Tempered Steel Bolts and Studs"

ASTM A-570 "Hot Rolled Carbon Steel Sheet and Strip, Structural Quality"

ASTM A-1011 "Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength"

Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength"

ASTM D-698 "Test Methods for Moisture-Density Relations of Soils and Soil

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Aggregate Mixtures, Using 5.5-lb Rammer and 12 Inch Drop”

ASTM D-4254 "Test Methods for Minimum Index Density of Soils and Calculation of Relative Density"

1.04 JOB CONDITIONS; PERMITS AND EASEMENT REQUIREMENTS

- A. Where the work is in the public right-of-way or utility company right-of-way, the CONTRACTOR will coordinate the appropriate permits or easements. OWNER will execute permits as necessary. The CONTRACTOR shall observe regulations and instructions of the right-of-way OWNER as to the methods of performing the work and take precautions for the safety of the property and the public. Negotiations and coordination with the right-of-way owner shall be carried on by the CONTRACTOR, not less than five (5) days prior to the time of his intentions to begin work on the right-of-way.
- B. Comply with the requirements of the permit and/or easement, a copy of which will be supplied by the OWNER. The work within the Texas Department of Transportation (TxDOT) shall comply with TxDOT specifications. If required by the Right-of-Way OWNER, obtain Protective Liability Insurance in the amount required by the particular company or other insurance as is specified in the permit at no cost to the OWNER. Acquire a permit, agreement, or work order from the right-of-way owner as is required.
- C. Construction along roads shall be performed in such manner that the excavated material be kept off the roads and railroads at all times, as well as, all operating equipment. Construction shall not interfere with the operations of the roads and railroads.
- D. Barricades, warning signs, and flagmen, when necessary and specified, shall be provided by the CONTRACTOR.
- E. Existing pipelines and utilities are to be protected. The CONTRACTOR shall verify location and elevation of any pipelines and utilities before proceeding with the construction and plan his construction so as to avoid damage to the existing pipe lines or telephone cables. Verification of location of existing utilities before manufacturing steel casing pipe shall be the complete responsibility of the CONTRACTOR.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Casing Pipe. Casing pipe shall be new, un-coated, un-lined steel pipe manufactured in accordance with AWWA Standard C200, latest edition, Casing shall meet ASTM A-36, ASTM A-570, ASTM A-135, ASTM A-139, or approved

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equal. Steel casing pipe shall have minimum yield strength of 35,000 psi. Casing pipe joints shall be fully welded in accordance with AWWA C-206.

- B. Casing pipe size shall be compatible with carrier pipe size as shown in Table 1 below or as specified in the design drawings. Minimum length shall not be less than 20 feet. Used pipe will not be acceptable. Minimum Wall Thickness also shall be as shown in Table 1 below.

TABLE 1			
		Casing Pipe	
Carrier Pipe Size (in.)	Casing Pipe Size (in.)	Thickness (in.)	Weight (lbs/ft.)
8	24	0.375	94.62
12	24	0.375	94.62
16	30	0.375	118.65
20	36	0.438	166.19
24	42	0.438	194.42
30	48	0.50	259.02
36	54	0.50	291.07
42	60	0.625	395.66
48	66	0.750	395.66

- C. Casing Spacers.

1. Steel Pipe. Casing spacers shall be selected to provide a maximum clearance of 4 inches between the end of the runner and the inside diameter of the casing pipe. The spacer shall hold the carrier pipe in a centered position within the casing pipe. Casing spacers shall provide electrical insulation and adequate support of the carrier pipe and shall prevent damage to the carrier pipe and protective coating/bag/wrap during installation and normal operation. Casing spacer material, length, width, and spacing shall be based on the casing spacer manufacturer's recommendation and shall be approved by the OWNER or its designated AGENT. Casing spacers shall be secured to the carrier pipe using steel bands that are either 304 Stainless steel (all components) or coated with 15 mil fusion bonded PVC. A casing spacer must be placed within 2 feet of the end of the casing and at intervals no greater than 10 feet. Bands shall be 8 inches long for carrier pipes less than 16 inches in diameter and no less than 12 inches wide for carrier pipes 16 inches in diameter and larger. Bands shall be 14 gauge minimum and risers shall be 10 gauge minimum, with design and fabrication in accordance with manufacturers recommendations for each installation.

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Acceptable manufacturers include Pipeline Seal and Insulator, Inc. or approved equals.

- D. Casing End Seals. Casing end seals shall be sized by the CONTRACTOR to accommodate the diameter of the casing pipe. These seals shall be installed using brick mortar ends seals as shown in the project drawings and details. Attachment clamps shall be constructed of stainless steel.
- E. Cellular grout. Cellular grout shall be sand cement slurry containing a minimum of seven (7) sacks of Portland Cement per cubic yard of slurry. All slurry shall be plant batched and transit mixed.
- F. All shipments of casing pipe shall be accompanied by a certificate of compliance to these specifications prepared by an independent testing laboratory and signed by a registered professional engineer.

2.02 MIXES

- A. CEMENT MORTAR
Consisting of one (1) part cement to two (2) parts clean sand with sufficient water to make a thick workable mix.
- B. CELLULAR GROUT MIX
The cellular grout shall be a low-density, non-shrink grout composed of Type II Portland cement, water, and a performed foam. The cellular grout shall have the following characteristics:
 - 1. Minimum 28-day Compressive Strength = 1000psi
 - 2. Slurry (Wet) Density = 50 to 60 pcf
 - 3. Cement = Type II, per ASTM C150
 - 4. Water = Potable
 - 5. Foam = Per ASTM C869
 - 6. Water/Cement Ration = 0.56 to .60
- C. FLOWABLE FILL
Flowable Fill shall be in accordance with SAWS Item 299.

Special Specification

2.03 EQUIPMENT

Tunneling or boring equipment shall be manufactured by a company that specializes in design and fabrication of this type of equipment and has at least five (5) years of experience.

The equipment shall be:

- A. Capable of installing steel casing pipe the length of the crossings as shown on the drawings for variable subsurface conditions. Contractor shall provide verification that excavation equipment is capable of efficiently excavating and other variable subsurface conditions.
- B. Provide a means for controlling line and grade in accordance with specified criteria, centering cutting head inside borehole, and maintaining settlement, heave or voids to within specified limits.
- C. Equipment shall be hydraulically operated and capable of pushing the pipe in a controlled manner and compatible with the anticipated jacking loads and pipe capacity. Contractor shall monitor the jacking force applied to the pipe and ensure the jacking force does not exceed pipe manufacturer's recommendations.

PART 3 EXECUTION

3.01 GENERAL

- A. If the grade of the pipe at the jacking or boring/tunneling end is below the ground surface, suitable pits or trenches shall be excavated for the purpose of conducting the jacking or boring operations and for placing end joint of the pipe. The location of the pits shall comply with the provisions contained within the permit issued by the right-of-way owner and the Utility Accommodation Policy published by the Texas Department of Transportation. Excavations greater than five (5) feet in depth shall be protected as specified in Section SS 804C Excavation, Trenching and Backfill.
- B. Where pipe is required to be installed under highways, streets, or other facilities by jacking or boring methods, construction shall be made in such a manner that will not interfere with the operation of the street, highway, or other facility, and shall not weaken or damage any embankment or structure.
- C. Pipe damaged in jacking, boring, or tunneling operations shall be repaired in place to the satisfaction of the OWNER. Pipe damaged beyond repair will be removed and replaced. Repair or removal and replacement of damaged pipe will be done at the CONTRACTOR's expense.

Special Specification

3.02 CONSTRUCTION METHODS

A. Jacking

1. Suitable pits or trenches shall be excavated for the purpose of jacking operations for placing end joints of the pipe. When trenches are cut in the side of embankments such work shall be securely sheeted and braced. Concrete seal slabs shall be used in the bottom of all jacking pits to prevent the inflow of groundwater and to provide a working surface for jacking operations. Jacking operations shall in no way interfere with the operation of railroads, streets, highways or other facilities. Barricades and lights shall be furnished as directed by the OWNER to safeguard traffic and pedestrians.
2. The pipe to be jacked shall be set on guides to support the section of pipe being jacked and to direct it in the proper line and grade. Embankment material shall be excavated just ahead of the pipe and material removed through the pipe, and the pipe forced through the opening thus provided. In areas where groundwater may seep into the pit, the CONTRACTOR shall use pre-manufactured casing seals at the point where the casing extends through the sheeting.
3. The distance that the excavation shall extend beyond the end of the pipe shall depend on the character of the material, but shall not exceed two feet (2') in any case.
4. Generally, pipe shall be jacked uphill.
5. When jacking of pipe has begun, the operation shall be carried on without interruption, insofar as practicable, to prevent the pipe from becoming firmly set in the embankment.
6. CONTRACTOR shall backfill pits upon completion.

B. Boring or Tunneling

1. The CONTRACTOR is responsible for determining the boring or tunneling excavation method and equipment suitable for excavating the existing subsurface conditions.
2. The boring shall proceed from a pit provided for the boring equipment and workmen. The location of the pit shall be approved by the OWNER. The boring shall be done mechanically either using a pilot hole or by the auger method.

Special Specification

3. When the pilot hole method is used an approximate two (2) inch pilot hole shall be bored the entire length of the crossing and shall be checked for line and grade on the opposite end of the bore from the work pit. This pilot hole shall serve as the centerline of the larger diameter hole to be bored.
4. When the auger method is used, a steel encasement pipe of the appropriate diameter equipped with a cutter head to mechanically perform the excavation shall be used. Augers shall be of sufficient diameter to convey the excavated material to the work pit. The annular space between the casing pipe and the excavation shall be pressure grouted.
5. Excavated material shall be disposed of by the CONTRACTOR, as approved by the OWNER. The use of water or other fluids in connection with the boring operation will be permitted only to the extent necessary to lubricate cuttings; jetting will not be permitted.
6. In unconsolidated soil formations, a gel-forming colloidal drilling fluid consisting of at least 10 percent of high grade carefully processed bentonite may be used to consolidate cuttings of the bit, seal the walls of the hole, and furnish lubrication for subsequent removal of cuttings and immediate installation of the pipe.

C. Excavation and Backfill of Access Pits

1. Do not allow excavation over the limits of the bore or tunnel as specified. Trench walls of access pits adjacent to the bore or tunnel face shall be truly vertical. Shore the trench walls as necessary to protect workmen, the public, structures, roadways, and other improvements.
2. Excavations within the right-of-way and not under surfacing shall be backfilled and consolidated by tamping in 12" loose lift horizontal layers to 98% of maximum density as measured by ASTM D-698. Surplus material shall be removed from the right-of-way and the excavation finished to original grades. Backfill pits immediately after the installation of the carrier pipe is completed. If carrier pipe is not installed immediately after casing pipe installation, the Right-of-Way Owner may require the access pits be temporarily backfilled until installation of carrier pipe.
3. Where seeding or sodding is disturbed by excavation or backfilling operations, such areas shall be replaced by seeding or sodding as specified in CoSA Items 520 Revegetation.

D. Installation of Pressure Grout Mix

Special Specification

1. Install pressure grout mix in the void space between the outside of the casing pipe and the excavation. For bore or jacks with casing pipe, install pressure grout mix immediately upon completion of setting casing pipe.
2. Unless specified otherwise, install pressure grouting through grout fittings for the casing pipe 48" in diameter or larger. Grout fittings shall be fabricated into casing pipe at a maximum spacing of 6'. Remove and plug grout fittings after pressure grouting.
3. Install pressure grout from the low end for all crossings where grout fittings are not used. Seal the low end and pressure grout until grout is extruded from the opposite end.

3.03 FREE AIR SYSTEM

If required by OSHA standards, free air systems shall be installed and maintained.

3.04 INSTALLING CARRIER PIPE IN CASINGS

- A. Pipe to be installed within the casing shall meet the requirements for this type of pipe as specified. Place, align, and weld skid rails (reinforce weld) inside the casing. Skid rails shall also be extended across the entire length of the bore pit and cement mortar shall be placed on both sides of the rails.
- B. For Polyurethane or Pritec coated steel pipe:
 1. Before installing pipe inside casing, install exterior joint coating (heat shrink) on each joint and temporarily tack weld each joint internally at 3, 6, 9, and 12 o'clock. Tack welds add rigidity to the pipe during the installation.
 2. Pull, push, or skid pipe into place inside the casing using a constant force method such as hydraulic cylinders. Use of construction equipment such as excavators for pulling or pushing pipe inside the casing will not be allowed. Lubricants such as flax soap or drilling mud may be used to ease pipe installation. Do not use petroleum products, oil or grease for this purpose.
 3. After carrier pipe installation is complete, remove temporary tack welds.
 4. Verify electrical discontinuity between the carrier pipe and casing by performing Casing Electrical Isolation Testing as specified in Section 13110, Cathodic Protection System. If continuity exists, remedy the short prior to applying cellular grout.

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5. Completely fill the annular space between the carrier pipe and the casing with cellular grout. The CONTRACTOR shall take precautions to prevent flotation of the carrier pipe during grouting. Provide necessary bulkheads as recommended by the cellular grout supplier. If pressure is used to apply grout, verify the maximum allowable pressure with the carrier pipe manufacturer, and do not exceed this pressure.
6. After grouting the annular space, perform a 360 degree internal weld on each joint of the carrier pipe and apply mortar inside the joints.

C. Casing Pipe Joints

All joints for the casing pipe shall be butt welded with a minimum of two passes around the circumference of the joint. The procedures and techniques employed in welding the joints shall conform to AWWA C206, latest edition.

D. Carrier Pipe Joints

Carrier pipe joints shall be fully restrained using the jointing systems defined in Section 02571, Steel Pipe Mortar Lined.

3.05 MONITORING

Contractor shall install and monitor surface settlement and ground deformation points in accordance with Section 02401 - Geotechnical Instrumentation.

3.06 CLEANING AND RESTORATION

Upon completion of the work of this Section, dispose of, away from the site, all excess material, all debris, trash, containers, residue, remains, and scraps which result from the work of this Section. In addition, restore the site to a condition equal to or better than that found prior to the initiation of work.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Tunneling or boring casing shall be measured by the horizontal linear foot, as shown on the plan stationing, for the size and type shown on the Drawings, as measured from the face of the boring pit to the face of the receiving pit.
- B. Open-cut casing shall be measured by the horizontal linear foot, as shown on the plan stationing, for the size and type shown on the Drawings.
- C. Removal of obstructions from tunnels shall be measured per each.

4.01 PAYMENT

Special Specification

- A. Payment shall be made at the unit bid price per horizontal linear foot of tunneling or boring casing pipe as specified, as shown on the plan stationing, for casing pipe for the various sizes and types shown. Payments shall be made based on 90% of the linear foot bid price after installation of the casing pipe and submittal of associated mil certificates and shop testing information for the pipe installed, demonstration of compliance with requirements of the contract documents and SAWS for Record Drawings as approved by the OWNER. The remaining 10% shall be payable upon successful completion of the installation of the carrier pipe and all annular grout.
- B. Payment shall be made at the unit bid price per horizontal linear foot of open-cut casing pipe as specified, as shown on the plan stationing, for casing pipe for the various sizes and types shown. Payments shall be made based on 90% of the linear foot bid price after installation of the casing pipe and submittal of associated mil certificates and shop testing information for the pipe installed, demonstration of compliance with requirements of the contract documents and SAWS for Record Drawings as approved by the OWNER. The remaining 10% shall be payable upon successful completion of the installation of the carrier pipe.
- C. Payment for removal of obstructions from tunnels shall be made at the unit bid price per each. The Contractor will receive compensation for removal of obstructions, as defined as metallic debris, reinforced concrete, whole trees, and other hard objects larger than 40% of the outer diameter of the cutter head, which cannot be broken up by the cutting tools with diligent effort, and that are partially or wholly within the cross-sectional area of the bore. The Contractor will receive no additional compensation for removing, clearing, or otherwise making it possible for the boring equipment to advance past objects consisting of wood, non-reinforced concrete, and other nonmetallic objects or debris with maximum lateral dimensions less than 40% of the outer diameter of the cutterhead, whichever is larger. Additionally, full- or partial-face rock with unconfined compressive strength less than 6,000 psi will not be considered an obstruction and will not be grounds for additional compensation.

-END OF SECTION-

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SECTION 02401

GEOTECHNICAL INSTRUMENTATION

PART 1 GENERAL

1.01 SCOPE

- A. This Section specifies the requirements for furnishing, installing, and monitoring instrumentation devices to monitor ground (settlement and heave), structure, and utility movement, or deformation; maintenance of instruments; and removal of instrumentation upon completion of construction. This Section also provides the threshold and limiting values of allowable ground movements (settlement and heave), structure movements, horizontal displacement, and groundwater impacts. Instruments include, but are not limited to, inclinometers, surface monitoring points (SMPs), structure settlement monitoring points (SSMPs), and utility monitoring points (UMPs).

1.02 RELATED SECTIONS

- A. The work of the following Sections is related to the work of this Section. Other sections not referenced below may be related to the proper performance of this work.

SS 804B Control of Groundwater and Surface Water

SS 804C Excavation, Trenching and Backfill

02400 Jacking and Boring

1.03 PERFORMANCE REQUIREMENTS

- A. Work shall include furnishing all labor, equipment, and materials for installing, protecting, monitoring, maintaining, analyzing, reporting, and removing instrumentation required to monitor surface and subsurface conditions during construction.
- B. Contractor shall protect and maintain new at no additional cost to Owner until approval is received from the Engineer for removal of such instrumentation. Instrumentation damaged during construction shall be replaced by the Contractor at no additional cost to Owner. Any existing instrumentation not shown on the Contract Drawings shall be protected and shall not be disturbed.
- C. Instrumentation readings, data collection, analyses, record keeping, and preparation of summary reports shall be performed by the Contractor. The work shall also include overall analysis of monitoring data collected so that if any abnormal movement, excessive ground settlement or heave, or other damage is observed, immediate steps shall be taken by the Contractor to stop the causes of such movements and prevent any further movement. In such instances, the Contractor shall prepare and execute a corrective program within 24 hours of identification of the problem, at no additional cost to the Owner. Remedial measures may require modifications of the Contractor's

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construction procedures. The Contractor shall provide access to work at all times to allow the Engineer to make measurements and conduct separate quality assurance monitoring to confirm the Contractor's measurements. The Engineer may collect, check, and/or analyze the instrumentation monitoring data at any time during construction for quality assurance purposes. Readings shall be provided to the Engineer within 24 hours of performing the readings for use in quality assurance monitoring.

- D. Work related to this Section shall also include development and submission of a detailed monitoring plan containing information called for in this Section.
- E. Contractor shall install instruments on structures, utilities and improvements at risk of impact from excavations within 50 feet of tunnels and shafts and take initial readings for all instruments, and record at least three (3) complete sets of measurements or readings from the instruments a minimum of fourteen (14) calendar days before the start of shaft or tunnel excavation or any dewatering. The initial readings on each instrument shall be taken a minimum of 24 hours apart.
- F. The Contractor shall be responsible for procuring, furnishing, installing, and monitoring instrumentation reading devices for the various monitoring systems.

1.04 SUBMITTALS

- A. Contractor shall submit a Geotechnical Instrumentation Work Plan thirty (30) days prior to installation of instrumentation including the following:
 - 1. Detailed plan of instrument locations.
 - 2. Detailed instrumentation monitoring plan with schedule, technical details, and procedures for installation, protection, monitoring, maintenance, and removal.
 - 3. Instrumentation manufacturer's shop drawings, product descriptions, operating manuals, specifications, installation procedures, calibration timeframe, calibration instructions, and calibration certificates for each type of instrument.
 - 4. Manufacturer's certificate of compliance with specified standards.
 - 5. Design installation details of inclinometers, including grout mix design(s) as required herein.
 - 6. Equipment and procedures to be used for pavement breaking and removal and surface repairs as required.
 - 7. Qualifications of individual(s) responsible for overseeing the monitoring program and surveying.
 - 8. Samples of daily reporting forms and example plots or graphs for each type of instrument.
- B. Within 48 hours of installation, Contractor shall supply drilling and inclinometer logs and detailed descriptions of instrument installation to Engineer. Piezometer logs shall also be submitted if the Contractor elects to install any.
- C. The Contractor shall supply daily reports of the work monitored and provide them to the Engineer. The daily reports, including monitoring data, shall be submitted to the

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Engineer within twenty-four (24) hours after the observations have been made. The Contractor shall immediately report to the Engineer any ground movement observed that approaches threshold values. The report shall include as a minimum:

1. Electronic copies of monitoring data compatible with Microsoft Excel, clearly indicating instrument identification numbers and locations, date and time of all previous and current readings, reference elevations and depths for readings, weather conditions at time of readings, name of Owner and Engineer, project name, project number, contract number, and all other pertinent information or other information as required by the Engineer.
 2. Electronic copies of, at a minimum, cumulative plots of ground movement, deformation, and water levels. The data shall be presented in a graphical format showing vertical installation, the initial observation, previous observations, and the current observation. The report shall clearly identify the data collected during the current monitoring period. Data from each instrument shall be presented on its own graph.
- D. Contingency Plan: At least 30 calendar days prior to the start of construction, the Contractor shall submit a Contingency Plan that defines the remedial measures to be implemented to stabilize the excavation if any geotechnical instrumentation readings exceed the respective threshold values or limiting values for movement stated herein.

The Contingency Plan is not to restrict the Contractor from using the best construction methods available to meet the conditions, but is required to demonstrate a reasonable preparedness to mitigate the effects ground movement exceeding the limiting values. The Contractor shall have all manpower, equipment, materials, and other items identified in the Contingency Plan available at all times while tunnel and shaft excavations are open or any dewatering operations are being performed. As a minimum, the Contingency Plan shall include:

1. Name and qualifications of personnel responsible for implementing the Contingency Plan.
2. Description of conditions considered to require remedial measures in order to protect adjacent structures, utilities, property, roads, and railroad tracks and to stop the observed ground movement observed.
3. List of stand-by manpower and equipment and their purpose for implementation of remedial measures and their availability.
4. List of stand-by materials or other items to be used and their purpose for implementation of remedial measures and their immediate availability.
5. Methods of verification of the successful implementation of remedial measures.

1.05 QUALITY ASSURANCE

- A. The installation, calibration, data collection, and analysis of results from the instrumentation systems shall be performed by qualified individuals with a minimum of three (3) years of previous experience with the devices or systems specified herein.

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An instrumentation specialist shall be assigned by the Contractor for overall responsibility and oversight of the work.

B. Contractor shall meet the following tolerances:

1. Establish the initial elevations of the monitoring points to the nearest one hundredth (0.01) of a foot.
2. Record of subsequent elevations of monitoring points to the nearest one hundredth (0.01) of a foot.
3. Install inclinometer casings to tolerances as required herein.
4. Establish the initial coordinates of inclinometers to the nearest one hundredth (0.01) of a foot.
5. Record the subsequent coordinates of inclinometers to the nearest one hundredth (0.01) of a foot.

C. Contractor shall install and operate the instrument systems in strict conformance with the manufacturer's requirements and as specified herein.

D. Contractor shall provide instrumentation systems at all times during the monitoring program that meet the manufacturer's minimum calibration requirements. Instruments shall be recalibrated in accordance with the manufacturer's recommendations. In case of instrument failure, Contractor shall replace those instruments within 24 hours of detection at no additional cost to the Owner.

1.06 AVAILABILITY OF DATA

- A. All data collection, instrument readings, and monitoring survey data shall be performed by the Contractor. This information shall be furnished to the Engineer per the schedule requirements as defined herein.
- B. Data reports and all other unprocessed data, readings, and observations shall not be disclosed to third parties outside the Contract without the express written permission of the Engineer and the Owner.
- C. In the event of noted abnormal monitoring data or evidence of damage to existing facilities, the Contractor may be directed by the Engineer to increase the frequency of data collection and/or to install and monitor additional instrumentation at no additional cost to the Owner.

1.07 DEFINITIONS

- A. Inclinometers - Inclinometers consist of an inclinometer casing installed and grouted within vertical boreholes in the in-situ soil. A probe lowered within the casing monitors changes in inclination along the casing axis and is used to record the magnitude and depth of horizontal ground displacements in two orthogonal directions aligned with the cardinal directions.
- B. Initial Instrumentation Monitoring - Initial instrumentation monitoring is the initial reading of the installed instruments and shall include determination of actual

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installation locations and elevations for all instrument monitoring points and survey benchmarks.

- C. Limiting Values - Established limits of ground movement which if exceeded require the Contractor to cease construction operations and implement the submitted Contingency Plan until it is shown that mitigation efforts are successful.
- D. Monitoring Points - Monitoring points include surface monitoring points, structure settlement monitoring points, utility monitoring points, and survey benchmarks. All monitoring points shall be monitored by optical survey methods to determine vertical and/or horizontal displacements occurring during construction.
- E. Settlement and Ground Movement Instruments - Settlement and ground movement instruments include inclinometers and various types of monitoring points.
- F. Structure Settlement Monitoring Points - SSMPs are fixed markers placed on structures.
- G. Surface Monitoring Points - SMPs are fixed markers placed on or near the ground surface.
- H. Survey Control - Survey control is defined as a system of precise field measurements of the types and kinds specified herein, utilizing suitable methods and equipment, and utilizing qualified personnel for determination of elevations, coordinates, and distances for performing construction operations and geotechnical instrumentation monitoring. Survey control shall be performed by a professional land surveyor licensed in the State of Texas.
- I. Threshold Values - Established limits of ground movement which if exceeded require the Contractor to implement the submitted Contingency Plan and to initiate mitigating measures.
- J. Utility Monitoring Points - UMPs are fixed markers attached to existing utilities.

PART 2 PRODUCTS

2.01 INCLINOMETER SYSTEM (IC)

- A. All installed inclinometer components shall be from the same manufacturer.
- B. Inclinometer Probes: Overall resolution of +0.0001-foot lateral movement per 2-feet of casing and an accuracy of ± 0.01 -inch per reading and ± 0.3 -inch per 50 readings. Use Slope Indicator Co. Digitilt inclinometer probe (Part No. 50302500); Geokon Inc. Model GK-604D; RocTest Ltd. Model Accutilt; or equal probes. Provide a carrying case for each probe. Use same probe for all inclinometer readings.
- C. Cable: Combination signal and suspension cable. Cable with a steel core, heavy-duty, waterproof jacket and external markings spaced at 1-foot intervals. Cable minimum 100-feet long and furnished with one pulley assembly suitable for mounting on the inclinometer casing. Use Slope Indicator Co. Digitilt Control Cable or equal.

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- D. Portable Data-Logger: LCD display, internal data storage capabilities, and powered by rechargeable internal batteries. Use Slope Indicator Co. Digitilt Datamate Readout (Part No. 50310900); Roctest Ltd. Model Accutilt-SA, or equal.
- E. Casing: Acrylonitrile-butadiene-styrene (ABS) plastic, approximately
- F. 2.75-inches outer diameter, with internal longitudinal grooves. Complete with caps, regular couplings for each separate inclinometer installation. Use GeoKon Model 6500 inclinometer casing or equal. Wrap connections with tape to water-proof.
- G. Casing Sections: Inclinometer casing shall be Model 6500 manufactured by Geokon or similar. No less than 10-foot lengths with no section having more than one degree of twist before installation.
- H. Couplings, locking devices and caps: Sizes and types recommended by the casing manufacturer.
- I. Use cement grout, placed by tremmie method that conforms to the recommendations of the inclinometer manufacturer.
- J. Certify that computer software is compatible with brand and type of measurement device used to collect data for inclinometer data reduction and graphing of inclinometer readings.

2.02 SURFACE MONITORING POINTS (SMP)

- A. Surface monitoring points installed in pavement will be PK nails with an identification tag that are driven or drilled or epoxied into the pavement. P/K nails shall also have an indent in the center of its rounded head to receive a surveyor's plumb bob. The identification tag shall be 1-1/2-inch diameter by 3/32-inch thick with a punched number for identification. The nail/anchor shall be placed through the central hole in the identification tag and driven into a surface on the facility such that the identification tag lies directly between the instrumented surface and the head of the bolt with the identification number facing up, so it can be read. Bonded survey targets are an acceptable alternative, provided that they are capable of delivering the required accuracy of measurement. Each surface monitoring point shall have a tag or marking indicating the identification number, tunnel station, and offset from centerline.
- B. SMPs installed in soil shall be rebar driven in a shallow pre-excavated hole with a surface cover encased in cement. Each soil SMP shall have a tag or marking indicating the identification number, tunnel station, and offset from center- line.

2.03 STRUCTURE SETTLEMENT MONITORING POINTS (SSMP)

- A. SSMPs consist of survey hubs, reflective targets, or markers affixed to structures per the manufacturer's recommendations or as otherwise directed by the Engineer. The Contractor shall install SSMPs on selected existing structures in accordance with the Geotechnical Instrumentation Work Plan..
- B. Reflective targets will be placed used as SSMPs on surfaces of existing structures that must not be disturbed or altered but require monitoring. Use Model RS90 Plastic Angle Reflector Targets or RSZ-10-30x30mm Retro Reflective survey targets with adhesive

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backing, Manufactured by Bernsten or similar, positively affixed by adhesive/epoxy or appropriate fastener. The reflective monitoring points will be on a plastic tab with an adhesive base.

2.04 UTILITY MONITORING POINTS (UMP)

- A. Each utility monitoring point will consist of a 2-inch, Schedule 40 PVC casing installed to the crown of the utility to support the ground to allow for multiple readings of a center rod resting on the utility crown throughout the Work. The rod shall be fitted with a suitable plate or end cap of a shape and consisting of a material that prevents damage to the utility being monitored. The annular space between the rod and PVC casing shall be backfilled with bentonite slurry to prevent soil ingress and binding. Provide a protective cover (road box) as necessary to protect the monitoring point from disturbance that may affect measurements or damage the utility being monitored.

PART 3 EXECUTION

3.01 GENERAL

- A. Contractor shall install instrumentation in accordance with the instrument manufacturer's recommendations, and as described herein, unless otherwise directed by Engineer. The Contractor may install and monitor additional instrumentation as desired by the Contractor, but installation and monitoring of such additional instrumentation shall be performed at no additional cost to the Owner. Locations of additional instrumentation installed by the Contractor shall be acceptable to the Engineer. The Contractor shall also install instrumentation, especially inclinometers in accordance with the requirements of the Texas Commission on Environmental Quality and the Texas Administrative Code.
- B. Exact locations of new instrumentation shall be determined in the field and shall be acceptable to the Engineer prior to installation of such instruments by the Contractor. To the extent possible, instruments shall be installed at locations out of the way of pedestrian or vehicular traffic and to avoid interference or disturbance by construction activities.
- C. Each instrument shall be permanently marked with a unique identification number. The Contractor shall utilize the unique identification numbers.
- D. Contractor shall be responsible for obtaining all utility clearances for all above ground and underground utilities, including private utilities, in the area of the proposed instrumentation locations by contacting the Texas One Call System at 811, or through www.texas811.org before installation of such instruments. The Contractor shall relocate instruments as necessary to satisfy utility clearance requirements. The Contractor shall obtain the Engineer's acceptance of any relocation greater than three (3) feet in any direction prior to installing such instruments.
- E. Contractor shall be responsible for the maintenance of all existing and new geotechnical instrumentation during construction. Instrumentation shall be stored on-site in a weather-proof, heated, and ventilated space where possible. The Contractor

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shall provide access to the Engineer and Owner to all geotechnical instrumentation equipment at all times upon request.

- F. The Contractor shall be responsible for supplying all necessary power for all monitoring equipment.

3.02 INSTALLATION AND MONITORING

A. Inclinometers .

1. A six (6) inch diameter or larger borehole as required by the inclinometer manufacturer shall be drilled for installation of the inclinometer casing components. Drilling equipment must be capable of achieving the minimum depth requirements or as otherwise directed by the Engineer.
2. The top of the casing shall be capped. Contractor shall install casings within two (2) degrees of vertical and demonstrate by means of a torque rod or other acceptable methods that not more than ten (10) degrees of twist or axial rotation exists between the top and the bottom of the casing. The casings shall be installed to within six (6) inches of the depths indicated in the Geotechnical Instrumentation Work Plan. Inclinometers not within these tolerances shall be replaced by the Contractor at no additional cost to the Owner.
3. Assembly and installation of the casing shall be in accordance with the manufacturer's recommendations. The bottom of the casing shall be capped prior to installation. After installation of the casing in the open borehole, the annulus shall be backfilled by tremie grouting the annulus with the specified cement grout. The Contractor shall employ methods to maintain the position of the inclinometer casing against buoyancy and rotation during backfilling. The suggested procedure is to align the casing grooves, fill the inclinometer casing with enough water to prevent buoyancy, grout the lower ten (10) feet of casing with the specified cement grout, allow the grout to set for three (3) days, and then complete grouting the remainder of the annulus with a grout mix suitable for the soil above the rock. Restraining the casing at the top is not permissible.
4. Access security shall be provided by constructing an eight (8) inch diameter, above grade protective enclosure. The protective enclosure shall be painted with high visibility paint and as appropriate for the material of the protective enclosure.
5. The Contractor shall maintain inclinometer casings in operating condition from the time of installation until completion of construction requiring inclinometer readings. The Contractor shall establish and maintain convenient access to all instruments throughout construction. Any instrument damaged during construction shall be replaced by the Contractor at no additional cost to the Owner.
6. Monitoring of inclinometers shall be the responsibility of the Contractor and shall be performed under direction of a Professional Engineer licensed in the State of Texas and by qualified Contractor personnel.

- B. Surface Monitoring Points - The contractor shall install temporary survey benchmarks as required to perform monitoring of the SMPs. SMP locations and associated survey benchmarks shall be identified by high visibility paint or with a colored disc survey

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marker. Monitoring of SMPs shall be the responsibility of the Contractor and shall be performed under direction of a Professional Land Surveyor licensed in the State of Texas and by qualified Contractor personnel.

- C. Structure Settlement Monitoring Points - The SSMPs shall be affixed to the structure as indicated by the manufacturer's recommendations to allow vertical positioning of an optical survey level rod. SSMPs shall be installed so as not to permanently damage the surface finish of the structure, such as in the mortar course of brick or concrete block structures. The Contractor shall install temporary survey benchmarks as required to perform the monitoring of the SSMPs. SSMP locations and associated survey benchmarks shall be identified by a high visibility survey marker. Monitoring of SSMPs shall be the responsibility of the Contractor and shall be performed under direction of a Professional Land Surveyor licensed in the State of Texas and by qualified Contractor personnel.
- D. Utility Monitoring Points - Contractor shall obtain written permission to install UMPs from the owner of the utility prior to installation. The Contractor shall install temporary survey benchmarks as required to perform the monitoring of the UMPs. UMP locations and associated survey benchmarks shall be identified by high visibility paint or with a colored disc survey marker. Monitoring of UMPs shall be the responsibility of the Contractor and shall be performed under direction of a Professional Land Surveyor licensed in the State of Texas and by qualified Contractor personnel.

3.03 PROTECTION AND MAINTENANCE

- A. All protective instrument access covers and enclosures shall be lockable and keyed alike. The Contractor shall provide two (2) keys to the Engineer after installation of instruments.
- B. Contractor shall protect and maintain all instruments and shall keep the protective covers locked. Maintenance may include, but not be limited to draining or flushing the terminal boxes and inclinometer casings.
- C. Contractor shall repair or replace damaged or missing instrument components or entire instruments as required within 24 hours of detection of such damaged or missing components or entire instruments.
- D. Damaged or missing instrument components or instruments shall be repaired or replaced by the Contractor at no additional cost to the Owner unless otherwise directed by the Engineer.

3.04 MONITORING SCHEDULE AND LIMITS

- A. The Contractor shall monitor the inclinometers, SMPs, SSMPs, and UMPs, and shall report to the Engineer as described below:
 - 1. Initial Monitoring: Initial instrumentation monitoring for all instruments shown on Geotechnical Instrumentation Work Plan or as otherwise listed herein shall be performed and recorded between 48 and 96 hours after installation of each instrument. Installation of instruments shall be completed so that at least three (3) complete sets of measurements or readings can be collected from the instruments

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at least two (2) weeks prior to the start of any shaft or tunnel excavation and any dewatering. The initial measurements or readings on each instrument shall be taken a minimum of 24 hours apart. Initial measurements or readings shall be taken until a minimum of three (3) separate elevation determinations agree to within two hundredths (0.02) of a foot are made for each location.

2. Shaft Excavation: Inclinometers, SMPs, SSMPs, and UMPs within 100 feet of the shaft excavation shall be monitored a minimum of once daily during excavation activities and during any shaft related construction, and a minimum of once weekly thereafter when work on the shaft is not active until the shaft concrete lining is complete.
 3. Tunnel Excavation: Inclinometers, SMPs, SSMPs, and UMPs shall be monitored a minimum of once daily when the instrument location is within 200 feet of the tunnel heading, and a minimum of once weekly thereafter until the entire tunnel has been completed and lined, including grouting.
 4. At all other times, including after completion of shaft and tunnel construction, inclinometers, SMPs, SSMPs, and UMPs, shall be monitored a minimum of once per month until the warranty period expires or the Engineer directs the removal of such instruments, whichever occurs first.
 5. Inclinometers, SMPs, SSMPs, and UMPs shall be monitored at more frequent intervals when directed by the Engineer, at no additional cost to the Owner.
 6. Readings from all instruments and monitoring points shall be submitted to the Engineer within 24 hours of collecting data as required herein.
 7. The Engineer shall occasionally conduct quality assurance measurements of instruments. Measurements by the Engineer shall take precedence over the Contractor's measurements. However, the Contractor shall rely on the Contractor's own instrument readings for construction purposes.
 8. All monitoring points shall be referenced to fixed points which are a minimum of two hundred (200) feet away from all excavations to assure that the monitoring points provide accurate measurements.
 9. All elevation measurements shall be recorded to the nearest one hundredth (0.01) of a foot. All elevations shall be based on the survey benchmarks and vertical control indicated on the Contract Drawings.
- B. Access - Contractor shall provide access to the Owner and Engineer to observe and for measuring the instruments at all times.
- C. Instrument Threshold Values and Limiting Values. The Contractor shall limit the effects of construction to those specified in the following table.

<u>Instrument Type</u>	<u>Threshold Value</u>	<u>Limiting Value</u>
Inclinometers (I)	0.50 inches	1.00 inch
SMPs	0.25 inches	0.50 inches
SSMPs	0.25 inches	0.50 inches
UMPs	0.25 inches	0.50 inches

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1. Ground movement due to tunneling or shaft excavation operations shall be limited as required herein. The Contractor shall utilize whatever means as necessary to limit ground movement, including, but not limited to, underpinning, compaction grouting, and consolidation grouting. Ground movement shall be measured at locations shown on the Contract Drawings and as required herein.
2. If a Threshold Value is reached, the Contractor shall meet with the Engineer to discuss the need for response action(s) within twenty-four (24) hours of reaching a threshold value.
 - a. If directed by the Engineer that response action(s) are needed, the Contractor shall submit a detailed specific plan of action to the Engineer within twenty - four (24) hours of Engineer's request, based on the Contingency Plan as required herein.
 - b. If directed by the Engineer, the Contractor shall implement such response action(s) within twenty-four (24) hours of receiving direction by the Engineer.
 - c. Contractor shall install and monitor additional instruments if directed by the Engineer at no additional cost to the Owner.
 - d. Contractor shall increase the frequency of readings of instruments if directed to do so by the Engineer or as deemed necessary by the Contractor at no additional cost to the Owner.
3. If a Limiting Value is reached or exceeded, the Contractor shall immediately take the following actions:
 - a. Cease all related construction and dewatering operations.
 - b. Develop a listing of corrective actions to be taken and submit to the Engineer for review, based on the Contingency Plan as required herein.
 - c. Implement corrective actions.
 - d. Resume related operations.
 - e. Verify success of corrective actions.
 - f. If corrective actions are not successful, cease all related operations and repeat process listed above.
4. If ground movement unacceptably damages pavement, structures, or other facilities, the repair or replacement of such pavement, structure, or other facility shall be as required and directed by the Engineer and the Owner of such pavement, structure, or other facility. The repair or replacement of pavement, structures, or other facilities shall be performed by the Contractor and shall be performed at no additional cost to the Owner.
5. If ground movement unacceptably degrades utility function, the repair or replacement of such utility shall be as required as directed by the Engineer and the utility Owner. The utility repair or replacement shall be performed by the Contractor and shall be performed at no additional cost to the Owner.

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3.05 REMOVAL OF INSTRUMENTS

- A. Prior to final acceptance of the Work and except as otherwise indicated or directed by the Engineer, the Contractor shall remove and dispose of at least the top three (3) feet of instrument or casing for all instrumentation. Any existing instrumentation that is not specifically indicated on the Contract Drawings shall not be disturbed. Existing and Contractor installed piezometers and inclinometers shall be abandoned in accordance with the rules and regulations of the Texas Commission on Environmental Quality and applicable portions of the Texas Administrative Code. The Contractor shall complete and submit Monitoring Well Plugging Registration Records with applicable fees to the Texas Commission on Environmental Quality as required for the abandonment of such piezometers and inclinometers. Any surface enclosures, including protective bollards, shall be removed and the area surrounding removed instruments shall be restored to undisturbed conditions by the Contractor. Contractor shall also repair or patch any pavement that is disturbed or damaged by the Work required herein.
1. Inclinometer Locations. Restoration for each inclinometer location shall consist of backfilling, grading, and pavement repair and/or seeding as required to restore each location to the surrounding ground surface conditions as required by the Engineer or property owner. Pavement repair shall be performed in accordance with the Contract Documents.
 2. Restoration of SMP and SSMP Locations. SMPs installed in unpaved areas and SMPs or SSMPs affixed to structures on private property shall be removed in their entirety and the surrounding surface shall be restored. SMPs installed in paved areas may remain, unless otherwise directed by the Engineer. Restoration for each SMP in an unpaved area shall consist of backfilling, grading, and seeding as required to restore each location to its original condition as required by the Engineer or property owner. Restoration for each SMP or SSMP affixed to a structure shall consist of cleaning the surface of the structure of any adhesive residue, repair or patching of any holes drilled into the surface of the structure, and/or otherwise required by the Engineer or property owner to restore each location to its original condition.
 3. Restoration of UMP Locations. UMPs installed shall be removed in their entirety and the surrounding ground surface and/or pavement shall be restored or as otherwise required by the Engineer or utility owner. Pavement repair shall be performed in accordance with the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Geotechnical instrumentation will not be measured for payment.

4.02 PAYMENT

Special Specification

- A. No direct payment shall be made for incidental costs associated with Geotechnical instrumentation. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

END OF SECTION

Special Specification

SECTION 02439

PRECAST REINFORCED CONCRETE VALVE VAULT

PART 1 GENERAL

1.01 WORK INCLUDED

Furnish all labor, materials, equipment, incidentals and transportation necessary for placing precast reinforced concrete valve vault.

1.02 QUALITY ASSURANCE

A. DESIGN CRITERIA

Precast reinforced concrete valve vault shall conform:

1. To the requirements of ASTM's C857 and C858 for underground precast concrete utility structures
2. Be designed for the specific site conditions and construction document requirements.
3. Be designed to resist buoyant forces due to saturated soil.

B. TEST REQUIREMENTS

For testing of precast (machine-made) valve vaults, a minimum of four (4) test cylinders for design compressive strength shall be made for each day's production run of each size and class of valve vault section. Strength tests for each production run will be based on the average strength of two (2) cylinders which may be tested any time after completion of the specified curing period. When design strength is attained on the initial test, further tests on that run will not be required. Should the initial test fail to meet the design strength, subsequent tests shall be made at twenty-eight (28) days unless additional test cylinders were made during production of that run. Failure to attain design compression strength by the twenty-eight (28-day) test will result in rejection of the run represented by the test. Equipment required for testing for precast (machine-made) valve vaults shall be furnished by the fabricator. Cylinders for compressive strength tests shall be made in accordance with ASTM C31.

C. PERMISSIBLE VARIATIONS

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Tolerances for precast sections shall conform to ASTM C858.

Deviations from the above tolerances will be acceptable if the sections can be fitted at the plant or job site and it is determined that an acceptable joint can be made. For this condition an acceptable joint is when two (2) sections are fitted together on a flat surface, in proper alignment and in the position they will be installed, the longitudinal opening at any point shall not exceed 1". Sections fitted together at the plant and accepted in this manner shall be match-marked for installation.

D. INSPECTION

The quality of materials, the process of manufacture, and the finished valve vault shall be subject to inspection and approval by the OWNER or an authorized representative at the manufacturing plant. In addition, the valve vault shall be subject to further inspection by the OWNER at the project site prior to and during installation.

E. CAUSE FOR REJECTION

The valve vault shall be subject to rejection on account of failure to conform to any of the specification requirements. Individual sections of valve vault may be rejected because of the following:

1. Fractures or cracks in the vault.
2. Defects that indicate imperfect proportioning, mixing and molding.
3. Surface defects indicating honeycombed or open texture.
4. Damaged ends, where such damage would prevent making a structurally sound and water tight joint.

1.03 SUBMITTALS

Submittals shall include:

- A. Manufacturer's product data sheets
- B. Concrete mix and test results

1.04 STANDARDS

Except as modified herein, the applicable provisions of the following standards shall apply as if written here in their entirety:

- A. American Society of Testing and Materials (ASTM) standards:

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ASTM C857	Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
ASTM C858	Standard Specification for Underground Precast Concrete Utility Structures
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
- B. American Association of State Highway and Transportation Officials (AASHTO) standards:
- | | |
|-------------|---|
| AASHTO M198 | Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants |
|-------------|---|
- C. Texas Department of Transportation (TxDOT), "Texas Highway Department Standard Specifications for Road and Bridge Construction", latest edition.

1.05 DELIVERY AND STORAGE

- A. Coordinate delivery with installation where possible to avoid unnecessary handling and equipment movement. When stockpiling is required, storage shall be made as close as possible to the point of installation.
- B. Store precast sections on level blocking in a manner acceptable to the OWNER. No load shall be placed upon them until design strength is reached and curing completed. Shipment of sections may be made when the design strength and curing requirements have been met.
- C. Store flexible gasket materials not on the box section, and joint lubricating compounds in a cool dry place. Gaskets and preformed plastic materials for pipe joint construction shall be kept clean, away from oil, grease, excessive heat and out of the direct rays of the sun.

PART 2 PRODUCTS

2.01 MIXES

CONCRETE: Mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be assured. Transit mixed concrete will not be acceptable. Concrete shall be 5,000 psi minimum.

2.02 MANUFACTURED PRODUCTS

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- A. Valve Vault: Materials, manufacture and curing of precast reinforced concrete valve vault shall conform to ASTM C858. Vault shall be a precast concrete structure in accordance with the plans and specifications, and shall be manufactured by Oldcastle Precast, or approved equal.
- B. COLD APPLIED PREFORMED GASKETS:
1. Cold applied preformed gaskets shall be suitable for sealing joints of tongue and groove concrete box sections. The gasket sealing the joint shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes or obnoxious odors. The gasket joint sealer shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength, and shall be supplied in extruded rope-form of suitable cross-section. The size of the gasket joint sealer shall be in accordance with the manufacturer's recommendations and sufficient to obtain the squeeze-out as described in Paragraph 3.02, Installation.
 2. Gasket joint sealer shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that half may be removed longitudinally without disturbing the other half to facilitate application as noted below.
 3. The chemical composition of the gasket joint sealing compound shall conform to the requirements of AASHTO M198-08 1, Type B, Flexible Plastic Gasket (Bitumen).
- C. WORKMANSHIP AND FINISH: Valve Vault shall be substantially free from fractures, large or deep cracks and surface roughness. The ends of the valve vault shall be normal to the walls and centerline of the valve vault within the limits of Permissible Variations specified above. The vault exterior shall be coated with a bituminous coating for areas to be installed below grade.
- D. MARKINGS: The following information shall be clearly marked on each section. Markings shall be indented on the valve vault or painted thereon with waterproof paint.
1. The load rating and ASTM Designation No. of the valve vault
 2. The date of manufacture
 3. The name or trade name of the manufacturer

PART 3 EXECUTION

3.01 INSTALLATION

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A. LAYING

Valve vault sections shall be installed such that the bottom section(s) shall be full sections. Partial sections, if necessary, shall be utilized for the top most section only. Valve vault cover shall be separate from the vault walls.

B. JOINTING

1. Joints using cold applied preformed plastic gaskets shall be made as follows:
 - a. A suitable primer of the type recommended by the manufacturer of the gasket joint sealer shall be brush-applied to the tongue and groove joint surfaces and the end surfaces and allowed to dry and harden. No primer shall be applied over mud, sand, dirt or sharp cement protrusions. Clean and dry the surface to the primed when primer is applied.
 - b. Before laying the valve vault in the trench, attach the plastic gasket sealer around the tapered tongue or tapered groove near the shoulder or hub of each joint. Remove the paper wrapper from one side only of the two-piece wrapper on the gasket and press firmly to the clean, dry valve vault joint surface. Do not remove the outside wrapper until immediately before pushing the valve vault into its final position.
 - c. When the tongue is correctly aligned with the flare of the groove, remove the outside wrapper on the gasket and pull or push home the valve vault with sufficient force and power (Back Hoe shovel, chain hoist, ratchet hoist or winch) to cause the evidence of squeeze-out of the gasket material on the side of outside around the complete valve vault joint perimeter.
 - d. When the atmospheric temperature is below 60°F, plastic joint seal gaskets shall either be stored in an area warmed to above 70°F, or artificially warmed to this temperature in a manner satisfactory to the OWNER. Apply gaskets to valve vault joints immediately prior to placing valve vault in trench, followed by connection to previously laid box section.

3.02 BACKFILL

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Take special precautions in placing and compacting the backfill to avoid any movement of the valve vault or damage to the joints.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Precast reinforced concrete vaults will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with precast reinforced concrete vaults. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

-END OF SECTION-

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SECTION 02571

STEEL PIPE, MORTAR-LINED

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide all steel pipe, mortar-lined, polyurethane-coated with welded joints as designed, manufactured, and installed per ANSI/AWWA C200, C205, C206, C207, C208, C214, C222, C602, C604 (Installation of Steel Pipe), and AWWA Manual M11 as modified by the Contract Documents, the manufacturer's recommendations, and these specifications. Specials shall be provided as specified in Section 02572 – Steel Pipe Fabricated Specials.
- B. A single PIPE MANUFACTURER shall be responsible for furnishing all the mortar-lined and polyurethane coated steel pipe and smaller diameter appurtenant steel pipe. Approved manufacturers include Thompson Pipe Group, Northwest Pipe, and American Spiral Weld. No other suppliers will be allowed. Manufacture of steel pipe and specials shall be under the direction and management of one steel PIPE MANUFACTURER only. This does not prevent a separate supplier from manufacturing specials or fittings; however, all Work shall be directed by the manufacturer of the water piping. No ocean going shipment of pipe will be allowed. Shipment by rail will be allowed only if manufacturer can satisfactorily demonstrate via a submittal that shipped items will not be damaged during rail shipment and transport to the job site. The responsibility of the pipe manufacturer shall include, at a minimum:
 - 1. Certify all pipe, fittings and specials are being manufactured in full accordance with the Contract Documents.
 - 2. Manage the design and fabrication of the pipe and specials.
 - 3. Prepare and submit all submittal information and shop drawings.
 - 4. Make any corrections that may be required to the submittal information and shop drawings.
- C. As part of the CONTRACTOR'S Bid Documents, submit the qualifications for the pipe manufacturer. Verification of qualifications will be conducted as part of the Bid Document review process for steel pipe and the CONTRACTOR'S

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Preliminary Critical Path Method (CPM) schedule. Qualifications shall include the following:

1. Years of Experience. Submit written verification that the pipe manufacturer has been manufacturing ANSI/AWWA C200 pipe with cement mortar-lining and polyurethane coating and similar design pressure as this Project for a minimum of 5 years.
2. Project Experience. Submit written verification that the pipe manufacturer has produced a minimum of 45,000 linear feet of 48-inch or larger pipe, with wall thickness of ¼-inch or greater. Submit reference names, telephone numbers, and descriptions of projects for pipe conforming to ANSI/AWWA C200 and this requirement. Descriptions for applicable projects shall include, but not be limited to, length, diameter, wall thickness, lining and coating materials, steel metallurgy, location of facility where pipe was manufactured and names and titles of key plant personnel involved with the Work.
3. Certifications. Submit written verification that the pipe manufacturer is certified by either the Steel Plate Fabricator's Association (SPFA) Quality Assurance Program or International Organization for Standardization (ISO) 9001 or Lloyd's Register Quality Assurance Limited (LRQA).
4. Personnel Qualifications. Submit names, titles and qualifications of current plant personnel to be used to manufacture/fabricate pipe for the Work and the experienced pipe manufacturer's representative proposed for onsite observation. Pipe manufacturer's representative shall be as specified in this Section. Experience shall be applicable to the fabrication plant facilities and personnel and is not required to be specifically related to the company or corporation that currently owns the fabrication facility or employs the personnel.
5. Production and Delivery Capability. Submit written verification from the pipe manufacturer/fabricator demonstrating compliance with the production and delivery schedule of the pipe as indicated in the CONTRACTOR'S preliminary CPM schedule.
6. SAWS, in evaluating the information provided by the CONTRACTOR regarding their pipe manufacturer, is doing so only for the purposes of determining qualifications of the CONTRACTOR in determining the best value for SAWS and is not in any way relieving or eliminating the CONTRACTOR of its duty under the Contract Documents for its subcontractors, supplier performance or delivery of work, goods or services under the Contract.

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1.02 RELATED WORK

- A. Section 02400 Jacking and Boring
- B. Section 02572 Steel Pipe Fabricated Specials
- C. Section 09910 Pipeline Coatings and Linings
- D. Section 09970 Painting and Protective Coatings
- E. Section 13110 Cathodic Protection System
- F. Section SS 804C Excavating, Trenching and Backfill
- G. Section SS 841A Hydrostatic Testing Operations

1.03 SUBMITTALS

- A. Certified Affidavits of Compliance. CONTRACTOR shall submit all certified affidavits of compliance for each portion of Work for which CONTRACTOR is requesting payment before acceptance of such payment will be made. Performing and paying for sampling and testing as necessary for the certified affidavits of compliance are the CONTRACTOR'S responsibility. The following certified affidavits of compliance are required for all pipe and other products or materials furnished under this Section of the Contract Documents, as specified in ANSI/AWWA C200:
 - 1. Mill Certificates. Material lists and steel reinforcement schedules which describe all materials to be utilized. Metallurgical test reports for steel proposed for use on the Project. Chemical and physical test reports from each heat of steel that indicate the steel conforms to the Contract Documents. Records shall indicate heat of steel for each pipe joint listed in the paragraph Line Layout Information. Within thirty (30) days of manufacture, the CONTRACTOR shall submit the pipe manufacturer's example of how the heat of steel will be tracked to each installed section of pipe and fitting.
 - 2. List cross-referencing pipe mark numbers with pipe sequence numbers, heat numbers and can numbers.
 - 3. Hydrostatic test reports.
 - 4. Results of production weld tests.
 - 5. Sand, cement, and mortar tests.

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6. A Certified Test Report from the polyurethane coating manufacturer indicating that the coatings were applied in accordance with the manufacturer's requirements and in accordance with this Section and Section 09910, Pipeline Coatings and Linings on all pipe, fittings and joints made in the factory and in the field. Full time factory quality control tests for polyurethane coating are required.
 7. All materials in contact with treated or potable water are ANSI/NSF 61 approved.
 8. Coating applicator shall submit a typical QA/QC inspection form during the submittal process.
 9. The coating applicator shall submit daily inspection reports within one week of the inspection date to the OWNER/CM.
 10. All welds were performed in conformance with these Contract Documents.
 11. Provide certification stating that pipe lining and coating materials instructions and requirements of the lining and coating materials manufacturer will be followed and that the company is acceptable to the pipe manufacturer,
- B. Shop Drawings. The CONTRACTOR shall submit Shop Drawings of pipe in accordance with the requirements of ANSI/AWWA C200 and the following supplemental requirements:
1. Certified dimensional drawings of all pipe, fittings and appurtenances.
 2. Production schedule for manufacturing/fabricating pipe for the Work as part of CONTRACTOR'S CPM schedule. Steel pipe production schedule shall be included in all versions of the CONTRACTOR'S CPM schedule beginning with the first schedule submittal.
 3. Joint and pipe wall construction details which indicate the type and thickness of cylinder; the position, type, all size and area of wire or other reinforcement; coating and lining holdbacks; manufacturing tolerances; maximum angular joint deflection limitations; and all other pertinent information required for the manufacture and installation of the product. Joint details and design calculations shall be submitted for all welded joint types, including beveled ends for alignment conformance and deep butt strap joints required for control of temperature stresses as applicable. The pipe manufacturer shall submit performance data indicating that the

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proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

4. Pipe design criteria including a complete stress analysis of each section of pipe wall, girth joints, restrained joints, lap joints, specials, all sufficient to ascertain conformance of pipe and fittings with the Contract Documents.
5. Closure sections and cutoffs for field length adjustment. Test bulkheads, including details for removal of test bulkheads and repair of lining. Temporary bulkheads shall be watertight.
6. Ground Profile and Utility Locations.
 - a. Prior to preparation of line layouts, CONTRACTOR shall verify the existing ground profile and the location and depth of all underground utilities using centerline stakes set by the CONTRACTOR at no more than 100 feet intervals. CONTRACTOR shall carefully locate and excavate utility, survey, document and submit this information to the OWNER.
 - b. Ground profile and utility locate information shall be provided to OWNER through the submittal process. Any Drawings that are modified by OWNER due to adjustments in pipeline profile will be reissued to the CONTRACTOR.
7. Pipe Laying Schedule Information.
 - a. Pipe laying schedule and marking diagrams compatible with the requirements of AWWA Manual M11 which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include the station and centerline or invert elevation to which the end of each pipe will be laid; all elements of curves and bends, both in horizontal and vertical alignment; and the limits within each reach of restrained and/or welded joints or of concrete encasement. The location of all mitered pipe sections, beveled ends for alignment conformance, and deep butt strap joints for temperature stress control shall be clearly indicated on the diagrams.

The pipe laying schedule shall have a sequence of laying and an explanation of all abbreviations used in the schedule. For long, straight pipe runs, the pipe laying schedule shall list the pipeline station and either the pipe centerline or invert elevation coordinated with the Drawings at least every 100 feet.

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- b. Drawings showing the location and details of bulkheads for hydrostatic testing of the pipeline and details for removal of test bulkheads and repair of the lining.
 - c. Details and locations of closures for length adjustment, temporary access manways, vents and weld lead pass holes as indicated and as required for construction convenience.
 - d. The method that the CONTRACTOR proposes to use for measuring angular deflection of pipe joints.
8. Welding Information. Submit the following prior to performing any Work:
- a. Full and complete information regarding location, type, size and extent of all welds with reference called out for Welding Procedure Specifications (WPS) numbers shall be shown. The Shop Drawings shall distinguish between shop and field welds. Shop Drawings shall indicate by welding symbols or sketches the details of the welded joints and the preparation of parent metal required to make them.
 - b. Written welding procedures for shop and field welds including Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR). All WPS used to fabricate and install pipe shall be qualified under the provisions of ANSI/AWS D1.1 - Structural Welding Code - Steel or the ASME Boiler and Pressure Vessel Code (BPVC) for shop welds and ANSI/AWS D1.1 for field welds. Written WPS shall be required for all welds, both shop and field, regardless of whether they are prequalified or qualified by testing. WPS qualified per the ASME BPVC shall include Supplementary Essential Variables for notch-tough welding. All provisions of ANSI/AWS D1.1 pertaining to notch-tough welding shall apply.

Each fabricator or erector is responsible for the development of welding procedures. At a minimum, the welding procedures shall consist of the following:

- i. Electrode Specification (ANSI/AWS A5.0, A5.20, etc.)
- ii. Electrode Classification (E7018, E71T-1, etc.)
- iii. Electrode Diameter (1/8 in., 5/32 in., etc.)

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- iv. Electrical Characteristics (AC, DC+, DC-)
- v. Minimum Pre-heat and Interpass Temperature
- vi. Welding Current (amperage) / Wire Feed Speed
- vii. Arc Voltage
- viii. Travel Speed
- ix. Position of Welding
- x. Number and Thickness of Weld Passes
- xi. Post Weld Heat Treatment
- xii. Shielding Gas Type Flow Rate
- xiii. Joint Design Details
- xiv. Length of Leads (Maximum length, and length used to perform test)
- c. Written nondestructive testing (NDT) procedure specifications and NDT personnel qualifications.
- d. Current welder performance qualifications (WPQ) shall be submitted for each welder prior to performing any Work either in the shop or field. Welder's certification shall be in the same Welding Procedure Specification that has been submitted. Qualification testing shall be in accordance with ASME Section IX or AWS B2.1 and as defined in Section 4 of ANSI/AWWA C206 or ANSI/AWWA C200, as applicable.
- e. Credentials of the CONTRACTOR'S certified welding inspectors (CWI) and quality control specialists for review prior to starting any welding in the shop or field. The credentials shall include, but not be limited to, American Welding Society QC-1 Certification. Other NDT quality control personnel shall be certified as required by ANSI/AWS D1.1.
- f. Certified Test Reports for NDT data for each shop-welded and field-welded joint. This data shall include all testing on each weld joint, including re-examination of repaired welds, using visual, radiographic, magnetic particle, dye penetrant examination,

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ultrasonic or air test examination methods specified. Test data shall be reviewed and signed by the welding inspector(s).

- g. Certified Test Reports for daily welder logs for field and shop welding. Logs shall list all welders to be used for the Work, the welding process, position, welder stamp number, certification date, certification status for each welder, test documentation, and Welder Procedure Specification.
 - h. Welding map showing the sequence of welds for all field welds.
 - i. Written weld repair procedure for each type of shop and field weld proposed for use on the Project.
 - j. Written rod control procedure for shop and field operations demonstrating how the CONTRACTOR intends to maintain rods in good condition throughout the Work. The rod control procedure shall also demonstrate how the CONTRACTOR intends to ensure that the proper rods are used for each weld.
 - k. Shop drawings and welding information together as a complete package. Welding Procedure shall be accepted by the OWNER before welding of joints begins.
9. Control of Temperature Stresses.
- a. Proposed sequencing of events to control temperature stresses in the pipe wall during installation prior to starting of any field welding.
 - b. Proposed sequencing of events or special techniques to minimize distortion of the steel as may result from shop welding procedures.
 - c. Plan for monitoring pipeline temperatures.
 - d. Plan for minimizing wrinkles in coating due to pipe temperature changes.
10. Detail drawings indicating the type, number and other pertinent details of the slings, stulling, and other methods proposed for pipe support and handling during manufacturing, transport, and installation. Documentation confirming that the handling and support system has been designed and sealed by a registered professional engineer, licensed in the State of Texas. The recommended methods of handling and placement of the pipe shall be submitted to the OWNER as a record copy prior to

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transporting of any pipe to the Site. All pipe handling equipment and methods shall be acceptable to the OWNER.

11. For record copy, detailed drawings indicating loading and shipping procedures that are designed to minimize damage to coating.
12. Pipe manufacturer's Written Quality Assurance/Control Program.
13. Sample of pipeline marking tape.
14. Submit detail for watertight plugs per this specification, Section 2.02 and 3.01K.2. Watertight plugs shall be provided to seal the pipe ends when pipe laying has stopped.

C. CONTRACTOR shall submit affidavits of compliance, shop drawings and manufacturer information for pipe coating system, as described in Section 09910 – Pipeline Coatings and Linings.

1.04 QUALITY CONTROL AND ASSURANCE

- A. Inspection. All pipe, linings, coatings, welds and related work shall be subject to inspection at the place of manufacture and/or the place the Work is performed in accordance with the provisions of ANSI/AWWA C200 as supplemented by the requirements herein. The CONTRACTOR shall notify the OWNER in writing not less than 14 calendar days prior to the start of any phase of the pipe manufacturing, welding, lining, coating, testing or field operations. The CONTRACTOR shall provide manufacturers' site visits in accordance with this section. A pre-manufacturing inspection by the OWNER is mandatory. The pipe manufacturer will be required to present and demonstrate compliance with all manufacturer specifications required in this project. Personnel at the plant involved in this Project shall be in attendance. All aspects of pipe manufacture will be reviewed: welding, cement mortar lining, coating, testing, handling, and loading and shipping.
 1. Certified Welding Inspector. The CONTRACTOR and PIPE MANUFACTURER shall provide a certified welding inspector(s) (CWI) for all shop and field welding as specified in ANSI/AWWA C200 and C206. The CWI shall visually inspect 100 percent of all welds including each pass, verify proper procedures are being followed using qualified welders, supervise CONTRACTOR'S NDT and witness OWNER'S NDT. The welding inspector(s) shall submit written certification that all welds were performed in conformance with these Contract Documents. All shop weld tests shall be reviewed and signed by the inspector(s).

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2. All pipe and fittings will be inspected by OWNER prior to unloading and upon delivery to the site. Any pipe not fully meeting these Contract Documents will not be paid for as material on Site until it is repaired to within these Contract Documents.
3. MANUFACTURERS' SITE VISITS
 - a. At the expense of the CONTRACTOR, the OWNER and/or OWNER'S REPRESENTATIVES will visit the pipe fabrication and coating facilities during the fabrication and coating of the pipe. The Contractor shall notify the Owner in writing not less than 14 days prior to the start of any phase of the pipe fabrication or coating. The total number of days required for each site visit shall be two (2) days. The CONTRACTOR shall include in the total cost of their bid the cost for transportation, lodging and per diem rates for meals for three (3) people designated by the OWNER.

B. Onsite Observation.

1. Pipe Manufacturer. The pipe manufacturer shall provide the services of an experienced, competent, and authorized field service representative who is acceptable to the OWNER to be onsite for the initial installation of pipe and fittings. The field service representative minimum experience shall include 5 years of practical knowledge and experience installing similar-sized steel pipe with the same type of joints, linings, and coatings as the pipe to be furnished under this contract. The resume of the proposed field service representative which meets the specified minimum required experience qualifications shall be submitted for review.

For budgeting purposes, assume up to 80 hours on Site will be required for the pre-installation and initial installation of pipe and fittings. Additional periodic Site visits will be at the request and discretion of the OWNER for a minimum of one periodic Site visit and a maximum of six periodic Site visits. Assume each additional Site visit will require 8 hours on Site. The field service representative duties shall include, but not be limited to, the following:

- a. Observe the installation and welding of the pipe and fittings.
- b. Report any concerns to the OWNER. OWNER may have CONTRACTOR expose buried joints in order to verify that the coating has not been damaged due to the weld.
- c. Answer questions and provide assistance to the OWNER and the CONTRACTOR.

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- d. Submit copies of all field reports and test results in accordance with Paragraph 1.03 Submittals.
2. Polyurethane Coating Manufacturer. The pipe manufacturer shall provide services of the coating manufacturer's representative and a representative of the heat shrink joint manufacturer for the initial installation to advise CONTRACTOR and OWNER regarding installation, including but not limited to, handling and storage, cleaning and inspecting, coating repairs, field applied coating, heat shrink installation procedures and general construction methods and how they may affect the pipe coating. The pipe manufacturer's representative(s) shall be required to return if, in the opinion of the OWNER, the coating or the CONTRACTOR'S construction methods do not comply with Contract Documents. Cost for the pipe manufacturer's representative(s) to return to the Site shall be at no additional cost to the OWNER. For budgeting purposes, assume up to 80 hours on Site will be required for the initial installation. Additional periodic Site visits will be at the request and discretion of the OWNER for a minimum of one periodic Site visit and a maximum of six periodic Site visits. Assume each additional Site visit will require 8 hours on Site.
- C. Welder Qualifications. All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the Welding Procedure Specification submitted and materials to be used. Welders shall be qualified by the CONTRACTOR under the provisions of ANSI/AWS D1.1 or ASME BPVC for shop welds and ANSI/AWS D1.1 for field welds. All welders shall have been certified within the last six months or shall provide a welding continuity log.
- D. Shop Tests. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of ANSI/AWWA C200, as applicable. The CONTRACTOR shall be responsible for performing and paying for said material tests. The OWNER shall have the right to witness all testing conducted by the CONTRACTOR; provided that the CONTRACTOR'S schedule is not delayed for the convenience of the OWNER. In addition to those tests specifically required, the OWNER may request additional samples of any material including mixed concrete and lining and coating samples for testing by the OWNER. The additional samples shall be furnished as part of the Work.
 1. Weld Tests. Shop Nondestructive Testing (NDT) shall be performed for various weld categories in accordance with the requirements of ANSI/AWWA C200 and as Specified. Testing shall include submitting written documentation of procedures per Section V ASME BPVC, and acceptable criteria shall be in accordance with Section VIII of the ASME BPVC.

Special Specification

- a. Fillet Welds. Examine 100 percent of fillet welds using the magnetic particle inspection method.
- b. In all hand welding, the metal shall be deposited in successive layers. For hand welds, no less than 2 passes and not more than 1/8-inch thickness of metal shall be deposited in each pass. Each pass except the final one, whether in butt or fillet welds, shall be thoroughly bobbed or peened to relieve shrinkage stresses and to remove dirt, slag, or flux before the succeeding bead is applied. Each pass shall be thoroughly fused into the plates at each side of the welding groove or fillet and shall not be permitted to pile up in the center of the weld. Undercutting along the side shall not be permitted.

Welds shall be free from pin holes, non-metallic inclusions, air pockets, undercutting and/or any other defects.

- c. All Welds. In addition to other required tests, CONTRACTOR'S certified welding inspector shall visually examine 100 percent of each pass for all welds.
 - d. In addition to weld tests, doubler pads shall be air tested as stated in ANSI/AWWA C206.
 - e. In addition to the tests required in ANSI/AWWA C200, magnetic particle-weld tests on steel cylinders shall be conducted one time for each 5,000 feet of production welds and at any other times there is a change in the grade of steel, welding procedure, or welding equipment. Additionally, at least one set of tests per operator per work shift shall be performed.
 - f. Spiral weld seams shall be tested by the visible penetrant method of ASTM E 165 - Methods for Liquid Penetrant Inspection or magnetic particle inspection method of ASME Section VIII, Division 1, Appendix VI, for a minimum distance of 12 inches from each end of each joint after the spigot and bell are formed. Defects shall be repaired.
- 2. Gasket Tests. Joint gaskets shall be tested in accordance with ANSI/AWWA C200. Certified test reports shall be provided to the OWNER prior to any material being delivered to the Site.
 - 3. Hydrostatic Tests. After the joint configuration is completed and prior to lining with cement-mortar, each steel cylinder shall be shop tested and certified to a pressure of at least 75 percent of the yield strength of the pipe steel cylinder. Test pressure shall be maintained for a minimum of 2

Special Specification

minutes. Factory hydrostatic tests shall be submitted as Certified Test Reports.

4. Charpy Tests. Steel greater than or equal to 1/4-inch thickness used in production manufacturing of pipe and specials shall be tested for notch toughness using Charpy V-Notch tests in accordance with ASTM A370 - Test Methods and Definitions for Mechanical Testing of Steel Products. The test acceptance for full size specimens (10 mm by 10 mm size) shall be 25 feet-pounds at a test temperature of 30 degrees F; tests shall include three impact specimens and shall be conducted in the direction transverse to the final direction of rolling. Steel for pipe and specials shall be qualified for notch toughness with Charpy tests as indicated for the specified steel.
 - a. Plate. Charpy tests shall be conducted on each plate as required in ASTM A20. Plates that do not meet the above Charpy acceptance criteria shall not be used in production of pipe.
 - b. Coils. Each heat of steel for plates or coil used for pipe barrels 1/4-inch and thicker shall be tested to verify minimum impact values of 25 ft-lb at 30°F in accordance with ASTM A370.
 5. Shop Fit Test. To ensure that lap and bell and spigot joints may be fully assembled, that excessive annular space between spigots and bells does not exist, and that the pipe meets the requirements of ANSI/AWWA C200, the pipe manufacturer shall perform a shop fit test on a minimum of five joints of each pipe size and joint type used. The joints to be tested shall be selected by the OWNER based on pipe measurements. The shop fit test shall join the pipe ends in the shop with the proposed adjacent pipe end. The pipe ends shall be match marked after shop assembly. Record the actual annular space, with the data to include as a minimum:
 - a. Maximum space at any point.
 - b. Minimum space at any point.
 - c. Space at 90-degree intervals - top, bottom and spring line on both sides.
- E. Field Tests. The following field tests shall be required. Field testing shall not damage factory applied coating system.
1. Rubber Gasket Joint Tests. All rubber gasketed joints shall be tested in accordance with ANSI/AWWA C200 and as specified in Section SS 841 – Hydrostatic Testing Operations

Special Specification

2. Welded Joint Tests. CONTRACTOR'S certified welding inspector shall perform a magnetic particle test and visually inspect all welds. All field-welded joints shall be tested by the CONTRACTOR using the magnetic particle inspection procedure conforming to the requirements of ANSI/ASTM E 709 "Standard Guide for Magnetic Particle Testing" and ASTM E 1444 "Standard Practice for Magnetic Particle Testing" unless otherwise specified. Additionally, butt straps shall be air tested with low pressure from a threaded fitting between the welds as specified in Section 02572 - Steel Pipe for Fabricated Specials
3. Holiday Tests. Holiday tests shall be required as specified in Section 09910 – Pipeline Coatings and Linings.
4. Polyurethane Coating tests: Provide field coating tests as described in Section 09910 Pipeline Coatings and Linings.
5. Pipe Vertical Deflection Tests. Pipe shall be measured for deflection at 25-foot intervals unless otherwise required by OWNER.
6. Hydrostatic Pressure and Leakage Tests. Hydrostatic pressure and leakage testing shall be as specified in Section SS 841 – Hydrostatic Testing Operations.

PART 2 PRODUCTS

2.01 GENERAL

- A. Markings. The pipe manufacturer shall legibly mark (stencil) all pipes and specials in accordance with the laying schedule and marking diagram. Each pipe and special shall be numbered in sequence and said number shall appear on the laying schedule and marking diagram in its proper location for installation. All pipe sections and specials shall be marked at each end with top field centerline. The word "top" shall be stenciled on the outside top spigot of each pipe section and special. In addition, pipes and specials shall be stenciled with the outside diameter, wall thickness and pressure class. Identical markings shall be provided on the interior of the pipe and special, and shall be a minimum of one foot away from test plug or pipe joint. Any markings that are obscured before, during or after pipe and special installation shall be reestablished at the nearest appropriate location on the pipe and special. All pipe and special markings shall be stenciled. No piping shall be shipped to the project without proper markings.
- B. Laying Lengths. Maximum joint length shall not exceed 50 feet. Maximum joint length for pipe in casing shall not exceed 25 feet.
- C. Repair of Defects. Patching inserts, overlays or pounding out of dents will not be permitted. Repair of notches or laminations on ends shall not be permitted.

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Damaged ends shall be removed as a cylinder, and the end properly prepared. Distorted or flattened lengths shall be rejected. A buckled section shall be replaced as a cylinder.

2.02 MATERIALS

- A. Steel for Cylinder and Specials. Provide steel coils for spiral welded steel pipe or steel plate for straight seam welded steel pipe per ANSI/AWWA C200 and as follows. Pipe sections shall be fabricated by either of the two following methods: Pipe sections may be spirally welded or fabricated from cylindrical courses joined circumferentially by complete penetration butt joint welds with no more than three longitudinal seams per course. Longitudinal seams shall be staggered by at least 15 degrees of pipe circumference across circumferential joints. Splice within the cylinder shall not be permitted.

1. Minimum yield strength of 42,000 psi.
2. Minimum elongation in 2-inch gauge length of 22 percent.
3. Weld-Ability. Maximum carbon equivalent of 0.45, as measured using AWS D1.1, Annex XI, Guideline on Alternative Methods for Determining Preheat formula:

$$CE=C+((Mn+Si)/6))+(Cr+Mo+V)/5+(Ni+Cu)/15.$$

4. Pressure Vessel Quality as follows:
 - a. Coils. Coils shall be of the continuous cast process, fully-killed, fine-grained practice conforming to physical, manufacturing and testing requirements of ASTM A1018.
 - b. Plate. Plate shall be fully-killed, conforming to ASTM A20, fine-grained practice conforming to physical, manufacturing and testing requirements of ASTM A516, Grade 70. Steel plate chemistry shall conform to ASTM A516, Grade 70. Steel plates that are 3/4 inch thick or greater shall be normalized.
 - c. Toughness.
 - i. Charpy V-notch Acceptance Criteria: Transverse specimen orientation, full size specimens, 25 foot-pounds energy at test temperature of 30 degrees F. Test outside diameter wrap of two coils or two plates minimum per heat lot.

- B. Cement Mortar. Cement for mortar shall conform to the requirements of ANSI/AWWA C205; provided, that cement for mortar lining shall be Type I or II

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per ASTM C150. Cement shall not originate from kilns which burn metal-rich hazardous waste fuel, nor shall a fly ash, bottom ash or pozzolan be used as a cement replacement. Sand shall be silica base and shall not leach in water. Sand shall be in accordance with ANSI/AWWA C205. Cement mortar linings shall be dense and smooth without bumps, blisters, ridges, or spalling, to the satisfaction of the OWNER. All rough spots shall be smoothed over with a rubbing stone, or other method, to the satisfaction of the OWNER. Epoxy bonding agent shall be in accordance with ASTM C881, Type II, moisture insensitive and suitable for service conditions. Latex admixture shall be Euclid "Euco Flex-Con" or Sika "SikaLatex". Admixture shall contain no calcium chloride. All cement and cement components shall be ANSI/NSF 61 approved. The minimum lining thickness shall be in accordance with ANSI/AWWA C205. The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, roughness and mortar spatter. Cracks shall be subject to repair within the guidelines of ANSI/AWWA C205. Cement mortar for patching shall be the same materials as the mortar for machine lining, except that a finer grading of sand and mortar richer in cement shall be used when field inspection indicates that such mix will improve the finished lining of the pipe. The nominal inside diameter after lining shall not be less than the diameter shown on the Drawings, allowing for tolerances according to ANSI/AWWA C200 and C205.

- C. Liquid Applied Epoxy Coating: Liquid Epoxy Coating shall comply with Section 09910 Pipeline Coatings and Linings.
- D. Polyurethane Coating: Polyurethane Coating shall comply with Section 09910 Pipeline Coatings and Linings.
- E. Field Welded Joints. Field welded joints shall be in accordance with ANSI/AWWA C206 - Field Welding of Steel Water Pipe. Lap-welded slip joints or butt strap joints shall be used for restrained lengths. Field welded lap joints shall have the bell expanded by pressing (not rolling) to obtain the required shape and welding tolerances. Welded joints shall be provided as needed and where indicated on the Drawings. Butt-strap joints shall be used where required for closures.
 - 1. Lap-welded slip joints shall be used for all pipe. Lap-welded slip joints shall be welded on the inside or outside with full fillet weld. Where weld after backfill (WAB) is used, a minimum of two passes shall be used with a maximum pass thickness of 1/8-inch. Ends of pipe, fittings, and specials for field welded joints shall be prepared with one end expanded in order to receive a plain end making a bell and plain end type of joint. Clearance between the surfaces of lap joints shall not exceed 1/8 inch at any point around the periphery.

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2. Where necessary to make closure to pipe previously laid, closure joints shall be installed using butt strap joints in accordance with ANSI/AWWA C206 and applicable provisions of this Section of the Contract Documents. Butt straps shall be welded on the interior and exterior of the pipe.
- F. **Restrained Non-Welded Joints.** Restrained non-welded joints shall be used where indicated on the Drawings in accordance with AWWA M11. Lugs or collars shall be in accordance with ASTM A283, Grade B or C; or ASTM A36. Tie bolts shall be in accordance with ASTM A193, Grade B7. Tie bolt threading shall be in accordance with ANSI/ASME B1.1, Class 2A fit, coarse thread series for 7/8 inch and smaller, and 8-thread series for 1 inch and larger. Tie bolt ends shall be chamfered or rounded. Nuts shall be in accordance with ASTM A194, hexagonal, Grade 2H or better. Nut threading shall be as specified for tie bolts, except Class 2B fit. Nut dimensions shall be in accordance with ANSI/ASME B18.2.2, heavy semi-finished pattern. Flat washers shall be hardened steel in accordance with ASTM A325.
- G. **Flanged Joints.** Flanges shall be in accordance with ANSI/AWWA C207, slip-on, except where otherwise permitted. Flange dimensions and drilling, blind flanges and gaskets shall be in accordance with ANSI/AWWA C207 and shall meet pipe class as specified when mating steel pipe to steel pipe or mating steel pipe to a valve. Gaskets shall be furnished by the pipe manufacturer. Flanges shall match the valves, and it shall be the responsibility of the pipe manufacturer and CONTRACTOR to verify flanges match.
- H. **Insulated Flanges.** Insulated flanges shall be as specified in Section 13110 – Cathodic Protection.
- I. **Flange Bolting.** Flange bolting material shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M, Class 1 for B and D Flanges with ASTM 194, Grade 8M nuts. For Class E and F flanges the bolts shall be ASTM A194 grade 2H nuts with bolt and nuts to be zinc plated in accordance with ASTM B633 where buried, in accordance with ANSI/AWWA C207, and of the bolt and nut type or bolt-stud and two nuts permitted for 1 inch and larger. Bolt and bolt-stud lengths shall be such that ends project ¼ to ½ inch beyond surface of nuts. Ends shall be chamfered or rounded. Threading shall be in accordance with ANSI/ASME B1.1, coarse thread series, Class 2A fit. Bolt-studs may be threaded full length. Bolt head dimensions shall be in accordance with ANSI/ASME B18.2.1, regular pattern for square and heavy pattern for hexagonal. Nuts shall be hexagonal and nut dimensions shall be in accordance with ANSI/ASME B18.2.2, heavy, semi-finished pattern. Nut threading shall be in accordance with ANSI/ASME B1.1, coarse thread series, Class 2B fit. Bolts and nuts shall be furnished by the Contractor.

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- J. Dismantling Joints. Dismantling joints shall be Romac “DJ400”, Dresser “Style 131 Dismantling Joint”, or Viking Johnson. For use in potable water systems, coating to be in accordance with ANSI/NSF 61.
- K. Flanged Coupling Adapters. Flanged coupling adapters shall be Dresser “Style 128” or Smith-Blair “913” with anchor studs of sufficient size and number to withstand test pressure.
- L. Mechanical Couplings. Reducing mechanical couplings shall be Baker “Series 220”, Dresser “Style 62”, or Smith-Blair “413” and “415”, without pipe stop. Insulating mechanical couplings shall be as specified in Section 13110 – Cathodic Protection. All other mechanical couplings shall be Baker “Series 200”, Dresser “Style 38”, or Smith-Blair “411 Flexible Coupling”, without pipe stop.
- M. Pipe Appurtenances and Specials. Unless otherwise indicated, pipe appurtenances and specials shall be in accordance with the requirements of Section 02572 – Steel Pipe Fabricated Specials.
- N. Small Branch Connections. Small branch connection pipe nipples (twelve (12) inches or less) shall be seamless black steel pipe in accordance with ASTM A53, standard weight (Schedule 40). Fittings required for interior pipe welding shall be threaded outlets or welded outlets. Threaded outlets shall be Bonney “Thredolets”, Porter “W-S Teelets”, or Flowserve/Vogt “Weld Couplets”. Welded outlets shall be Bonney “Weldolets”, Porter “W-S Teelets”, or Flowserve/Vogt “Weld Couplets”. Outlets shall be installed as specified in Section SS 841 – Hydrostatic Testing Operations.
- O. Pipe End Covers. For all pipe and specials with shop applied cement mortar linings, provide a 12 mil polyethylene or other suitable cover on the ends of the pipe and specials. The covers shall be so designed to prevent drying out of the interior of the pipe. Covers shall be substantial enough to remain intact during shipping and storage until the pipe is installed.
- P. Stulling. Adequate stulling shall be designed and provided by the pipe manufacturer on all specials, fittings and straight pipe so as to avoid damage to the pipe and fittings during handling, storage, hauling and installation. The stulling shall be tight fitting to prevent pipe deflection. The following requirements shall apply:
 - 1. The stulling shall be placed as soon as practicable after the mortar lining has been applied and shall remain in place while the pipe is loaded, transported, unloaded, installed, and backfilled at the Site.
 - 2. The stulling materials, size and spacing shall be the responsibility of the CONTRACTOR, with the following exceptions:

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- a. One stull shall be placed vertical when pipe is oriented with top up.
- b. For pipe joints p to 36 feet long, stulls shall be placed at a maximum spacing 12 feet apart. For pipe joints 36 to 50 feet long, a minimum of 4 stulls shall be placed at a maximum spacing of 15 feet apart.
- c. The stulling shall include the number of points shown in the table below.

Pipe Diameter	# of Stull Points
48" – 72"	6

3. Stulling is for handling and transportation only as well as preventing egging before backfilling. Proper placement of embedment material controls deflection. Stulls are not structural members as they are eventually removed.
 4. Stulling on shop-lined pipe shall consist of stulls and wood wedges. Stulling shall be installed in a manner that shall not harm the lining.
- Q. Pipeline Marking Tape. Pipeline marking tape shall be minimum 4 mil thick polyethylene which is impervious to alkalis, acids, and chemicals and solvents which are likely in the soil. Tape shall be 12 inches wide. Imprinted lettering shall be one-inch tall, permanent black on a blue background, and shall read "WATER LINE BURIED BELOW." Tape shall be as manufactured by Reef Industries (Terra Tape), Allen (Markline) or equal.
- R. Joint Grout. The grout for joint lining shall be cement grout in accordance with the Contract Documents, except that composition shall be one part cement to two parts sand and sufficient water for dry-pack consistency. Sand shall conform to ASTM C-33 and shall be clean, fine, sharp, silica sand. Water shall be treated and suitable for drinking water.
- S. Epoxy Coating. Epoxy shall conform to the requirements of ANSI/AWWA C210.
- T. Shop Prime Coat. Shop prime coat shall be rust-inhibitive primer as recommended by the pipe manufacturer.
- U. Joint Lubricant. Lubricant shall be a non-toxic vegetable-based compound listed as in compliance with ANSI/NSF 61.
- V. Watertight Plugs. Watertight plugs shall be provided to seal the pipe ends when pipe laying has stopped.

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- W. Bituminous Filler for Wall Fittings. Bituminous filler for wall fittings shall be asbestos-free plastic asphalt roof cement in accordance with ASTM D4586, Type II.
- X. Watertight Pipe Sleeves. Watertight pipe sleeves shall be Thunderline Corporation “Link-Seal”, insulating type with modular rubber sealing elements, nonmetallic pressure plates, and galvanized bolts and nuts.
- Y. Anchor Bolts. Anchor bolts shall be in accordance with ASTM A307.

2.03 PIPE DESIGN CRITERIA

- A. Pipe Diameter. The pipe shall be of the diameter as shown on Drawings. Unless indicated otherwise, the inside diameter shall be considered the finished diameter after lining.
- B. Pipe Wall Thickness. The pipe wall thickness shall be in accordance with ANSI/AWWA M11, except with an inside diameter equal to or greater than 48-inch shall have a minimum wall thickness of 0.25” or $D/t = 200$, whichever is greater, with zero minus tolerances. Pipe wall thickness shall be constant for the entire length of pipe section. In restrained lengths, the steel cylinder area shall not be progressively reduced from the point of maximum thrust to the end of the restrained length. The cement mortar lining shall not be used in the pipe wall stiffness calculations.
- C. Design (Working) Pressure. Unless otherwise indicated, the working (maximum steady state) and field hydrostatic test pressures shall be as indicated on the Drawings. The transient pressure (maximum total unsteady state) shall be 1.5 times the working pressure. Design in accordance with ANSI/AWWA C200 except that the design stress (using a safety factor of 2.0 to yield strength) shall not be greater than 21,000 psi at design working pressure nor shall the design stress (using a safety factor of 1.5 to yield strength) be greater than 75 percent of the minimum yield strength or 31,500 psi for 42,000 psi steel pipe at design transient pressure. In restrained lengths, design hoop stresses shall not exceed 21,000 psi.
- D. Modulus of Soil Reaction. Design calculations which require a modulus of soil reaction (E') shall assume an E' of 1500 psi for trench Type A backfill and 3000 psi for trench Type B backfill.
- E. Bedding Constant. The bedding constant, K shall be 0.10.
- F. Pipe Deflection. The requirements of Section SS 804C – Excavation, Trenching and Backfill govern for the excavation and backfilling of trenches for laying steel pipe, fittings, and specials. Conformance with pipe deflection requirements shall be as set forth below.

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1. Average allowable pipe deflection is limited to 2% for polyurethane coated steel pipe. In no case shall a single measurement in any direction exceed 1.5 times the average allowable deflection. These measurements include the allowable tolerance for lining thickness.
2. Deflection measurements shall be made by the CONTRACTOR in the presence of the OWNER's representative. Method for taking measurements shall be agreed to by the OWNER and CONTRACTOR in writing prior to installing the first joint of pipe.
3. Average deflection shall be determined by averaging the pipe's measured vertical deflection as indicated below. Locations where measurements are taken shall be clearly marked on the interior of the pipe.
 - a. For pipe joints 36 feet in length or less, measurements shall be taken at two locations, $\frac{1}{4}$ -distance from each pipe end.
 - b. For pipe joints longer than 36 feet, measurements shall be taken at three locations including $\frac{1}{4}$ -distance from each pipe end and at the pipe midpoint.
4. If the average measured deflection at any joint or any single measurement fails to meet specifications, the entire joint shall be reworked in accordance with the manufacturer's recommendations and as directed by the ENGINEER at no additional cost to the OWNER. This may include uncovering the pipe and re-compaction of the pipe bedding, and repair of coating.
5. Installed pipe joints will also be examined for flat spots and internal lining stress cracks by the OWNER's representative. A flat spot is anything flat enough to cause lining damage. Lining damage shall be repaired in accordance with the manufacturer's recommendations and as directed by the OWNER at no additional cost to the OWNER. Repair of flat spots may include uncovering the pipe and re-compaction of the pipe bedding, and repair of the coating.
6. Where pipe has been reworked to comply with the deflection requirements, CONTRACTOR shall re-measure for deflection no earlier than seven days after the repaired pipe is backfilled. OWNER's representative will re-inspect for flat spots at this time.
7. No pipe installation shall be accepted until the entire installation is in compliance with the above deflection requirements.

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8. All costs associated with measuring for pipe deflection and any repairs or rework associated with meeting these requirements shall be borne by the CONTRACTOR.
- G. Internal Vacuum. The pipe shall be designed to withstand full internal vacuum (0 psia).
- H. Closures and Correction Pieces. Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing indicated. The locations of correction pieces and closure assemblies shall be shown on the line layout drawings and shall be subject to the ENGINEER's review. Any change in location or number of said items shall require prior acceptance by the ENGINEER.

2.04 JOINT DESIGN CRITERIA

- A. Deflection at Joints. The design horizontal and vertical deflection of the pipe shall not exceed 75 percent of the pipe manufacturer's recommendation, or the amount that results in more than a 1/8-inch gap at the weld location, whichever is less.
- B. Restrained Joint Design. The joints furnished shall have the same or higher pressure rating as the adjoining pipe. The clearance between faying surfaces shall be less than 1/8 inch at any point around the periphery. The pipe manufacturer shall determine joint depth requirement based on anticipated temperature change. The joint shall have a rust inhibitive primer. The pipe shall be homed to mid-way of the joint to allow either expansion or contraction to occur. Where indicated on the Drawings, for the inside of the joint, the joint shall have a full circumference double pass minimum field-weld. Designs shall include stresses created by the greater of:
 1. Temperature differential of 30 degrees F plus Poisson's effect in combination with hoop stress, or;
 2. Thrust due to bulkheads, bends, reducers and line valves resulting from transient pressure times area in combination with hoop stress.Field welding of joint rings shall not be allowed for thrust restraint. Any fittings used for vertical bends shall be restrained.
- C. Temperature Control Joint Design. Where restrained joints are required, a special longer butt strap joint (temperature control joint) shall be provided at a maximum spacing of 250 feet to account for movement of the installed pipe due to temperature changes. The pipe manufacturer shall determine the length required

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for the longer butt strap as defined by the CONTRACTOR'S pipe laying procedures and the location of the special joint.

PART 3 EXECUTION

3.01 GENERAL

- A. Shop Cement Mortar Lining. Unless indicated otherwise, interior surfaces of all steel pipe, fittings, and specials shall be cleaned and lined in the shop with cement mortar lining applied centrifugally in conformity with ANSI/AWWA C205. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or stulling as specified. The lining machines shall be of a type that has been used successfully for similar Work and shall be accepted by the OWNER. Every precaution shall be taken to prevent damage to the lining. The pipe shall be left bare where field joints occur as indicated. Ends of the linings shall be left square and uniform. Feathered or uneven edges shall not be permitted.
- B.
1. Centrifugally line straight sections of pipe. Lining of special pieces or fittings shall be by mechanical, pneumatic, or hand placement. Provide cement mortar lining of uniform thickness. Finish to a smooth dense surface.
 2. Centrifugally line straight sections of pipe. Lining of special pieces or fittings shall be by mechanical, pneumatic, or hand placement. Provide cement mortar lining of uniform thickness. Finish to a smooth dense surface.
 3. Steel plate specials larger than 16 inches in diameter shall have lining reinforced with 2-inch by 4-inch No. 13 gage welded steel wire mesh.
 4. Brace and support pipe during lining application to minimize pipe distortion or vibration. Bracing and supports shall not damage the pipe, coating, or lining.
 5. Tightly close ends of pipe and fittings with plastic sheet caps. Plastic end caps shall be of sufficient thickness and strength to resist shipping, handling, and storage stresses.
 6. Damage to the cement mortar lining, including disbondment, cracking, or blistering, caused by improper curing, shipping, handling, or installation shall be repaired in accordance with AWWA specifications and to the satisfaction of the Engineer.

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7. Other requirements of mortar lining materials and processes: As specified in AWWA C205.

C. Liquid Epoxy Lining:

1. Clean and coat the interior of cement mortar lined pipe at insulating joints or where specified with two coats of epoxy coating.
2. Epoxy coating applied at insulating joints shall be applied to two feet on each side of the insulating joint. If only one side of the joint can be coated the coating shall be applied for a minimum of four feet.
3. Mortar lining shall be allowed to cure 15 days or steam cured not less than 7 days prior to surface preparation of the mortar and epoxy coating application. Hand applied mortar lining shall be allowed to cure a minimum of 15 days or as required to meet the coating manufacturer's requirements for application on cement or concrete, whichever is greater.
4. Prepared mortar lining by abrasive blasting to remove all laitance and create a suitable anchor profile.
5. Epoxy coating shall be applied in two coats minimum, at a total coating thickness of 16 mils dry film thickness. Coating applied over cement mortar lining shall be applied in a manner that will minimize gassing and pinholes in the completed lining.
6. Mortar lining shall be dry during epoxy lining application

- D. Lining and Coating Holdback. Shop applied interior linings shall be held back from the ends of the pipe as acceptable to the OWNER. Shop applied exterior coatings shall be held back from the ends of the pipe as specified in 09910 Pipeline Coatings and Linings as otherwise acceptable to the OWNER. Exterior metal not coated shall receive a shop applied prime coat. Prime coat shall extend underneath the coatings by specifications. All holdback areas for welded joints, all butt straps, shall be thoroughly cleaned and given a shop applied prime coat to end of pipe. The surface preparation and primer shall be compatible with the intended finish coating as specified in Section 09970 Painting and Protective Coating and Section 09910 Pipeline Coatings and Linings as applicable.

- E. Shop Welded Surfaces. All weld seams on pipe surfaces that will have a coating in accordance with Section 09910 Pipeline Coatings and Linings and shall be ground such that the maximum weld bead height shall not exceed 1/32-inch. All ground weld seams shall be smooth and free of burrs. Grinding into or gouging of adjacent pipe wall shall not be permitted.

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- F. Pipe End Covers. The ends of all pipe and specials shall be securely covered or otherwise sealed during transport to the Site. The ends of the pipe shall remain sealed until pipe installation.
- G. Handling and Storage.
1. Coated pipe shall not be shipped or installed until coating has developed full adhesion and cure.
 2. All pipe, fittings and specials shall be carefully handled as recommended by the PIPE MANUFACTURER. During coating application, storage, loading, transportation, unloading, laying and installation, every precaution shall be taken to protect and prevent damage to pipe, lining, and coating including impact shocks, and free fall. Pipe shall be handled at all times with a minimum of two wide non-abrasive slings, belts or other equipment designed to prevent damage to the coating or lining. The equipment shall be kept in such repair that its continued use is not injurious to the coating or lining. Forklift equipment shall have all bearing surfaces padded with suitable padding material. Lift pipe with web slings a minimum of 12-inch wide and of a type that will not damage the coating. Metal chains, cable, tongs, forklifts or other equipment likely to damage the coating will not be permitted. Dragging or skidding of pipe on grade or in the trench will not be permitted. The spacing of pipe supports required to handle the pipe shall be adequate to prevent cracking or damage to the lining or coating. All pipe handling equipment shall be acceptable to the OWNER.
 3. Provide transportation vehicles with padded bolsters between each layer of pipe and heavy padding under load ties. Bolsters shall be curved to fit the outside of the pipe and 12 inches wide, minimum. All pipe contact locations shall be heavily padded with carpet and strips of the outer tape wrap material (adhesive side against the carpet) during shipment to the project site and from the storage yard to the point of installation.
 4. Pipe shall not be stored on rocks, gravel, or other hard materials that might damage the coating. Provide padded 12-inch wide skids and chucks, sand bags, select loamy or sand berms, suspended from cutback ends, or suitable means so that the coating shall not be damaged and in a manner which shall protect the pipe against damage whenever stored at the Site or elsewhere. Pipe shall not be laid on asphalt without suitable padding at all contact points.
 5. Stockpiled pipe shall be secured to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials. The pipe and specials shall not be rolled and shall be secured to prevent accidental rolling. It shall be the responsibility of the CONTRACTOR and the pipe

Special Specification

and specials manufacturer to prevent damage of the pipe and specials coating and lining which might be caused by handling, transporting, storage or installation of the completed pipe; including at low temperatures or exposure to UV radiation. Any pipe and specials damaged during handling, transporting, storage or installation shall be repaired or replaced. Repairs must meet the approval of the PIPE MANUFACTURER, ENGINEER, CM and OWNER.

6. Pipe shall be inspected by the CONTRACTOR at the project site for damage. Any damage to the pipe, lining, or coating shall be repaired as directed if, in the opinion of the CM or ENGINEER, a satisfactory repair can be made; otherwise, the damaged section shall be replaced at the sole expense to the CONTRACTOR.
 7. No metal tools or heavy objects shall be permitted to come into contact unnecessarily with the finished coating. Workmen shall not be permitted to walk on the coating except when absolutely necessary and approved by the Engineer. When permitted, shoes with rubber or composition soles and heels or other suitable footwear that will not damage coating shall be used.
 8. Pipe shall be hauled direct from pipe plant to the Site and strung along pipeline route, thus avoiding re-handling of pipe and the possibility of damage thereto. Where fully loaded truck and trailer cannot operate along the pipeline route, pipe may be unloaded at access points along the route, and brought to the trench side by approved methods; however, the Contractor shall be responsible to ensure that pipe is undamaged at the time of laying. If the pipe cannot be hauled directly from the pipe plant to the laying site, a maximum of two (2) handlings is allowed. Shipment by rail will be unacceptable unless it can be demonstrated that it will not damage the pipe. No more than two (2) repairs on either lining or coating per joint will be allowed for delivery by rail.
- H. Long-term Exposure: Pipe that is exposed to UV rays for a period over 180 days after application shall either be provided with UV resistant topcoat, covered to prevent UV degradation, or be certified in writing by the coating manufacturer that UV exposure will not be affected the thickness of the coating if exposed up to 1 year of sunlight. Exposure greater than 1 year shall not impact the dry film thickness of the coating. Areas of coating that display UV degradation of more than 2 mils per year of coating loss in accordance with SSPC PA2-2012 shall be removed and repaired at the sole cost of the CONTRACTOR. For exposures greater than 1 year with UV degradation, the required application of a UV resistant topcoat will depend on the project location, laying schedule, anticipated length of exposure, and type of outer wrap. The manufacturer shall be consulted for 3,000 psi water blasting minimum and a compatible UV resistant topcoat or pipe shall be stored under a protective cover. Protective covering can be colored

Special Specification

plastic sheeting, canvas, or other UV blocking material. Clear plastic sheets are not acceptable. Areas of coating that display degradation shall be removed and repaired at sole cost of the CONTRACTOR

- I. End Caps: Pipe ends of mortar lined pipe and fittings shall be tightly closed with a plastic wrap to aid in curing and to minimize drying out of and contamination of the lining. Plastic end cap shall consist of a minimum of one 10-mil sheet of polyethylene or other suitable material. End caps shall be substantial enough to resist shipment, handling, and storage loads and firmly attached in place. The plastic end cap shall remain intact and in place until pipe installation. Damaged or missing plastic end caps shall be repaired or replaced.
- J. Bracing:
 - 1. The steel PIPE MANUFACTURER shall furnish and install adequate bracing or stulling to keep the pipe from becoming deformed or damage from occurring to the coating or linings. Stull bracing shall be installed as soon as possible after application of lining. Stulls shall remain in place during handling, storage, transportation, and installation of pipe and fittings until after the pipe zone material is compacted.
 - 2. The stulls shall be installed with pads and wedges in such a manner that the pipe lining will not be damaged and the stulls will not be dislodged during shipping and handling of the pipe. If stulls are welded, they shall be installed and removed in such a manner to prevent damage to the steel cylinder, lining, or coatings. All damage shall be repaired to the satisfaction of the Engineer.
- K. Holiday Testing. Just prior to installation, pipe, fittings and specials shall be tested by the CONTRACTOR and witnessed by the OWNER with specified electrical flaw detectors. Holidays shall be repaired by the CONTRACTOR at no expense to the OWNER, as specified in Section 09910 Pipeline Coatings and Linings.
- L. Pipe and Specials Protection.
 - 1. At all times, all pipe at the fabrication plant or stored at the Site, which has been cement-mortar lined in the shop shall be protected with suitable pipe end covers, as specified, to maintain a moist atmosphere and to prevent unauthorized access by persons, animals, water, or any undesirable substance. The CONTRACTOR shall introduce water into the pipe to keep the cement-mortar moist where moisture has been lost due to damaged covers.
 - 2. At the end of the each work day, the ends of open pipe and specials in the trench shall be sealed with a watertight plug. All water in the trench shall be removed prior to removing the plug. If the pipe is not properly sealed

Special Specification

resulting in exposure to water, mud, debris, etc., the CONTRACTOR, at their expense shall clean the exposed pipe section to the satisfaction of the OWNER prior to proceeding with pipelaying.

3. At all times, means shall be provided to prevent the pipe from floating due to water in the trench from any source. Pipe which has floated shall be replaced at no cost to OWNER.
4. At locations where the CONTRACTOR proposes to cross the installed pipeline with heavy equipment, precautions as accepted by the OWNER shall be taken to protect the pipe from damage. Acceptable precautions include, but are not limited to, backfilling the pipe trench as necessary to protect the pipe or concrete encasing the pipe and placing steel plating over the pipe. Any damage to the pipe caused by the CONTRACTOR'S operation or his equipment shall be repaired to the OWNER'S satisfaction at no cost to the OWNER.

3.02 PIPE CLEANUP

As pipe laying progresses, the CONTRACTOR shall keep the pipe interior free of all debris. The CONTRACTOR shall completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, pointing of joints and any necessary interior repairs prior to testing the completed pipeline. Non-compliance with this item will result in non-payment for affected portions of pipeline. All pipe shall be broom swept.

3.03 INSTALLATION OF PIPE

- A. General. No pipe and specials shall be installed where the lining or coating/interior or exterior surfaces show cracks or damage that may jeopardize the integrity of the pipe as determined by the OWNER. Such damaged lining and coating/interior and exterior surfaces, shall be repaired or a new undamaged pipe shall be provided. All pipe damaged prior to Final Completion shall be repaired or replaced.
- B. Test Section. Prior to the installation of any pipe, a pre-installation inspection procedure shall be performed as specified in Section SS 804C – Excavation, Trenching and Backfill.
- C. Inspection. The CONTRACTOR shall inspect each pipe and fitting to insure that there are no damaged portions of the pipe. The CONTRACTOR shall remove or smooth out any burrs, gouges, weld splatter or other small defects prior to laying the pipe.
- D. Cleaning. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon

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and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the Work, using watertight plugs as specified.

- E. Placement. Pipe shall be laid directly on the imported bedding material. No blocking shall be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Allow gaps in the bedding to allow installation of the external joint protection. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Initial backfill shall be “mechanically consolidated” to a point 12 inches above installed pipeline. In addition, the compaction and other requirements shall be as specified in Section SS 804C – Excavation, Trenching and Backfill.
- F. Installation Tolerances and Change in Alignment. Each section of pipe shall be laid in the order and position shown on the line layout and marking diagrams and in accordance with the following:
 - 1. Each section of pipe shall be laid to line and grade, within plus or minus 0.28 foot horizontal deviation and plus or minus 0.14 foot vertical deviation. Pipe shall be in the center of the trench to allow proper compaction.
 - 2. The position of the pipe shall be verified by instrument control at every joint.
 - 3. In addition to the horizontal and vertical tolerances above, lay the pipe so that no high or low points other than those on the line layout and marking diagram are introduced. To prevent high points or low points along the pipeline, the general slope of the pipeline shall not be changed between vertical angle points.
 - 4. When pipe is to be connected to existing pipe, the terminus of the existing pipe shall be field located prior to fabricating new pipe.
 - 5. The CONTRACTOR shall submit any required alignment adjustments to the OWNER for acceptance. The CONTRACTOR shall make any required field alignment adjustments to allow proper fit-up of pipe in conformance with tolerances specified.
 - 6. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the OWNER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the specified maximum allowable deflection. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint. In all cases the joint

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opening, before finishing with the protective cement-mortar or epoxy lining inside the pipe, shall be the controlling factor.

- G. Laying on Grade. Except for short runs which may be permitted by the OWNER, pipes shall not be laid uphill on grades exceeding 10 percent. Pipe which is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. Bends shall be properly installed as indicated.
- H. Cold Weather Protection. No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.
- I. Marking Tape. Continuously install marking tape along the pipe at a depth two feet above the top of pipe, unless otherwise shown on the Drawings, in accordance with the recommendations and instructions of the marking tape manufacturer.

3.04 INSTALLATION OF WELDED JOINTS

- A. Fitting Up. When fitting up the ends of pipe to be welded or fitting butt strap pieces, minor jacking or clamping will be allowed. Cold working the metal with sledges or localized application of heat and working the metal with sledges will not be allowed. If field displacement of joints, where butt strap joints are indicated, does not allow proper fit up with the tolerances indicated, special closure butt straps or mitered pieces shall be shop fabricated and installed, subject to ENGINEER'S acceptance.
- B. Backfilling. After the pipe and pipe joint are properly positioned in the trench, the length of pipe between joints shall be backfilled in lifts to at least one foot above the top of the pipe. Care shall be exercised during the initial backfilling to prevent movement of the pipe and to prevent any backfill material from being deposited on the joint.
- C. Adequate Space. Where exterior welds are performed, adequate space shall be provided for welding and inspection of the joints. Exterior joint welding shall be completed before application of field applied joint coating for pipe 42" and smaller. It will be acceptable to weld the joint from the inside after the exterior joint coating and backfilling has been done for pipe 48" and larger, if it can be demonstrated that this procedure will not damage the exterior joint coating.
- D. If the CONTRACTOR chooses to use Weld after Backfill (W.A.B.), special techniques shall be used to limit damage to the exterior heat shrink sleeve. Hand (stick) welding shall be used. The maximum heat input shall not exceed 23,000 joules.

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1. Maximum weld temperature and duration shall not result in full carbonization of the joint coating adhesive. Full carbonization is defined as the loss of volatile organic compounds that result in complete loss of tackiness, adhesion to the steel, and corrosion protection properties.
 2. Finished joint coating shall not have any visual creases or folds in the joint coating backing material that extends through both the inner protective layer and outer joint sleeve.
 3. One test joint shall be provided for each welder. After welding, the test joint shall be excavated to verify no unacceptable damage to the exterior heat shrink sleeve. Discoloration, minor orange peel, and crevices less than 50% of the heat shrink sleeve backing thickness will be acceptable. Deeper crevices, cracks, and holes are not acceptable.
 4. After the pipe has been joined and properly aligned and prior to the start of the welding procedure, the spigot and bell shall be made essentially concentric by tacking to obtain a 1/8" maximum clearance tolerance around the periphery of the joint. In no case shall the clearance tolerance be permitted to accumulate. Before welding, thoroughly clean pipe ends to bare metal. All welding shall be hand welding to avoid damage to the heat shrink sleeve. Welding shall be performed so as not to damage lining or coating. Cover the lining and/or coating as necessary to protect from welding splatter.
- E. Protection of Coating. A heat resistant shield shall be draped over at least 24 inches of coating beyond the holdback on both sides of the weld during welding to avoid damage to the coating by hot weld splatter. Welding grounds shall not be attached to the coated part of the pipe.
- F. Welding. Prior to the beginning of the welding procedure, any tack welds or joint stops used to position the pipe during laying shall be removed. The weld shall then be made in accordance with ANSI/AWWA C206. Where more than one pass is required, each pass except the first and final one shall be peened to relieve shrinkage stresses; and all dirt, slag and flux shall be removed before the succeeding bead is applied.
- G. For pipe 48" and larger, if the CONTRACTOR chooses to use Weld after Backfill (WAB), special techniques shall be used to limit damage to the exterior heat shrink sleeve. 'Weld after Backfill' procedures on wall thicknesses of 0.30 inch or less must be approved by the Construction Manager based on field testing demonstrating the welding procedures can comply with the requirements of this specification.

1. Weld After Backfill Joint Requirements:

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- a. Post-welded or 'Weld after Backfill' joints are defined as welded pipe joints that have been coated and backfilled prior to completing interior welds.
2. Post welded joints shall be coated and protected as follows:
 - a. Joint coating shall be as indicated in Section 09910 2.04 D 11 C. Tape wrapped joints will not be acceptable.
 - b. Provide a 6-inch wide Canusa Aqua Shield AQW-WAB (or Rachem Equivalent) protective layer centered over the interior weld location as recommended by the joint sleeve manufacturer. Heat resistant tape will not be acceptable.
 - c. Hold back primer shall be suitable for post weld conditions as specified in Section 09910 3.04 D and shall not exhibit any binder breakdown in the heat affected zone that causes loss of joint coating adhesion to the holdback primer.
 - d. Filler mastic materials shall be high temperature materials with 500 degree F melting point.
 - e. Joints shall be buried prior to welding, with not less than 6 inches of soil or flowable fill material above the pipe, and minimum side and bottom of trench distances as shown in the project trench details.
3. Welding of the joints shall be in conformance with this section and as indicated herein:
 - a. All welding shall be wire-fed or with stick electrodes, and two or more weld passes as required to meet the approved AWS qualified welding procedures and maximum coating temperature limitations. Not more than 1/8" shall be deposited per weld pass. 'Weld after Backfill' procedures must be approved by the Engineer based on field testing demonstrating the welding procedures can comply with the requirements of this Section.
 - b. Welding speed, amperage, and voltage shall be as required to maintain a maximum heat input of 23,000 joules or a maximum surface temperature at the coating/steel interface of 800 degree F, whichever is least.
 - c. Maximum weld temperature and duration shall not result in significant carbonization of the joint coating adhesive. Significant carbonization is defined as the loss of volatile organic compounds that result in

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substantial loss of tackiness, adhesion to the steel, and corrosion protection properties.

- d. Finished joint coating shall not have any visual creases or folds that extend through more than 50% of the joint coating backing material.
 4. If Contractor elects to weld after backfill any joints, Contractor shall demonstrate that the joint welding procedures will not significantly damage the coating by using a temporary prototype test joint of the minimum wall thickness used on the project. The test joint shall be backfilled, and each welder proposed for the project shall be tested. Each welder shall provide a complete welded joint including a minimum of two feet of weld over head and below head. The test joint will be excavated after welding and destructively tested. The heat shrink sleeve shall be tested by an adhesion test in accordance with ASTM D1000, and shall meet an adhesion value of 15 lb-inch. Test shall be performed directly over the weld (parallel) and perpendicular to the weld. The sleeve backing shall not rip, tear, or split. The test shall be done a minimum of 24 hours after welding. Additionally, a visual inspection of the sleeve will be made to verify the sleeve is not damaged beyond the limits of this specification. Additionally, excavate the first two joints for evaluation of the joint coating condition. Engineer will randomly select up to three additional post-welded joints for excavation by Contractor for evaluation of joint coating condition. Joint coating will be destructively evaluated by the Engineer. Contractor will removed and replace joint heat shrink sleeve upon completion of the evaluation.
 5. In the event that any excavated post welded joint exhibits any heat related damage as defined herein, Contractor shall modify and test a new welding after backfill procedure prior to completing any additional welded joints. Contractor shall demonstrate that the revised joint welding procedure will not significantly damage the coating by repeating the weld after backfill evaluation requirements defined in this Section, including excavation of the three additional randomly selected joints for destructive evaluation.
- H. Control of Temperature Stresses. Adequate provisions for reducing temperature stresses shall be the responsibility of the CONTRACTOR.
1. All welding shall be carefully controlled to minimize shrinkage stresses and distortion.
 2. Control temperature stresses in accordance with ANSI/AWWA C206, the accepted temperature stress control submittal, and the Contract Documents.
 3. To control temperature stresses, the temperature control joint areas of the pipe shall be shaded from the direct rays of the sun by the use of properly

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supported awnings, umbrellas, tarpaulins, or other suitable materials. The Temperature Control Joint Area is defined as the entire length of pipe left exposed near a control joint after placing the pipe backfill between it and the other control joints in each direction. Shading materials at the joint area shall not rest directly on the pipe but shall be supported to allow air circulation around the pipe. Shading of the pipe joints need not be performed when the ambient air temperature is below 45 degrees F.

4. At intervals not exceeding 250 feet along welded reaches of the pipeline, and where shown, the pipe shall be laid with an initial lap of not less than two-inch greater than the minimum lap dimension. Where temperature control joints occur in a traveled roadway or other inconvenient location, the location of the shrinkage control joint may be adjusted, as acceptable to the OWNER.
- I. Inspection. As soon as practicable after the welding of each pass, all field-welded joints shall be 100 percent visually inspected by the CONTRACTOR'S certified welding inspector. Visual inspection acceptance criteria shall be in full conformance with ANSI/AWS D1.1, Paragraph 6.1, Visual Inspection Acceptance Criteria table for statically loaded nontubular connections.
- J. Testing. Field welded joints shall be tested using the magnetic particle inspection procedure conforming to the requirements of ANSI/ASTM E 709 "Standard Guide for Magnetic Particle Testing" and ASTM E 1444 "Standard Practice for Magnetic Particle Testing". Butt straps shall have an additional air test. Air test shall be low pressure for a threaded fitting between the welds. A ¼ NPTF threaded air test tap hole shall be installed for testing. Test pressure shall be 15 psi and be held for 10 minutes.
- K. Repair of Welds. Welds that are defective shall be repaired by the CONTRACTOR to meet the requirements of the applicable sections of the Contract Documents. Defects in welds or defective welds shall be removed, and that section of the joint shall then be rewelded. Only sufficient removal of defective material that is necessary to correct the defect is required. After the repair is made, the joint shall be checked by repeating the original test procedure. Welds deficient in size shall be repaired by adding weld metal. All defects shall be ground out, rewelded, and retested. Upon retest, the repaired area shall show no leaks or other defects. The test shall be rerun, and repairs made, as many times as required to achieve a successful test at no additional cost to the OWNER.
- L. Outlets for Weld Leads: The CONTRACTOR may use outlets for access for weld leads. Outlets shall be welded after use. The minimum spacing for outlets for weld leads shall be 500 feet. Outlets through air valves, manways, etc shall be included in the calculation for 500 feet minimum spacing.

3.05 INSTALLATION OF PIPE APPURTENANCES

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- A. Protection. Where the joining pipe is polyurethane coated, buried appurtenances shall be coated with heat shrink sleeve.
- B. Valves. Valves shall be handled in a manner to prevent any injury or damage to any part of the valve. Joints shall be thoroughly cleaned and prepared prior to installation. The CONTRACTOR shall adjust stem packing and operate each valve prior to installation to insure proper operation. Valves (body and seat) shall not be subjected to test pressures greater than valve manufacturer's recommendation. Valves shall be installed so that the valve stems are plumb and in the location show on Drawings. Buried valves shall be coated and protected in accordance with Section 09970, Painting and Protective Coatings.
- C. Flanged Joints. Before the joint is assembled, the flange faces shall be thoroughly cleaned of all foreign material with a power wire brush. The gasket shall be centered and the connecting flanges drawn up watertight without unnecessarily stressing the flanges. Bolts shall be tightened in a progressive diametrically opposite sequence in accordance with AWWA C-207 and torqued with a suitable, acceptable and calibrated torque wrench set for the torque recommended in accordance with AWWA M11. Clamping torque shall be applied to the nuts only. Non-asbestos ring gaskets shall be applied to the inside faces of blind flanges with adhesive. All buried flanges shall be coated and protected in accordance with Section 09910 Pipeline Coatings and Linings.
- D. Flexible Coupled Joints. When installing flexible couplings, care shall be taken that the connecting pipe ends, couplings and gaskets are clean and free of all dirt and foreign matter with special attention being given to the contact surfaces of the pipe, gaskets, and couplings. The couplings shall be assembled and installed in conformity with the recommendations and instructions of the coupling manufacturer. All welds shall be ground flush at the location of flexible couplings.
- E. Bolted Coupling. Wrenches used in bolting couplings shall be of a type and size recommended by the coupling manufacturer. Coupling bolts shall be tightened so as to secure a uniform annular space between the follower rings and the body of the pipe with all bolts tightened approximately the same amount. Diametrically opposite bolts shall be tightened progressively and evenly. Final tightening shall be done with a suitable, approved, and calibrated torque wrench set for the torque recommended by the coupling manufacturer. Clamping torque shall be applied to the nuts only. Upon completion of the coupled joint, the coupling and bare metal of the pipe shall be cleaned, primed, and protected in accordance with the requirements of Section 09970, Painting and Protective Coatings.

3.06 REMOVAL OF STULLS

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Removal of Stulls. Pipe side stulls shall be left in place until 2 feet of compacted backfill has been completed. The pipe vertical stull shall be left in place until 4 feet of compacted backfill has been completed. The CONTRACTOR shall monitor pipe deflection by measuring pipe inside diameter before stulls are removed, and 24 hours after backfilling with approved compaction tests. Pipe deflection shall meet requirements in 2.03F of this section. After the backfill has been placed, the stulls shall be removed and shall remain the property of the CONTRACTOR. Stulls and wedges shall be removed without damage to any linings, coatings or pipe.

3.07 JOINT LINING AND COATING

A. Coatings.

1. Joint Coating of Polyurethane Coated Pipe. The exterior joint recesses shall be thoroughly wiped clean and all water, loose scale, dirt and other foreign material shall be removed from the outside surface of the pipe. The CONTRACTOR shall be responsible for his operations so that they do not damage the factory applied coating system. After the completion of joint testing and cleaning, all joints shall be coated with Heat Shrink Sleeves per AWWA C216.
2. Exterior Coating of Exposed Piping. The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of primer compatible with the finish coating required by Section 09970, Painting and Protective Coatings.
3. Coating of Fittings and Specials. Fittings and specials shall be coated in accordance with ANSI/AWWA C209 as modified in 09910 - Pipeline Coatings and Linings.
4. After the backfill has been completed to final grade, the interior joint recess shall be filled with grout. The interior joint recesses shall be thoroughly wiped clean and all water, loose scale, dirt and other foreign material shall be removed from the inside surface of the pipe. The joint shall be lined with grout as specified. The grout shall be tightly packed into the joint recess and troweled flush with the interior surface. All excess shall be removed. At no point shall there be an indentation or projection of the mortar exceeding 1/16-inch.
5. With pipe smaller than 24-inches in diameter, before the spigot is inserted into the bell, the bell shall be daubed with grout. The joint shall be completed and excess mortar on the inside of the joint shall be swabbed out.

3.08 REPAIR OF LINING

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If lining is damaged or found defective at Site, or after installation, the damaged or unsatisfactory portions shall be replaced with lining conforming to the Contract Documents. Defective linings, as determined by the OWNER, shall be removed from the pipe wall and shall be replaced to the full thickness required. Defective linings shall be cut back to a square shoulder in order to avoid feather edged joints. Temperature and shrinkage cracks in the grout less than 1/16-inch wide need not be repaired. Pipe, specials, or fittings with cracks wider than 1/16-inch shall be repaired in accordance with ANSI/AWWA C205. The progress of the application of lining shall be regulated in order that all hand work, including the repair of defective areas, is cured in accordance with the provisions of ANSI/AWWA C205 at no additional cost to the OWNER.

3.09 REPAIR OF COATING

Coating repair shall be as specified in Section 09910, Pipeline Coatings and Linings as applicable.

3.10 HYDROSTATIC AND LEAKAGE TESTING

Once installed, the pipe shall be hydrostatically and leakage tested as specified in Section SS 841A – Hydrostatic Testing Operations.

3.11 CORROSION CONTROL

Cathodic protection shall be as specified in Section 13110, Cathodic Protection System.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Steel pipe, mortar-lined shall be measured by the horizontal linear foot of the approved size and type, as shown on the plan stationing. Measurements will be separate for each pressure class and installation method to match the bid items in the Price Proposal. Measurements for each will be determined by reference to the approved pipe system make and lay drawing details up to the last pipe joint that is complete with all QC documentation.. The measurement of each line of pipe shall be continuous and shall include the horizontal lengths, as shown on the plan stationing, of all fittings and valves between the ends.
- B. Measurement of Internal Test Bulkhead Assembly (48" Diameter), shall be by unit price per each installed.

4.02 PAYMENT

- A. Payment for steel pipe, mortar-lined installed shall be made at the unit price bid per horizontal linear foot of pipe as specified, as shown on the plan stationing, for the various

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pressure classes and installation methods. Payments shall be made based on 90% of the linear foot bid price after installation of the steel pipe, mortar-lined, testing, submittal of associated mil certificates and shop testing information for the pipe installed, demonstration of compliance with requirements of the contract documents and SAWS for Record Drawings as approved by the OWNER. The remaining 10% shall be payable upon successful completion of the hydrostatic test.

- B. Internal Test Bulkhead Assembly (48" Diameter), will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.
- C. No direct payment shall be made for incidental costs associated with the staking and utility verification.

-END OF SECTION-

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SECTION 02572

STEEL PIPE FABRICATED SPECIALS (ANSI/AWWA C200, MODIFIED)

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall provide fittings, closure pieces, bends, elbows, reducers, tees, wyes, bifurcations, crosses, outlets, manifolds, nozzles, steel pipe wall sleeves, bulkheads, other specials, piping and appurtenances fabricated from steel plate, sheet, or coils and pipe above ground, inside structures complete in place, and pipe encased in concrete, in accordance with ANSI/AWWA C200, C208 and Manual M11 as modified by the Contract Documents. Steel pipe shall be provided as required in Section 02571 – Steel Pipe, Mortar-Lined.
- B. The manufacturer of the steel pipe shall be made responsible for furnishing all the specials. Manufacture of steel pipe and specials shall be as specified in Section 02571 – Steel Pipe, Mortar-Lined.
- C. As part of the CONTRACTOR's Bid Documents, submit the qualifications for the specials manufacturer/fabricator. Qualifications of the specials manufacturer/fabricator shall be as specified in Section 02571 – Steel Pipe, Mortar-Lined.
- D. Fabrication. All specials shall be fabricated in the shop. No field fabrication of specials will be allowed unless specifically accepted by the OWNER. Approval will be based on clear demonstration by the manufacturer/fabricator that the manufacturer/fabricator has the appropriate equipment to mobilize to construct the specials in accordance with these Contract Documents for shop fabrication, including holding the appropriate tolerances, and performing the indicated testing.

1.02 RELATED WORK

- A. Section SS 804C Trenching, Excavation and Backfill
- B. Section 02571 Steel Pipe, Mortar-Lined
- C. Section 09910 Pipeline Coatings and Linings
- D. Section 09970 Painting and Protective Coatings
- E. Section 13110 Cathodic Protection System
- F. Section SS 804C Excavating, Trenching and Backfill

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G. Section SS 841A Hydrostatic Testing Operations

1.03 SUBMITTALS

- A. Certified Affidavits of Compliance. The CONTRACTOR shall submit certified affidavits of compliance for all steel pipe fabricated specials and other products or materials furnished under this Section. The requirements of Section 02571 – Steel Pipe, Mortar-Lined shall apply.
- B. Shop Drawings. The CONTRACTOR shall submit shop drawings and line layout diagrams of all steel pipe fabricated specials. All submittals required for steel pipe and related work as listed in Section 02571 – Steel Pipe, Mortar-Lined shall also be required for specials including the following:
 - 1. Shop drawings shall indicate the type, size and location of all reinforcement pieces.
 - 2. Detailed design drawings shall also be submitted for reinforced fittings and shall include developed plans or cut-out patterns, dimensioning of all fabricated pieces and welding requirements. The CONTRACTOR shall provide such detailed information for all reinforced fittings.
 - 3. Design criteria shall be submitted to the OWNER for review prior to manufacture of steel pipe fabricated specials.
 - 4. Pipe Manufacturer's Qualifications. Furnish a copy of pipe manufacturer's certification by Steel Plate Fabricator's Association (SPFA), International Organization for Standardization (ISO) 9001 or Lloyd's Register Quality Assurance Limited (LRQA) and documentation of manufacturer's experience in fabricating ANSI/AWWA C200 pipe.

1.04 QUALITY CONTROL AND ASSURANCE

- A. Inspection. All specials shall be subject to inspection at the place of manufacture/fabrication as specified in Section 02571, Steel Pipe, Mortar-Lined. A certified welding inspector shall be provided for shop fabrication work and shall have the responsibilities outlined in Section 02571, Steel Pipe, Mortar-Lined.
- B. Onsite Observation. Onsite observation shall be as specified in Section 02571, Steel Pipe, Mortar-Lined.

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- C. Welder Qualifications and Welding Procedure Specifications (WPS). All welder performance qualifications and WPS shall be in accordance with Section 02571, Steel Pipe, Mortar-Lined.
- D. Shop Tests. The CONTRACTOR shall be responsible for performing and paying for material shop tests. The OWNER shall have the right to witness all testing conducted by the CONTRACTOR; provided that the CONTRACTOR'S schedule is not delayed for the convenience of the OWNER. In addition to those tests specifically required, the OWNER may request additional samples of any material including mixed concrete and lining and coating samples for testing by the OWNER. The additional samples shall be furnished as part of the work. Testing shall be performed before joints have been coated or lined.
 - 1. Weld Tests. All welds shall be non-destructive tested at the specials fabricator's facility as specified below for various weld categories. Testing shall include submitting written documentation of procedures per Section V, and acceptance criteria shall be in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code (BPVC).
 - a. Butt Joint Welds. Spot radiographically examine pipe in accordance with paragraph UW-52 of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1. If, in the opinion of the OWNER, the welds cannot readily be radiographed, they shall be 100 percent ultrasonically examined.
 - b. Fillet Welds. Examine 100 percent of all fillet welds using the magnetic particle or dye penetrant inspection method.
 - c. Groove Welds. Ultrasonically examine 100 percent of all groove welds that cannot be readily radiographically spot examined.
 - d. Welds on pipe seams for previously successfully tested straight pipe do not need to be retested.
 - e. All Welds. In addition to other required tests, pipe manufacturer's certified welding inspector shall 100 percent visually examine each pass of all welds as a minimum.
 - f. Butt strap joints shall have an inside and outside weld and shall be air tested. Air test shall be low pressure from a ¼-inch threaded fitting between the welds. Air test pressure shall be 15 psi for 10 minutes with no loss of air pressure.
 - 2. Hydrostatic Tests. If specials have been fabricated from untested straight pipe, they shall be hydrostatically tested with a pressure equal to 1-1/2 times the design working pressure shown on the Drawings. If specials have been

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fabricated from successfully tested straight pipe, no additional hydrostatic test is required unless otherwise indicated. In no case shall shop test pressure be less than 150 psi. All fittings with crotch plates shall be hydrostatically tested as indicated regardless of whether or not the straight pipe sections used were previously tested.

- E. Field Testing. Field testing shall conform to the requirements of Section SS 841A Hydrostatic Testing Operations.

PART 2 PRODUCTS

2.01 GENERAL

- A. Markings. Markings shall be as specified in 02571, Steel Pipe, Mortar-Lined and Coated. In addition, a mark indicating the true vertical axis of the special shall be placed on the top and bottom of the special
- B. Specials. Specials shall include, but are not limited to fittings, closure pieces, bends, elbows, reducers, tees, wyes, bifurcations, crosses, outlets, manifolds, nozzles, steel pipe wall sleeves, bulkheads and other specials, piping and appurtenances fabricated from steel plate, sheet, or coils and pipe above ground, inside structures complete in place, and pipe encased in concrete as required to provide the work complete.

2.02 MATERIALS

- A. Steel. Steel for specials shall conform to the requirements of Section 02571, Steel Pipe, Mortar-Lined.
- B. Lining. Specials shall be lined using the same materials for straight pipe as specified in Section 02571, Steel Pipe, Mortar-Lined.
- C. Coating. Specials shall be coated as specified in Section 09910, Pipeline Coatings and Linings.
- D. Access Manways. Access manways with covers shall be as shown on Drawings, installed during fabrication and not in the field. No temporary utility access penetrations shall be allowed. All threaded outlets shall be forged steel suitable for 3,000 psi service and shall be as manufactured by Vogt or equal.
- E. Outlets, Tees, Wyes and Crosses.
 - 1. Outlets 12-inch and smaller shall be fabricated from ASTM A53, Type E or S, Grade B, standard weight steel pipe in the standard outside diameters, i.e., 12-3/4-inch, 10-3/4-inch, 8-5/8-inch, 6-5/8-inch and 4-1/2-inch. Unless otherwise shown, wall thickness and collar reinforcing shall be designed by

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the pipe manufacturer as specified. Collars shall be manufactured with the same steel as specified for the mainline piping.

2. In lieu of collar reinforcement, pipe or specials with outlets may be fabricated in their entirety of steel plate having a thickness equal to the sum of the pipe wall plus the required reinforcement.
 3. Fittings shall be manufactured with crotch plate reinforcements as shown on the Drawings or as required by design procedures in AWWA Manual M11, whichever requirements are more stringent.
- F. Closures and Correction Pieces. Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing indicated. The locations of correction pieces and closure assemblies shall be shown on the pipe layout drawings and shall be subject to the OWNER's review. Any change in location or number of said items shall be accepted by the OWNER. Closure pieces shall be welded inside and out at each joint.

2.03 DESIGN OF SPECIALS AND FITTINGS

- A. General. The specials shall be of the diameter and wall thickness shown on the Drawings, or in accordance with these Contract Documents. Where not otherwise shown, reinforcement for fittings shall be designed by the pipe manufacturer in accordance with AWWA Manual M11. Shop welding shall conform to the applicable provisions of the ASME BPVC. Except as otherwise provided herein, specials shall be fabricated from materials in full conformance with the requirements of Section 02571 - Steel Pipe, Mortar-Lined and Coated, ANSI/AWWA C200, and the dimensions of ANSI/AWWA C208.
- B. The minimum thickness of plate for pipe from which specials are to be fabricated shall be the thickness of adjacent mainline pipe, the thickness shown on the Drawings, or whichever is thicker.
- C. Design Pressure. All fittings and specials shall be properly reinforced to withstand the internal working and transient pressure, both circumferential and longitudinal, and external loading conditions. Specials and fittings shall be equal to adjoining pipe in pressure and external loading design strength.
- D. Bevels and Miters. Unless otherwise shown, the minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11-1/4 degrees. Moderate deflections and long radius curves shall be designed using beveled joint rings. The maximum total allowable

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angle for beveled joints shall be 3 degrees per pipe joint. Bevels shall be provided on the bell ends. Mitering of the spigot ends will not be permitted.

- E. Deflection at Joints. Minor field adjustments can be made by pulling standard joints. The maximum allowable angle for pulled joints shall be as specified in 02571, Steel Pipe, Mortar-Lined or the angle which results from a 3/4-inch pull out from normal joint closure, whichever is less.
- F. All horizontal deflections or fabricated angles shall fall on the horizontal alignment, as shown on the Drawings. All vertical deflections shall fall on the vertical alignment, and the pipe angle point locations shall match the locations shown on the Drawings.
- G. Joints. All joints and related work for field assembly of the pipe and specials shall conform to Section 02571, Steel Pipe, Mortar-Lined. All shop joints shall be complete penetration butt-welds unless otherwise shown.
- H. Steel Welding Fittings. Steel welding fittings for pipe spools and fittings 24 inches in diameter and smaller shall be in accordance with ANSI/ASME B16.9 conforming to ASTM A234. Taper pipe wall at welds at 4:1 for connection to pipe of different wall thicknesses. The CONTRACTOR shall be fully responsible for coordinating the difference in diameter convention between these specials and ANSI/AWWA C200/C208 pipe and fittings to provide complete piping systems as shown.
- I. Ends for Mechanical Type Couplings. Except as otherwise shown, where mechanical-type couplings are shown, the ends of pipe shall be shoulder banded with Type C collared ends using double fillet welds. Where pipe 12-inches in diameter and smaller is furnished in standard schedule thicknesses and where the wall thickness equals or exceeds the coupling manufacturer's minimum wall thickness, the pipe ends may be grooved.
- J. Where welded test heads or bulkheads are used, extra length shall be provided to each opening of the special. After removal of each test head, the special shall be trimmed back to the design points with all finished plate edges ground smooth, straight, and prepared for the field joint.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide all specials, bolts, nuts, gaskets, jointing materials and all other appurtenances as indicated to provide a complete and workable installation. Where pipe support details are indicated, the supports shall conform thereto and shall be placed as indicated; provided that the support for all exposed piping shall be

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complete and adequate regardless of whether or not supporting devices are specifically indicated. Where indicated, welded joints shall be provided. Unless otherwise indicated, all specials shall be installed in full conformance with Section 02571, Steel Pipe, Mortar-Lined. At no additional cost to the OWNER, CONTRACTOR shall install temporary bulkheads as necessary to secure the pipe at night and when pipe laying operations are not being performed. Temporary bulkheads shall be waterproof.

- B. Lining and Coating. Specials shall have the same lining and coating as the adjoining pipe. Specials shall be lined and coated using the same thickness, application and curing of lining indicated for straight pipe in accordance with the applicable AWWA or ASTM Standards, as modified in Section 02571, Steel Pipe, Mortar-Lined, Section 09910, Pipeline Coatings and Linings or by any other applicable sections in these Specifications with the following provisions.
1. Specials that cannot be lined centrifugally or with field lining equipment shall be lined by hand. In such case, the lining shall be reinforced with welded wire fabric positioned approximately in the center of the lining and in accordance with the requirements of ANSI/AWWA C205 for lining specials.
 2. Specials that cannot be mechanically coated shall be coated by hand-application. Coating applied in this manner shall provide protection equal to that specified for the pipe. Fittings may be fabricated from pipe that has been mechanically lined or coated. Areas of coating that have been damaged by such fabrication shall be removed and reapplied by hand-applications.
 3. Unless otherwise indicated, the exterior surfaces of pipe or fittings passing through a structure wall shall be polyurethane coated from the center of the wall or wall flange to the end of the underground portion of pipe or fitting.
 4. Pipe above ground or in structures shall be shop primed and field coated as specified in Section 09970, Painting and Protective Coatings.
 5. Portions of wall sleeves that penetrate into structures and will be embedded in concrete shall be shop-lined and coated in accordance with requirements for submerged conditions as specified in Section 09970, Painting and Protective Coatings.
- C. Shop Welded Surfaces. All weld seams on pipe surfaces that will have a coating as specified in Section 02571, Steel Pipe, Mortar-Lined and Section 09910, Pipeline Coatings and Linings.
- D. Handling and Storage. Specials handling and storage shall be as specified in Section 02571, Steel Pipe, Mortar-Lined.

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- E. Holiday Testing. Specials shall be tested for holidays as specified in Section 02571, Steel Pipe, Mortar-Lined and Section 09910, Pipeline Coatings and Linings.
- F. Protection of Specials. At all times when the work of installing pipe is not in progress, the pipe shall be protected as specified in Section 02571, Steel Pipe, Mortar-Lined.
- G. Pipe Cleanup. Maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the OWNER as specified in Section 02571, Steel Pipe, Mortar-Lined.
- H. Field Welding. Field welding shall conform to ANSI/AWS D1.1 and ANSI/AWWA C206.
- I. Markings. Markings shall be as specified in Section 02571, Steel Pipe, Mortar-Lined.
- J. Take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source. The CONTRACTOR shall assume full responsibility for any damage due to this cause, and shall at its own expense replace the pipe to its specified condition and grade if it is displaced due to floating. Maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the OWNER.

3.02 INSTALLATION OF FABRICATED SPECIALS, AND CONCRETE-ENCASED PIPE WITHIN STRUCTURES

- A. Trenches shall be kept dry in accordance with Section SS 804C Excavating, Trenching and Backfill when the pipe special is laid. The pipe and specials shall be laid to the line and grade indicated as specified in Section 02571 – Steel Pipe, Mortar-Lined and shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for jointing, the bedding shall be checked for firmness and uniformity of surface. Steel pipe encased in concrete within structures shall be hydrostatically tested in conformance with Section SS 841A Hydrostatic Testing Operations, prior to encasement.
- B. The pipe shall be appropriately supported in the proper position prior to placing steel reinforcement or concrete.
- C. Steel reinforcement shall be constructed around the pipe and supported in a manner that does not touch the pipe or provide any metallic contact with the pipe. Steel reinforcement shall conform to the requirements of Special Specification Item No. 301.
- D. Place concrete for encasement as shown on the Drawings. Construction joints shall be located in the encasement to limit the size of each placement in order to avoid cold joints and to prevent floatation of the pipeline.

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- E. Cathodic protection for fabricated specials shall conform to the requirements of Section 13110, Cathodic Protection System.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Steel pipe fabricated specials will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with steel pipe fabricated specials.

END OF SECTION

Special Specification

SECTION 05500

METAL FABRICATIONS AND CASTINGS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Submerged: A location at or below a point 1 foot 6 inches above maximum water surface elevation in water-holding basins and channels.

1.02 SUBMITTALS

- A. Shop Drawings.
 - 1. Metal fabrications, including welding and fastener information, plans, elevations, sections, and details.
 - 2. Specific instructions for concrete anchor installation, including anchor templates, drilled hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.
- B. Product Data. For the following:
 - 1. Paint products.
 - 2. Grout.
- C. Quality Control Submittals.
 - 1. Adhesive Anchors.
 - a. Manufacturer's product description and installation procedures.
 - b. Current test data or ICBO evaluation report.
 - c. Adhesive Anchor Installer Certification.
 - 2. Welder/welding operator qualifications.
 - 3. Welding inspector credentials.
 - 4. Testing agency personnel credentials.
 - 5. Welding Inspector's Report.

Special Specification

1.03 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.04 QUALITY ASSURANCE

- A. Use the latest editions of all standards referenced in this specification.
- B. Qualifications.
 - 1. Adhesive Anchor Installers: Trained and certified by manufacturer.
 - 2. Welder/Welding Operator: In accordance AWS DI. 1 (Annex E), AWS B2.1 (App. A), or ASME BPVC SEC IX (Form QW-484).
 - 3. Welding Inspector: Certified in accordance with AWS QC I, and having prior experience with the welding codes specified.
 - 4. Weld Testing Agency: Personnel performing tests shall be NDT Level 11 Certified in accordance with ASNT SNT-TC- I A.
- C. Regulatory Requirements.
 - 1. Ladders, Load Test.
 - a. Test assemblies with specified loads.
 - b. Cycle load 200,000 times to demonstrate fatigue resistance, then check for defects.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Shipment.
 - 1. Insofar as practical, factory assemble items specified herein.
 - 2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled, in a manner that will protect materials from damage, and facilitate identification and field assembly.

Special Specification

B. Storage of Adhesive.

1. Store adhesive cartridges on pallets or shelving in a covered storage area.
2. Control storage temperature in accordance with manufacturer's written instructions.
3. Dispose of cartridges if shelf life has expired.

1.06 SPECIAL GUARANTEE

- A. Manufacturer's extended guarantee or warranty, with OWNER named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the OWNER, removal and replacement of sidewalk doors found defective during a period of 5 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in Paragraph 9.3 of the General Conditions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, meet the following requirements

<u>ITEM</u>	<u>ASTM Reference</u>
Steel Shapes and Plates	A36 REV B
Steel Pipe	A501 or A53-90b, Type E or S, Grade B
Structural Steel Tubing	A500-90a, Grade B
Stainless Steel Bars:	A276, AISI Type 316
Shapes	A276, AISI Type 304
Steel Plate, Sheet, and Strip	A167, AISI Type 316
Bolts and Threaded Rods	A193, AISI Type 316, B8N4N, B8M2, or B8M3
Nuts	A194, AISI Type 316, B8NIN, B8M2, or B8M3
Steel Bolts and Nuts:	
Carbon Steel	A307 or A36 REV B
High-Strength	A325a, Type I
Galvanized Steel Bolts	A307 or A36 REV B, with Nuts Al 53 Zinc Coating, ANSI B 1.1
Eyebolts	A489
Threaded Rods	A36 REV B
Flat Washers (Unhardened)	F844; use Al 53 for Zinc
Coating Flat Washers (Hardened)	F436
Aluminum, Structural Shapes,	B209 and B308, Alloy 6061-T6

Special Specification

and Plates

Aluminum Bolts and Nuts

F468, Alloy 2024-T4 Cast Iron

A48, Class 35

2.02 CHECKERED PLATES

- A. Steel: FS QQ-F-461, Class 1, minimum 1/4 inch; galvanize after fabrication.
- B. Aluminum: ASTM B209, Alloy 6061-T6.

2.03 ANCHOR BOLTS/SLEEVES

- A. Anchor Bolts: As shown in FASTENER SCHEDULE at the end of this section and as specified in various equipment sections.
- B. Anchor Bolt Sleeves.
 - 1. Plastic.
 - a. Single unit construction with deformed sleeve.
 - b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - c. Material Requirements.
 - (i) Plastic: High density polyethylene.
 - (ii) Density: ASTM DI 505.
 - (iii) Vicat Softening Point: ASTM DI 525.
 - (iv) Brittleness Temperature: ASTM D746.
 - d. Manufacturer: Sinco West, Simi Valley, CA.
 - 2. Fabricated Steel: ASTM A36 REV B.

2.04 PIPE SLEEVES

- A. ASTM A53, Schedule 40 steel pipe sleeves with continuously welded 3/16-inch thick seep ring of outside diameter 3 inches greater than sleeve outside diameter. Galvanize in accordance with ASTM A1 23.

2.05 CONCRETE AND MASONRY ANCHORS

- A. General.

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1. AISI Type 316 stainless, galvanized, or zinc-coated steel. Refer to FASTENER SCHEDULE at the end of this section.
2. Current evaluation and acceptance reports by ICBO or other similar code organization.
3. Acceptable for use in potable water structures by EPA and local health agencies or NSF.

B. Wedge Anchors.

1. Manufacturers and Products.
 - a. ITW Ramset/Red Head, Wood Dale, IL; Trubolt Wedge Anchor.
 - b. Hilti, Inc., Tulsa, OK; Kwik-Bolt I I Stud Anchor.
 - c. The Rawlplug Company, New Rochelle, NY; Rawl-Stud Anchor.
 - d. Wej-lt Corp., Tulsa, OK; ANKRtite Wedge Anchor.

C. Expansion Anchors.

1. Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
2. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
3. Stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
4. Self-drilling anchors, snap-off or flush type, zinc-coated.
5. Nondrilling Anchors: Flush type for use with zinc-coated or stainless steel bolt, or stud type with projecting threaded stud.
6. Manufacturers and Products.
 - a. ITW Rainset/Red Head, Wood Dale, IL; Multi-Set I I Drop-In and Self Drill Anchors.
 - b. Hilti, Inc., Tulsa, OK; Hilti HDI Drop-In Anchor.

Special Specification

- c. The Rawiplug Company, New Rochelle, NY; Rawl Steel Drop-In and Rawl Saber-Tooth Anchors.

D. Sleeve Anchors.

1. Manufacturers and Products.

- a. ITW Ramset/Red Head, Wood Dale, IL; Dynabolt Hex Nut Sleeve Anchor.
- b. The Rawiplug Company, New Rochelle, NY, Hex Head Rawl-Bolt Anchor.
- c. Wej-It Corp., Tulsa, OK; Wej-It Sleeve Anchor.

E. Adhesive Anchors.

1. Anchor Rod.

- a. Stainless steel threaded rod, diameter as shown.
- b. Length as required to provide minimum depth of embedment.
- c. Clean and free of grease, oil, or other deleterious material.

2. Adhesive.

- a. ASTM C881.
- b. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments, with gray color after mixing.
- c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
- d. Nonsag, with selected viscosity based on installation temperature and overhead application where applicable.

3. Packaging.

- a. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.

Special Specification

- b. Cartridge Markings: Include manufacturer's name, product name, material type, batch or serial number, and adhesive expiration date.
- 4. Manufacturers and Products.
 - a. Adhesives Technology Corp., Kent, WA; Anchor-It Fastening Systems, HS 200 Epoxy.
 - b. ITW Ramset/Red Head, Wood Dale, IL; Epeon Ceramic 6 Epoxy Anchor System.
 - c. Covert Operations Inc., Signal Hill, CA; CIA-Gel 7000 Epoxy Anchors.
 - d. The Rawlplug Co., Inc., New Rochelle, NY; Foil Fast Epoxy Injection Gel System.
 - e. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System (HIT C-I 00).
 - f. Ackerman Johnson Fastening Systems, Inc., Addison, IL; Poly-All PAC-24 Epoxy.
 - g. Unitex, Kansas City, MO. Pro-Poxy 300.

2.06 VAULT LADDERS

- A. Material: Steel.
- B. Fabricate ladders with rails, rungs, landings, and cages to meet applicable requirements of OSHA. CFR Part 1910.27, and ANSI A 14.3.
 - 1. Concentrated load of 250 pounds plus 30 percent impact on rungs.
 - 2. Maximum rung deflection of 1/360.
 - 3. Concentrated load of 250 pounds plus 30 percent impact between consecutive attachments.
 - 4. Self-closing gates at all landings.
- C. Flat Bar Ladders.
 - 1. Punch rails, pass rungs through rails, and weld on outside.
 - 2. Weld brackets to the ladder for fastening ladder to wall.

Special Specification

3. Hot-dip galvanize steel after fabrication in accordance with ASTM A123 and A385.
- D. Ladder Safety Post.
1. Telescoping tubular, spring balanced and automatically locking in the raised position, with release lever for unlocking.
 2. Hot-dip galvanized post.
 3. Spring Mechanism: Corrosion-resistant steel alloy.
 4. Furnish dissimilar metal protective coatings at connections.
 5. Manufacturer and Product: Bilco Co., New Haven, CT; "Ladder Up" to fit ladder rungs.

2.07 VAULT ACCESS COVERS

- A. Slab-type waterproof manhole frame and flush cover.
1. ASTM A48, Class 35, cast iron.
 2. Light-duty.
 3. 4-inch to 6-inch casting depth.
 4. Minimum Weight 290 pounds.
 5. Manufacturers.
 - a. Neenah Foundry Co., Neenah, WI.
 - b. Flockhart Foundry Co., Newark, NJ.
- B. Sidewalk Doors.
1. Exterior type waterproof aluminum single- or double-leaf.
 2. Component Fabrication.
 - a. Access Door Leaf(s): 1/4-inch diamond pattern plate with reinforcing on underside to withstand live load of 300 pounds per square foot with maximum deflection of 1/150th of the span.
 - b. Channel Frame: 1/4-inch with full anchor flange around perimeter.

Special Specification

- c. Equip door(s) with heavy forged brass or stainless steel hinges with stainless steel pins.
- d. Hinges.
 - (i) Through-bolt to cover with tamper-proof stainless steel bolts or "lock bolts" to resist vandalism.
 - (ii) Through-bolted to frame with stainless steel bolts and fiber locknuts.
- e. Equip doors with fully enclosed and lubricated compression springs with lower enclosing telescopic tube locked into supporting "boot" firmly attached to frame to retard downward motion of door leaves or corrosion-resistant stainless steel gas springs designed to limit to 17 pounds the lifting force required to open.
- f. Equip doors with hold-open arm with positive locking device with conveniently positioned release handle for easy and controlled closing.
- g. Furnish stainless steel snap lock mounted on bottom of leaf with removable topside handle and socket recessed in cover and provided with threaded plug for flush surface with handle removed.
- h. Provide recessed padlock hasp covered by a hinged lid flush with the surface, accessible from the exterior.
- i. 1/2-inch drainage coupling in front right corner of channel frame.
- j. Hardware: AISI Type 304 stainless steel.
- 3. Aluminum Finish: Mill finish with bituminous coating applied to surfaces in contact with concrete.
- 4. Manufacturers.
 - a. Bilco Co., New Haven, CT.
 - b. Thompson Fabricating Co., Birmingham, AL. C. Nystrom Products Co., Minneapolis, MN.

2.08 ACCESSORIES

- A. Antiseizing Lubricant: Loc Tite Co., Permatex.
- B. Neoprene Gasket.

Special Specification

1. ASTM D1056-91-RE-41-E, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases. unless otherwise shown.
2. Thickness: Minimum 1/4-inch.
3. Furnish without skin coat.
4. Manufacturers and Products.
 - a. Rubatex Division of Great American Industries, Bedford, VA;
 - b. Rubatex No. R-41 I -N.
 - c. Garlock Manufacturing, San Francisco, CA.

2.09 FABRICATION

A. General.

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Material Thinner than 1/8 Inch: Either galvanize before fabrication in accordance with ASTM A525, Coating Designation G210, or after fabrication in accordance with ASTM A123, except the weight of zinc coating shall average minimum 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1 ounce per square foot.
7. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
8. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

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9. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- B. Materials: Use steel shapes unless otherwise noted.
- C. Fabrication.
1. Fit and assemble in largest practical sections for delivery to site. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
 2. Fabricate as shown on Drawings and in accordance with ASTM A385.
 3. Welding.
 - a. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
 - b. Steel.
 - (i) Meet requirements of AWS DI.1 for techniques of welding employed, appearance, quality of welds made, and the methods of correcting defective work. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately.
 - (ii) Meet visual acceptance standards of AWS DI.1, Paragraph 8.15. 1. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - (iii) Complete welding before applying finish.
 - (iv) Aluminum: Meet requirements of AWS D1.2.
 4. Use fasteners as shown or scheduled.
 5. Grind cut edges smooth and straight.
- D. Finish.
1. ASTM A123 hot-dip galvanize after fabrication, Shop prime with rust-inhibitive primer, unless otherwise noted.

Special Specification

2. For items to be embedded in concrete, coat with zinc rich primer.
 3. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.
 4. Except for inlet grates not otherwise required to be welded, completely seal edges of tightly contacting surfaces, where galvanizing is required, by welding before galvanizing.
- E. Watertight Seal: Where required or shown, furnish rubatex gaskets of a type that is satisfactory for use in contact with sewage. Cover all bearing surfaces.
- F. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.
- G. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.
- H. Aluminum.
1. Fabricate in accordance with AA 30 and manufacturers' recommendations as approved.
 2. Grind smooth sheared edges exposed in finished work.

PART 3 EXECUTION

3.01 INSTALLATION OF METAL FABRICATIONS

- A. General.
1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
 2. Install rigid, substantial, and neat in appearance.
 3. Erect steel in accordance with AISC Code of Standard Practice for Steel Buildings and Bridges.
 4. Install manufactured products in accordance with manufacturer's recommendations.
 5. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
 6. Field weld components indicated.

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7. Perform field welding in accordance with AWS DI. 1.
8. Obtain OWNER approval prior to site cutting or making adjustments not scheduled.
9. After erection, apply prime or galvanize coating to welds, abrasions, and surfaces not in contact with concrete.

B. Erection Tolerances.

1. Maximum Variation from Plumb: 1/4-inch per story, non-cumulative.
2. Maximum Offset from True Alignment: 1/4-inch.

C. Aluminum.

1. Erection: In accordance with AA 30.
2. Do not remove mill markings from concealed surfaces.
3. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.

D. Pipe Sleeves.

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide a center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide a rubber caulking sealant or a modular mechanical unit to form a watertight seal in the annular space between pipes and sleeves.

3.02 ANCHOR BOLTS

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.
- B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.

Special Specification

- C. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.03 CONCRETE ANCHORS

- A. Begin installation only after concrete to receive anchors has attained design strength.
- B. Do not install an anchor closer than six times its diameter to an edge of concrete or masonry or closer than twelve diameters to another anchor, unless shown otherwise.
- C. Install in accordance with manufacturer's instructions.
- D. Use only drill type and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air.
- E. Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F.

3.04 ACCESS COVERS

- A. Install in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor surface.
- C. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.

3.05 ELECTROLYTIC PROTECTION

- A. Aluminum.
 - 1. Where in contact with dissimilar metals, or embedded in masonry or concrete, protect surfaces with zinc rich primer.
 - 2. Allow coating to dry before installation of the material.
 - 3. Protect coated surfaces during installation.
 - 4. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.
- B. Titanium: Where titanium equipment is in contact with concrete or dissimilar metals, provide full-face neoprene insulation gasket, 3/32-inch minimum thickness and 70 durometer hardness.

Special Specification

C. Painted Galvanized Surfaces: Prepare as follows: [NOT USED]

3.06 MANUFACTURERS' SERVICES

A. Adhesive Anchors: Conduct site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify OWNER of time and place for sessions.

3.07 FASTENER SCHEDULE

A. Provide fasteners sufficient for the intent.

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases		
Dry Area	Stainless steel bolts, unless otherwise specified with equipment	
Submerged or Wet Areas	Stainless steel bolts with fusion bond coating unless otherwise specified with equipment	
Anchor Bolts Into Concrete for Metal Fabrications and Structural Components		
Dry or Protected Areas	Zinc-coated steel bolts	
Exterior, Wet Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating	
Anchors for Metal Components to Concrete (e.g., Electrical Panels and Equipment)		
Dry Areas	Zinc-coated or stainless steel wedge or expansion anchors	
Wet and Damp Areas	Adhesive stainless steel anchors	
Submerged or Buried in Earth	Adhesive stainless steel anchors	
Connections for Structural Steel Components		
Exterior and Interior	High-strength zinc-coated steel bolts	
Connections for Steel Fabrications and Wood Components		
Exterior and Interior	Zinc-coated steel bolts	
Connections of Aluminum Components		
Exterior and Interior	Aluminum or stainless steel bolts	
All Others		
Exterior and Interior	Stainless steel fasteners	

Special Specification

- B. Antiseizing Lubricant: Use on all stainless steel threads.
- C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Metal fabrications and castings will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with metal fabrications and castings. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

-END OF SECTION-

Special Specification

SECTION 09910

PIPELINE COATINGS AND LININGS

PART 1 GENERAL

1.01 WORK RESULTS

- A. This section covers the work necessary to apply external polyurethane coating on steel pipe, field coating of joints, and field repair of coating damage, complete.
- B. Exposed steel pipe will be coated as specified in Section 09970, Painting and Protective Coatings, unless specifically specified otherwise.

1.02 SUBMITTAL REQUIREMENTS

- A. CONTRACTOR submittals shall be made in accordance with these Specifications.
- B. Shop Drawings: Catalog cuts and other information for all products proposed. Provide copy of approved coating system submittals to the coating applicator.
- C. Quality Control Submittals: Furnish the following:
 - 1. Applicator's Experience with list of references substantiating compliance.
 - 2. Coating manufacturer's certification stating the applicator meets or exceeds their coating application requirements and recommendations.
 - 3. Coating manufacturer shall provide a copy of the manufacturer's coating application quality assurance manual.
 - 4. If the manufacturer of field-applied coating differs from that of the shop applied primer, provide written confirmation from both manufacturers' that the two coating materials are compatible.
- D. Provide copies of Certified Test Reports for all coating and lining tests.

1.03 QUALITY ASSURANCE

- A. Coating Applicator's Experience and Certification:
 - 1. Coating Application Company and coating application supervisor (Certified Applicator) shall have a minimum of 5 years experience

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applying the specified coating system. Coating application personnel, whom have direct coating application responsibility, shall have a minimum of 2 years practical experience in application of the indicated coating system.

2. Coating applicator shall be certified by the coating manufacturer as an approved applicator.
- B. Coating and/or lining manufacturer technical representative shall be present for a minimum of three days technical assistance and instruction at the start of coating and/or lining operations within the shop. During this visit, the technical representative shall observe surface preparation and coating application and conduct tests of the coating to insure conformance with application instructions, recommended methods, and conditions.
- C. Coating and/or lining manufacturer's technical representative shall be onsite for three working days, minimum, at the start of each construction season to inspect coating application and procedures in the field. During this visit, the technical representative shall observe surface preparation and coating application and conduct tests of the coating to insure conformance with application instructions, recommended methods, and conditions.
- D. Coating and/or lining manufacturer shall include 8 hours per month of field or shop coating technical support when requested by the Engineer.
- E. Technical representative shall provide a written report to the Engineer for each visit. Report shall include copies of test data collected, description of observations, and all recommended corrective actions. Report shall be submitted within 5 working days after the visit. When deemed necessary by the Engineer, work will not be permitted to proceed until the recommended corrective actions have been implemented. After all corrective recommendations have been completed; the manufacturer representative shall return and certify that the application complies with the manufacturer's coating application recommendations.
- F. Additional visits by the manufacturer's representative shall be made at sufficient intervals during surface preparation and coating or lining as may be required for product application quality assurance, and to determine compliance with manufacturer's instructions, and as may be necessary to resolve problems attributable to, or associated with, manufacturer's products furnished for this project.

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1.04 ABBREVIATIONS

MDFT	Minimum Dry Film Thickness
mil	Thousandths of an Inch

1.05 DEFINITIONS

Manufacturer's Representative: Employee of coating manufacturer who is factory trained and knowledgeable in all technical aspects of their products and systems. Sales representatives are not acceptable as a technical representative unless written authorization from the coating manufacture is provided which states the sales representative has full authority to act on the behalf of the coating manufacturer.

1.06 REFERENCE STANDARDS

AWWA C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe-4-inch and Larger- Shop Applied.
AWWA C209	Cold Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
AWWA C210	Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
AWWA C216	Heat-shrinkable Cross-linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
AWWA C217	Cold-Applied Petrolatum Tape and Petroleum Wax Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
AWWA C222	Polyurethane Coatings for Interior and Exterior of Steel Water Pipe and Fittings
NACE RP-0274	High Voltage Electrical Inspection of Pipeline Coatings Prior to Installation.
SSPC-SP-1	Solvent Cleaning Surface Preparation
SSPC-SP-2	Hand Tool Cleaning Surface Preparation
SSPC-SP-3	Power Tool Cleaning Surface Preparation
SSPC-SP-5	White metal Abrasive Blast Surface Preparation

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SSPC-SP-6	Commercial Abrasive Blast Surface Preparation
SSPC-SP-10	Near White Metal Abrasive Blast Surface Preparation
SSPC-SP-11	Power Tool Cleaning to Bare Metal

1.07 SPECIAL WARRANTY REQUIREMENTS

The CONTRACTOR and coating applicator shall warrant to the OWNER and guarantee the work under this section against defective workmanship and materials for a period of two (2) years commencing on the date of final acceptance of the work.

1.08 OBSERVATION OF WORK

- A. The CONTRACTOR shall give the OWNER Representative a minimum of 14 days advance notice of the start of any work to allow scheduling for shop or field observation. Provide OWNER Representative a minimum 3 days' notice for actual start of surface preparation and coating application work.
- B. Provisions shall be made to allow OWNER's representative full access to facilities and appropriate documentation regarding coating application.
- C. Observation by the OWNER's representative or the waiver of observation of any particular portion of the work shall not be construed to relieve the CONTRACTOR of his responsibility to perform the work in accordance with these Specifications.
- D. Materials shall be subject to testing for conformance with these specifications as the OWNER's representative may determine, prior to or during incorporation into the work.

PART 2 MATERIALS

2.01 GENERAL

- A. Exterior and interior pipe and fitting surfaces shall be prepared and coated in accordance with referenced standards, written directions of the coating or lining manufacturer's, and these specifications, whichever is more stringent.
- B. Coatings and linings will be stored, handled, and applied per manufacturer's written directions.
- C. Pipeline coating or lining shall be the product of a single manufacturer. Product substitutions during the project will not be permitted.

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2.02 EXTERIOR SHOP-APPLIED COATINGS

A. General

1. Steel pipe shall be coated in accordance with AWWA C222, except as modified herein.
2. Pipe that is atmospherically exposed shall be shop primed as specified herein and Section 09970, Painting and Protective Coatings.
3. Buried dielectrically coated pipe and fittings passing through a structure wall or floor shall be coated for a minimum of two-inches beyond the interior wall or floor surface.

B. Plural Component Polyurethane:

1. General: Plural component, polyurethane coating system (referred to as a polyurethane system) shall be applied in accordance with AWWA C222, and as modified herein.
2. Shop Surface Preparation:
 - a. Steel pipe: SSPC-SP5, White Metal blast, 3.00 mil profile, minimum, or as required by the manufacturer, whichever is greater using standardized testing procedures including Press-O-Film and micrometer.
3. Shop Applied Coating Requirements:
 - a. Self-priming, plural component, 100 percent solids, non-extended polyurethane, suitable for burial or immersion.
 - b. One coat, 35 mils total dry film thickness, minimum, or as required to meet the holiday and coating defects limits specified this section.
 - c. Shall be one of the following products, subject to review and acceptance of submitted product performance reports:
 1. Protec II, Futura Coatings, Montgomeryville, PA.
 2. Chemthane 2265, Chemline, Inc, St. Louis, MO.
 3. Polyclad 777, Carboline Global, St. Louis, MO.

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4. Durashield 110 or Durashield 210, LifeLast, Pflugerville, TX.
 5. No approved equal.
- d. Acceptance of submitted product is contingent upon:
1. Submission of an independent testing report conducted within three years prior to bid opening documenting conformance to the coating performance criteria specified herein.
 2. Verification that no significant change in product formulation has occurred through comparison of current product Part A and B formulation with infrared spectrometry analysis of test product for the laboratory test report.
4. Laboratory Coating Testing and Report:
- a. General: Coating manufacturer shall submit to the Engineer for approval, test reports indicating conformance to the specified performance criteria using prepared samples as defined using coating materials conforming to the following general requirements:
1. Polyurethane coating material tested shall have been manufactured within 30 days of test sample preparation.
 2. Coating material to have a minimum of three years prior pipeline coating application history.
 3. Extended polyurethane coatings will not be acceptable.
 4. Submission of incomplete reports, use of test procedures or methods other than those specified, or preparation of samples with a coating material other than those listed will result in rejection of the coating.
 5. Reports shall be submitted for review and approval not less than 30 days prior to coating application along with current product data sheets and MSDS sheets for parts A and B.
 6. New product formula tests shall be accompanied with Part A and B wet samples for infrared spectrometry analysis.

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Wet samples shall be from the lot and batch tested and shall be collected and seal by the Engineer for laboratory analysis by the Engineer.

b. Test Sample Preparation:

1. Coating manufacturer to provide 10 days advanced notification of coating sample preparation for Engineer observation.
2. Failure to fully conform to the preparation requirements will result in rejection of the submitted coating material.
3. Sample preparation completed by the coating manufacturer shall be fully documented and reported to the testing agency by the manufacturer.
4. All coating test samples shall be prepared in conformance with the following general requirements.

c. Sample Surface preparation

1. Method: Abrasive Blast, Green Diamond or Steel Grit, SSPC-SP5, White Metal
2. Profile: 3.25 mils (± 0.25 mils), Angular profile, 90 Peak Count per inch minimum, measured and recorded using surface profilometer.

d. Coating Application:

1. Method: Spray film, in accordance with manufacturer's written shop application requirements.
2. Thickness: 35 mils, minimum
3. Cure: Air cure only, oven or other accelerated cures will not be acceptable.
4. Form: Sheet, steel panel, or steel pipe as required for test procedure.

e. Sample Quantity: Three minimum for each test performed or as required by the ASTM Test Standard, whichever is more stringent.

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f. Coating Tests:

1. Testing shall be performed by a certified independent laboratory testing agency with a minimum five years experience in the performance of ASTM test procedures on coating systems.
2. All testing shall be at room temperature, unless specifically required otherwise by the ASTM test procedure.

g. Reporting

1. As required by the ASTM test method, and the following additional information:
 - a. Sample panel preparation date and identification
 - b. Surface preparation method and abrasive
 - c. Surface Preparation profile and peak count
 - d. Coating lot and date of manufacture
 - e. Application spray gun and equipment used
 - f. Application temperatures of coating materials and material temperature at the gun, ambient temperature, and panel surface temperature
2. Include all periodic test data and/or observations for all tested samples and show all multiple measurements in both table and graph.
3. Show all calculations as required by the ASTM test method.
4. Include digital photographic documentation of all visual assessments, test apparatus, and final panel condition using 4 mega pixels minimum resolution.
5. Submit reports in both PDF and color printed format with photographs in JPEG format on USB.

C. Exterior Coating for Exposed Steel Pipe

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All atmospherically exposed or vault piping shall be shop coated with the coating system as specified in Section 09970 Painting and Protective Coatings.

2.03 INTERIOR SHOP-APPLIED LININGS

A. Cement Mortar Lining:

1. Clean and cement mortar line steel pipe and fittings in accordance with AWWA C205.
2. Cement: Conform to ASTM C150, Type II.
3. Shop applied cement mortar lining shall be uniform in thickness over the full length of the pipe joint.
4. Aggregate shall be silica sand or other aggregate that is not subject to leaching. Conform to ASTM C33.
5. Water for cement mortar: Clean and free from organic matter, strong alkalis, vegetable matter, and other impurities.

B. Liquid Applied Epoxy Lining:

1. Provide liquid epoxy primer and lining in all cement mortar lined metallic pipe at insulating joints for a minimum of two pipe diameters on each side of the insulated joint.
2. Epoxy coatings shall be NSF approved coatings suitable for potable water contact in accordance with ANSI/NSF Standards 60 and 61.
3. Epoxy shall be applied over the cement mortar lining where specified for the pipeline lining material.
4. Prepare the cement mortar lining by abrasive blasting to remove all laitance and provide a surface profile.
5. Cement mortar shall be allowed to cure for a minimum of 15 days prior to surface preparation and coating application or 7 days with steam curing.
6. Mortar lining shall be dry when epoxy lining is applied.

2.04 SPECIALS, FITTINGS, AND CONNECTIONS

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- A. Coating and lining application for special sections, connections, and fittings for steel or ductile iron pipe shall conform to coating system and application requirements as specified in this section.
- B. Specials, fittings, and connections shall be defined as any pipe section with turnouts for blowoffs, interconnects, any valve, or other appurtenances; tees; crosses; wyes; laterals; manholes; mitered angles or elbows; and pipes which require special fabrication that prevents mechanical production application of the specified coating system from end to end of pipe joint.
- C. In addition to the items listed as specials, the following items shall also be considered as specials:
 - 1. Pipe joints with pass through holes.
- D. Hand applied tape coatings will not be permitted on any specials, fittings, connections, and elbow fittings.
- E. Specials, fittings, and connections shall be externally coated with polyurethane coating system applied from end to end of pipe joint on all specials, fittings, and connections.

2.05 EXTERIOR FIELD JOINT COATING

- A. Pipe joints shall be field coated after pipe assembly in accordance with AWWA C216, or C217, whichever is applicable and as specified herein.
- B. Field joint coating shall be compatible with the shop-applied coating system and provided by the same manufacturer or a manufacturer approved by the pipe coating manufacturer.
- C. All joints on pipe 24-inches in diameter or greater shall be coated with a heat shrink coating material.
- D. Field joint coating materials shall be as follows or an approved equal.
 - 1. Heat Shrink Sleeves:
 - a. Filler Material:
 - 1. Provide filler material for all push-on, flange, and coupling type joints and at all changes in outside diameter are greater than 1/8-inch.

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2. Filler material shall adhere to the pipe and heat shrink sleeve. Size and type shall be as recommended by the sleeve manufacturer for type of pipe and joint.
 3. Filler mastic for joints subject to weld after backfill shall exceed 500 degrees F melt point temperature.
 4. Filler material shall be applied in a manner and of sufficient thickness that no tenting or voids remain under the heat shrink sleeve.
- b. Joint Coating:
1. Heat shrink, cross-linked polyolefin wrap or sleeve with a mastic sealant, 85-mils nominal thickness, suitable for pipeline operating temperature, as recommended by the manufacturer.
 2. Provide standard recovery sleeve for welded or bell and spigot steel pipe joints. High recovery sleeves shall be provided for flange joints and coupling style joints.
 3. Width of heat shrink sleeves shall be sufficient to overlap existing coating 2-inches minimum.
 4. Consider sleeve shrinkage during installation and joint profile in determining sleeve width required. Overlapping of two or more heat shrink sleeves to achieve the necessary width on pipe joints will not be permitted without Engineer approval.
 5. Sleeve shall meet requirements for “Weld After Backfill” when allowed and approved by Engineer.
- c. Holdback Primer: As specified this section
- d. Manufacturer’s: Berry-CPG Covalence WaterWrap
2. Wax Tape Coating:
- a. Apply coating in accordance with AWWA C217, except as modified herein.
 - b. Wax tape coatings shall be field applied on all buried flexible joints, thrust restraint rods and brackets, and on joints, fittings, or

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irregular shapes or complex configurations that are not suited for the use of heat shrink coating system.

- c. Do not use wax tape coating systems on vault piping, atmospherically exposed piping and appurtenances, or where subject to UV exposures.
- d. Provide filler material to fill and smooth all irregular surfaces, such that no tenting or voids remain under the applied wax tape.
- e. Use sand backfill to protect wax coating from damage.
- f. Coating System:
 - 1. Surface Preparation: SP11 Power Tool to Bare Metal.
 - 2. Primer: petroleum or petrolatum wax
 - 3. Filler Material: Filled petroleum or petrolatum wax
 - 4. Inner Tape: Petroleum or petrolatum wax impregnated fabric, 6-inch width maximum, 40 mils thick
 - 5. Outer Wrap: PVC or tape suitable for application to inner tape.
- g. Wax tape coating system shall be as manufactured by:
 - 1. Denso North American
 - 2. Trenton
 - 3. Or approved equal.

2.06 INTERIOR FIELD JOINT COATING

A. Mortar Lining:

- 1. After the backfill has been completed to final grade, the interior joint recess shall be filled with grout. The grout shall be tightly packed into the joint recess and troweled flush with the interior surface. Excess shall be removed.
- 2. At no point shall there be an indentation or projection of the mortar exceeding 1/16-inch.

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3. With pipe smaller than 24-inches in diameter, before the spigot is inserted into the bell, the bell shall be daubed with grout. The joint shall be completed and excess mortar on the inside of the joint shall be swabbed out.

2.07 REPAIR OF COATINGS AND LININGS

A. General

1. Coating or lining repair materials shall be compatible with the shop-applied coating or lining system and shall be approved by the coating or lining manufacturer.
2. All major repairs on pipe greater than 24-inches in diameter or coated with polyurethane coating system shall be repaired using heat shrink sleeves as specified for field joint coating in accordance with C216, except as modified herein.
3. Minor coating repairs for polyurethane coated or exposed pipe shall be as specified herein.

B. Coating Repair Materials

1. Heat Shrink Sleeves (major repair):
 - a. Filler Mastic: Provide mastic filler to fill tape void as required.
 - b. Full Wrap Coating: Cross-linked polyolefin wrap with a mastic sealant, 85-mil thickness nominal, suitable for pipeline operating temperature, sleeve material recovery as recommended by the manufacturer. Sleeve length shall provide a minimum of 3 inches overlap onto intact pipe coating.
 - c. Manufacturer's: Berry-CPG Covalence WaterWrap
2. Heat-Applied Patches (minor repair)
 - a. Heat applied adhesive, polyolefin backed, mastic coated tape, 12-inches maximum size.
 - b. Patch shall provide a minimum of 2 inches overlap onto intact pipe coating.
 - c. PERP patch as manufactured by Raychem (Polyken).

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C. Polyurethane Coating

1. Polyurethane coating system repair shall be in accordance with the coating manufacturer's recommended procedures.
2. Coating material for minor repairs shall be single use kits or other mix ratio controlled packages of slow set polyurethane coating material similar to the existing coating.
3. Major repairs will be completed using the coating material specified for the coating or the lining. Coating shall be reapplied using plural component spray equipment by a manufacturer certified coating applicator.

D. Exposed Pipe Coating System

Touch-up repair all damage to the primer and/or intermediate coats with the specified coating system prior to final coating of the pipeline in accordance with Section 09970, Painting and Protective Coatings.

PART 3 EXECUTION

3.01 ENVIRONMENTAL LIMITATIONS

A. General

1. Products shall comply with federal, state, and local requirements limiting the emission of volatile organic compounds and worker exposure.
2. Comply with applicable federal, state, and local, air pollution and environmental control regulations for surface preparation, blast cleaning, disposition of spent aggregate and debris, and coating application.
3. Do not perform abrasive blast cleaning whenever the relative humidity exceeds 85 percent, whenever surface temperature is less than 5 degrees above the dew point of the ambient air.
4. Do not apply coatings when:
 - a. Surface and ambient temperatures exceeds the maximum or minimum temperatures recommended by the coating manufacturer or these specifications,
 - b. In dust or smoke-laden atmosphere, blowing dust or debris, damp or humid weather, or under conditions that could cause icing on the metal surface.

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- c. For epoxy coatings or linings when it expected that surface temperatures would drop below 5 degrees above dew point within 4 hours after application of coating.
- d. Whenever relative humidity exceeds 85 percent for polyurethane coating application.
- 5. Where weather conditions or project requirements dictate, CONTRACTOR shall provide and operate heaters and/or dehumidification equipment to allow pipe surfaces to be abrasive blasted and coated as specified and in accordance with the manufacturers coating application recommendations.
- 6. Work activities can be restricted by the Engineer until adequate temperature and humidity controls are in place and functioning within the environmental limits specified.
- 7. Coating applicator shall provide a monitoring system approved by the coating manufacturer that constantly records pipe and coating conditions during coating application. Recorded monitoring parameters shall include pipe temperature, line speed, surface preparation, holiday test and other parameters applicable to the type of coating.

B. Temperature Control

- 1. In cold weather or if moisture collects on the pipe, preheat pipe to a temperature between 45 and 90 degrees and 5 degrees above dew point, whichever is greater.
- 2. When temperatures are above or below the coating manufacturers recommended application temperatures, the CONTRACTOR will provide temperature controls as necessary to permit work to precede within the manufacturer's temperature limitations.
- 3. Provide tenting, insulating blankets, baffles, or bulkheads as required to zone and control heating or cooling effectiveness.
- 4. Heating shall be with indirect fired heaters that do not increase humidity levels within the work area. Heaters shall be sized for the area to be heated.

C. Dehumidification

- 1. CONTRACTOR shall provide dehumidification equipment when necessary for shop or field environmental control during surface preparation and/or coating application. Dehumidification equipment shall

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be properly sized to maintain dew point temperature 5 degrees or more below surface temperature of metal surfaces to be cleaned and coated.

2. Cleaned metal surfaces shall be prevented from flash rusting throughout the project duration, condensation or icing shall be prevented throughout surface preparation and coating application.
3. Equipment size and power requirements shall be designed by personnel trained in the operation and setup of dehumidification equipment based on project requirements and anticipated weather conditions.
4. Dehumidification equipment shall operate 24 hours per day and continuously throughout surface preparation and coating application.
5. CONTRACTOR to provide personnel properly trained in the operation and maintenance of the dehumidification equipment or provided training by the dehumidification equipment supplier.
6. Daily maintenance requirements of the equipment shall be documented in writing and posted near the equipment for review by the Engineer.
7. Reblasting of flash rusted metal surfaces or removal of damaged coatings, because of equipment malfunction, shutdown, or other events that result in the loss of environmental control, will be at the sole expense of the CONTRACTOR.

3.02 SURFACE PREPARATION

A. General

1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of coating manufacturer whose product is to be applied.
2. Visible oil, grease, dirt, and contamination shall be removed in accordance with SSPC-SP1, solvent cleaning.
3. Surface imperfections such as metal slivers, burrs, weld splatter, gouges, or delaminations in the metal shall be removed by filing or grinding prior to abrasive surface preparation.
4. Protect prepared pipe from humidity, moisture, and rain. All flash rust, imperfections, or contamination on cleaned pipe surface shall be removed by reblasting.

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5. Priming and coating of pipe shall be completed the same day as surface preparation.

B. Weld Surface Preparation

Requirements: Spray applied coating systems do not require weld grinding.

C. Steel Surface Preparation

1. Surface preparation of steel pipe shall be in accordance with SSPC surface preparation standards utilizing the degree of cleanliness specified in Section 2.02.B.2.a.
2. Grit and/or shot abrasive mixture and gradation shall be as required to achieve the degree of cleanliness and coating adhesion specified.
3. Pipe cleaned by abrasive blasting with recyclable steel grit and/or shot or other abrasive shall be cleaned of debris and spent abrasive in an air wash separator.
4. Polyurethane coating system shall have a sharp angular surface profile of the minimum depth specified.
5. Work shall be performed in a manner that does not permit the cleaned metal surface to rust back or flash rust.
6. Rust back or flash rust shall be fully removed with the steel surface cleanliness equal to the metal surface cleanliness prior to rust back or flash rusting. Determination of the equivalent surface cleanliness shall be at the Engineer's sole discretion.

3.03 SHOP -APPLIED COATING SYSTEMS

A. Polyurethane Coating or Lining

1. Applicator Qualifications:
 - a. Equipment will be certified by the coating manufacturer to meet the requirements for material mixing, temperature control, application rate, and ratio control for multi-part coatings.
 - b. Equipment not meeting the written requirements of the coating manufacturer shall be rejected for coating application until repairs or replacement of the equipment is made to the satisfaction of the Engineer.

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- c. Personnel responsible for the application of the coating system shall have certification of attendance at the coating manufacturer's training class within the last three years. The certified applicator shall be present during all coating application work and shall have responsibility for controlling all aspects of the coating application.
2. Pipe surface temperature shall be between 50 and 100 degrees F or 5 degrees F above dew point, whichever is greater.
3. Coating application shall be performed in an environmentally controlled shop area that meets or exceeds the written environmental application requirements of the coating manufacturer. Application in outdoor conditions will not be acceptable without adequate environmental shelter, environmental controls, and/or dehumidification.
4. Coating adhesion and holidays testing shall be tested as specified in this section.
5. Coating manufacturer shall provide to the Engineer a copy of the manufacturer's coating application quality assurance manual prior to beginning coating application. Strict conformance to the requirements of the manual will be required. Deviation from the requirements of the manual will be grounds for the Engineer to reject the applied coating.
6. Unacceptable Coating Application
 - a. Coating applied under improper environmental conditions will be rejected.
 - b. Pipes that exceed the allowable quantity of coating defects, regardless of size or cause, shall be rejected.
 - c. Coating which fails the adhesion or holiday testing as specified this section shall be rejected.
 - d. Pipe coating that is subject to off ratio application, blistering, or is not applied in conformance with the coating manufacturer's written instructions or recommendations shall be rejected.
7. Rejected coating shall be removed from the full length of the pipe to bare metal and reapplied using proper application methods in accordance with the quality assurance manual and the requirements of these specifications.
8. Perform coating and lining repairs as specified in this section.

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3.04 EXTERIOR COATING HOLDBACK

- A. Coating holdbacks shall be straight and cut through the full thickness of the coating.
- B. Cutbacks shall be completed in a manner that permits field coating of joints in accordance with the manufacturer's recommendations and as specified herein.
- C. Holdbacks shall be as required for proper jointing of pipe, considering joint welding requirements, and be as follows:

Polyurethane coating	
Push-on joint, spigot	1 inch before centerline gasket
Push-on, bell	Flush with bell end
Welded, spigot	3 inches, minimum
Welded, Bell	4-inches, minimum

- D. Holdback Corrosion Protection:
 - 1. Holding primer for corrosion protection of cutbacks or holdbacks shall be compatible with the specified joint coating system and weld after backfill requirements, when applicable.
 - 2. Approved holdback primers are:
 - a. Tnemec Omnithane – Suitable for all joints, except joints subject to weld after backfill
 - b. Tnemec 90E-92 Ethyl Silicate Inorganic Zinc Primer – suitable for all joints, including weld after backfill joints.
 - c. ICI Devoe Cathacoat 304V Ethyl Silicate Inorganic Zinc Primer – suitable for all joints including weld after backfill joints.
 - d. Polyken or Other Tape Primers – Not allowed
 - 3. Primer shall not result in running or melting of the coating or cause toxic fumes when heated during weld after backfill operations.
 - 4. Application and thickness of holding primer shall be in accordance with the coating manufacturer's recommendations, but shall not impair the clearances required for proper joint installation.

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5. Primer application on spigot end of field welded pipe shall be held back 1 to 2 inches from the end of the spigot or as necessary to prevent toxic fumes during field welding.
6. Any corrosion within the holdback areas shall be abrasively blasted to near white metal in accordance with SP10 or power tool cleaned to bare metal in accordance with SP11 prior to applying joint coating.

3.05 PIPE LINING APPLICATION

A. Shop-applied Cement Mortar Lining:

1. Centrifugally line straight sections of pipe. Lining of special pieces or fittings shall be by mechanical, pneumatic, or hand placement. Provide cement mortar lining of uniform thickness. Finish to a smooth dense surface.
2. Steel plate specials larger than 16 inches in diameter shall have lining reinforced with 2-inch by 4-inch No. 13-gage welded steel wire mesh.
3. Centrifugally line straight sections of pipe. Lining of special pieces or fittings shall be by mechanical, pneumatic, or hand placement. Provide cement mortar lining of uniform thickness. Finish to a smooth dense surface.
4. Steel plate specials larger than 16 inches in diameter shall have lining reinforced with 2-inch by 4-inch No. 13-gage welded steel wire mesh.
5. Brace and support pipe during lining application to minimize pipe distortion or vibration. Bracing and supports shall not damage the pipe, coating, or lining.
6. Tightly close ends of pipe and fittings with plastic sheet caps. Plastic end caps shall be of sufficient thickness and strength to resist shipping, handling, and storage stresses.
7. Damage to the cement mortar lining, including disbondment, cracking, or blistering, caused by improper curing, shipping, handling, or installation shall be repaired in accordance with AWWA specifications and to the satisfaction of the Engineer.
8. Other requirements of mortar lining materials and processes: As specified in AWWA C205.

B. Liquid Epoxy Lining:

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1. Clean and coat the interior of cement mortar lined pipe at insulating joints or where specified with two coats of epoxy coating.
2. Epoxy coating applied at insulating joints shall be applied to both sides of the insulating joint for a minimum of two pipe diameters. If only one side of the joint can be coated the coating shall be applied for a minimum of four pipe diameters.
3. Mortar lining shall be allowed to cure 15 days or steam cured not less than 7 days prior to surface preparation of the mortar and epoxy coating application. Hand applied mortar lining shall be allowed to cure a minimum of 15 days or as required to meet the coating manufacturer's requirements for application on cement or concrete, whichever is greater.
4. Prepared mortar lining by abrasive blasting to remove all laitance and create a suitable anchor profile
5. Epoxy coating shall be applied in two coats minimum, at a total coating thickness of 16 mils dry film thickness. Coating applied over cement mortar lining shall be applied in a manner that will minimize gassing and pinholes in the completed lining.
6. Mortar lining shall be dry during epoxy lining application.

3.06 FIELD COATING JOINTS

A. General:

1. Remove all oil or grease contamination by solvent wiping the pipe and adjacent coating in accordance with SSPC-SP1, Solvent cleaning.
2. Clean pipe surface and adjacent coating of all mud, corrosion, and other foreign contaminants in accordance with SSPC-SP11, Power Tool Cleaning to Bare Metal or abrasive blast joints in accordance with SSPC-SP10, near white metal blast, that exhibit any surface corrosion or staining. When required, clean the full circumference of the pipe and a minimum of 6 inches onto the existing coating.
3. Remove all loose or damage pipe coating at joint and either repair the coating as specified herein or increase the length of the joint coating, where reasonable and practical.
4. Complete joint bonding of pipe joints before application of joint coating. Joint bonds shall be installed as specified in Section 13110, Cathodic Protection System. Joint bonds shall be low profile bonds and all gaps and crevices around the bonds shall be filled with mastic sealant.

Special Specification

5. CONTRACTOR to electrically test completed joint coating for holidays with high voltage spark tester.

B. Weld After Backfill Joint Requirements:

1. Post-welded or 'Weld after Backfill' joints are defined as welded pipe joints that have been coated and backfilled prior to completing interior welds.
2. Post welded joints shall be coated and protected as follows:
 - a. Joint coating shall be Canusa AquaShield heat shrink joint sleeves only. Tape wrapped joints will not be acceptable.
 - b. Provide 6-inch wide Canusa AquaShield protective layer centered over the interior weld location as recommended by the joint sleeve manufacturer. Heat resistant tape will not be acceptable.
 - c. Hold back primer shall be suitable for post weld conditions as specified this section and shall not exhibit any binder breakdown in the heat effect zone that causes loss of joint coating adhesion to the holdback primer.
 - d. Filler mastic materials shall be high temperature materials with 500 degree F minimum melting point .
 - e. Joints shall be fully buried prior to welding, with not less than 36-inch cover of soil or flowable fill material on all sides. Sand or flowable fill backfill is preferred for weld after backfill joints.
3. Welding of the joints shall be in conformance with the Section 02571, Steel Pipe-Mortar Lined , and as modified herein:
 - a. All welding shall be with stick electrodes and two or more weld passes as required to meet the specified AWS qualified welding procedures and maximum coating temperature limitations. 'Weld after Backfill' procedures on wall thicknesses of 1/4 inch or less must be approved by the Construction Manager based on field testing demonstrating the welding procedures can comply with the requirements of this specification.
 - b. Welding speed, amperage, and voltage shall be as required to maintain a maximum heat input of 23,000 joules or a maximum surface temperature at the coating/steel interface of 800 degrees F, whichever is least.

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- c. Maximum weld temperature and duration shall not result in full carbonization of the joint coating adhesive. Full carbonization is defined as the loss of volatile organic compounds that result in complete loss of tackiness, adhesion to the steel, and corrosion protection properties.
 - d. Finished joint coating shall not have any visual creases or folds in the joint coating backing material that extends through both the inner protective layer and outer joint sleeve.
- 4. If CONTRACTOR elects to post-weld any joints, CONTRACTOR shall demonstrate that the joint welding procedures will not significantly damage the coating by fully excavating the first two joints for evaluation of the joint coating condition. Engineer will randomly select up to five additional post-welded joints for excavation by CONTRACTOR for evaluation of joint coating condition. Joint coating will be destructively evaluated by the Engineer. CONTRACTOR will remove and replace joint heat shrink sleeve upon completion of the evaluation.
 - 5. In the event that any excavated post welded joint exhibits any heat related damage as defined herein, CONTRACTOR shall modify and test a new post welding procedure prior to completing any additional post-welded joints. CONTRACTOR shall demonstrate that the revised joint welding procedure will not significantly damage the coating by repeating the weld after backfill evaluation requirements defined in this Section, including excavation of the five additional randomly selected joints for destructive evaluation.

C. Heat Shrink Sleeve Joint Coating:

- 1. Store, handle, and apply field heat shrink sleeve coatings in accordance with AWWA C216 and these specifications.
- 2. Store sleeves in shipping box until use is required. Keep dry and sheltered from exposure to direct sunlight. Store off the ground or concrete floors and maintain at a temperature between 60 and 100 degrees as recommended by the sleeve manufacturer.
- 3. Metal surface shall be free of all dirt, dust, and surface corrosion prior to sleeve application. Surface preparation shall be in accordance with the joint coating manufacturer's recommendations.
- 4. Where corrosion in the holdback area is visible, surfaces shall be prepared in accordance with SSPC-SP10, near white metal blast, or SSPC-SP11, power tool cleaning to bare metal.

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5. Preheat pipe uniformly as recommended by the sleeve manufacturer. Monitor pipe temperature using a surface temperature gauge, infrared thermometer, or color changing crayons. Protect preheated pipe from rain, snow, frost, or moisture with tenting or shields and do not permit the joint to cool.
6. Fill all cracks, crevices, gaps, and step-downs greater than ¼ inch with filler mastic in accordance with the manufacturer's recommendations for the full circumference of the pipe.
7. Apply heat shrink sleeve when it is at a minimum temperature of 60 degrees and while maintaining the pipe temperature above the preheat temperature specified. Apply sleeve in accordance with the manufacturer's instructions and center the sleeve over the joint to provide a minimum 2-inch overlap onto the existing pipe coating.
8. Completed joint sleeve shall be fully bonded to the pipe and existing coating surface without voids. Mastic beading shall be visible along the full circumference of the sleeve. There shall be no excessive wrinkling or burns on the sleeves. Sleeves that do not meet these requirements shall be removed and the joint recoated as directed by the Engineer. Minor repairs may be repaired using heat applied patch material specified for minor coating repairs.
9. Allow the sleeve to cool before backfilling. In hot climates, provide shading from direct sunlight. Water quenching will be allowed only when permitted by the sleeve manufacturer.
10. Heat shrink joint coatings which have become wrinkled or disbonded because of prolonged exposure to UV light or thermal cycling shall be removed and replaced.
11. Double coating of defective or damaged heat shrink coatings will not be permitted. Any double coated heat shrink sleeves shall be immediately rejected and CONTRACTOR shall remove and recoat the joint.

3.07 REPAIR OF COATING AND LININGS

A. General:

1. All areas where holidays are detected or coating is visually damaged, such as blisters, tears, rips, bubbles, wrinkles, cuts, or other defects shall be repaired. Areas where no holidays are detected, but are visually damaged shall also be repaired.

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2. Maximum defects allowable shall be as specified herein for the coating system.

B. Polyurethane Coating or Lining Repairs

1. General

- a. Complete coating or lining repairs in accordance with the coating manufacturers written instructions and these specifications, whichever is stricter.
- b. Defect Size:
 1. Minor repairs - repairs that are less than 6-inches in the greatest dimension.
 2. Major repairs - repairs that exceed 6-inches in the greatest dimension.
- c. Pipes exceeding the maximum number or size of coating defects shall be stripped of coating, reblasted, and recoated.
- d. Pipe arriving in the field with defects or repairs exceeding the maximum number or size of coating defects will be returned to the shop for recoating at the CONTRACTOR's expense.

2. Minor Repairs:

- a. Coating or lining repairs on any joint of pipe shall not exceed 1.5 per 100 square feet of surface area.
- b. Two or more minor repairs within 6-inches diameter circle will be considered a single repair.
- c. Repairs for adhesion testing will not be included in the total number of repairs.
- d. Minor repairs
 1. Surface Preparation: Clean and feather the defect by power tool sanding with 80 grit or coarser sandpaper to roughen the existing coat and feather the edges of the defect for a minimum of 2-inches around the defect.
 2. Shop repair Materials:

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- a. Slow setting parent material polyurethane coating material in syringes or other single use packaging that controls mix ratio.
 - b. Coating Manufacturer's polyurethane coating repair products subject to Engineer approval.
 - 3. Field Repair Materials:
 - a. Melt stick coating repair (not acceptable for repairs greater than 1-inch diameter); ScotchCoat P206, or approved equal.
 - b. Heat applied coating materials; PERP Patch, Tyco Adhesives, or approved equal.
 - c. Coating Manufacturer's polyurethane coating repair products subject to Engineer approval.
 - 4. Apply a single coat of the specified patch coating material at the specified coating thickness.
 - 5. Repairs adhesion shall be 50 percent of the specified coating adhesion.
3. Major Repairs:
- a. Major repairs shall not exceed two per pipe joint and the combined area shall not be greater than 50 percent of the pipe.
 - b. Major repairs:
 - 1. Surface Preparation:
 - a. The metal surface and surrounding coating shall be abrasively blasted in accordance with SSPC-SP10, near white metal, or to equal in cleanliness and profile as the original surface preparation.
 - b. Existing coating shall be feathered and roughened to the equivalent of 40 grit sandpaper.
 - 2. Shop Repair Materials:

Same material as the pipeline coating or lining and shall be applied by using plural component spray equipment.

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3. Field Repair Materials:

- a. Same material as the pipeline coating or lining and shall be applied by using plural component spray equipment.
- b. Heat shrink sleeves as specified for pipeline joints.
- c. One coat of the specified original coating material shall be applied over the repaired surface at the specified thickness.
- d. Repair adhesion shall be equal to the specified coating adhesion.

3.08 INSPECTION AND TESTING

A. General

- 1. Applicator shall inspect and test the coating system in accordance with referenced standards and these specifications, whichever is more stringent.

The frequency of the testing shall be determined by the applicator, but shall not be less than the requirements of this specification.

- 2. OWNER or OWNER's Representative will conduct random independent inspections and tests for the final acceptance or rejection of pipe coating or lining at any time prior to installing and backfilling pipe.

B. Adhesion Testing

1. General

- a. Adhesion testing shall be conducted at the shop prior to shipment. Pipe shipped without adhesion testing will be field-tested. Pipe rejected in the field will be returned to the shop for repair at the sole expense of the CONTRACTOR.
- b. A minimum of two pipes will be tested for adhesion from each lot of pipe coated up to 3,000 square feet of pipe. An additional adhesion test will be conducted on every increment up to 2,000 square feet of pipe coated in excess of the first 3,000 square feet of pipe. (i.e. if one workday of production is 6,000 square feet of pipe, four adhesion tests will be conducted on the pipe lot.)
- c. A pipe lot is defined as the quantity of pipe that is coated by a single crew within a work shift, but not to exceed 12-hours.

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- d. The pipe coating applicator shall repair all coating damage from shop adhesion testing. CONTRACTOR shall be responsible for coating repairs for all field adhesion testing.
- e. Adhesion tests will be performed not less than 24 hours after coating application. Tests conducted prior to 24-hours will be acceptable only if the test meets or exceeds the adhesion criteria specified and the test was requested by the pipe fabricator.
- f. Pipe will be randomly selected for adhesion testing.
- g. OWNER or the OWNER's Representative has the right to conduct additional adhesion testing as deemed necessary to assure the pipe meets or exceeds the requirements of this specification at any time and location prior to pipe installation.

2. Rejection of Coating

- a. If any pipe within a lot fails to meet the test criteria specified for the coating type, that pipe shall be rejected along with all other pipes within the lot. Each pipe within the rejected pipe lot will then be individually tested and rejected on a pipe-by-pipe basis in conformance with the test procedures and criteria specific for the coating type.
- b. All rejected pipe shall have all coating removed from the full length pipe and the pipe abrasive blasted and recoated.

3. Polyurethane Adhesion Testing

- a. Acceptance Criteria
 - 1. Polyurethane coating or lining shall have an adhesion to steel of 1,500 pounds per square inch, minimum. Acceptance will be based on one pull minimum, with no pulls less than the minimum criteria where multiple pulls are conducted on the same joint of pipe.
 - 2. The median value for all coating or lining adhesion pulls performed within a lot of pipe shall not be less than 1,750 psi.
 - 3. Each pipe failing the minimum adhesion criteria shall be rejected. AWWA C222 rejection of pipe based on multiple

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adhesion pulls is specifically excluded from this specification.

4. Pipe lots failing the median value for all adhesion pulls shall be rejected and each pipe within the lot tested for adhesion. Each pipe that fails the minimum adhesion criteria shall be rejected.
5. Failure shall be by adhesive and cohesive failure only. Adhesive failure is defined as separation of the coating from the steel substrate. Cohesive failure is defined as failure within the coating, resulting in coating remaining both on the steel substrate and dolly.

b. Test Procedures

1. Polyurethane coating adhesion to steel substrates shall be tested using self-aligning pneumatic pull off equipment, such as the Delfesko Positest, and test procedures in accordance with ASTM D4541 and AWWA C222, except as modified in this section.
2. All adhesion test pull records shall be maintained in an electronic spreadsheet that includes pipe identification, pipe coating date, adhesion test date, surface tested (interior or exterior), surface temperature, coating thickness, tensile force applied, rate of pressure change per second, mode of failure, and percentage of substrate failure relative of dolly surface.
3. Dollies for adhesion testing shall be 20 millimeters in diameter, and glued to the coating surface and allowed to cure for a minimum of 12 hours before testing.
4. Polyurethane coatings shall be scored around the dolly prior to conducting the adhesion test. Scoring shall be completed manually, normal to the pipe surface, or in a manner that does not stress or over heat the coating.
5. Adhesion testing shall be performed at temperatures between 55 and 100 degrees F. Tests may be performed at temperatures up to 115 degrees F if no significant affect in the test results are statistically detectable.
6. Partial substrate and glue failures will be retested if the substrate failure is less than 50 percent relative of the dolly

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surface area and the applied tension was less than the specified adhesion. Pipes that have partial substrate failures greater than 50 percent and less than the specified adhesion will be rejected as a substrate adhesion failure.

7. Glue failures in excess of the minimum required tensile adhesion would be accepted as meeting the specified adhesion requirements.
8. Adhesion tests will be conducted on polyurethane pipe coating and lining independently and will be accepted or rejected independently of the other.

c. Adhesion Test Repairs

Repair patches on the polyurethane coating shall be randomly selected for adhesion testing in a manner as described herein and at the discretion of the coating inspector conducting the adhesion tests. Adhesion of repairs shall be as specified for the type of repair. A minimum of one test per day shall be provided. If the test fails, additional tests may be required by the Engineer.

C. Holiday Testing

1. Holiday tests on polyurethane coatings or linings will be conducted on the completed coating or lining after cure or 24-hours, whichever is less, using a high voltage spark test in accordance with NACE Standard RP-0274 and these specifications. In addition, the pipe shall be holiday tested by the CONTRACTOR just before the pipe is laid in the trench.
2. Coating thickness used for holiday testing shall be the minimum specified coating thickness.

D. Dry Film Thickness Testing

1. Coatings shall be tested for dry film thickness using a properly calibrated magnetic pull off or eddy current equipment.
2. Coating thickness measurements shall be conducted as necessary and without limitation. Testing conformance to the requirements of SSPC PA-2 is specifically excluded from this specification.

3.09 HANDLING, TRANSPORTATION, AND STORAGE

- A. Pipe shall be handled in such a manner as to protect the pipe and coating from damage.

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- B. Coated pipe shall not be shipped or installed until coating has developed full adhesion and cure.
- C. During coating application, storage, loading, transportation, unloading, laying and installation, every precaution shall be taken to protect and prevent damage to pipe, lining, and coating. Forklift equipment shall have all bearing surfaces padded with suitable padding material. Lift pipe with web slings a minimum of 12-inch wide and of a type that will not damage the coating. Metal chains, cable, tongs, forklifts or other equipment likely to damage the coating will not be permitted. Dragging or skidding of pipe on grade or in the trench will not be permitted.
- D. Provide transportation vehicles with padded bolsters between each layer of pipe and heavy padding under load ties. Bolsters shall be curved to fit the outside of the pipe and 12 inches wide, minimum. All pipe contact locations shall be heavily padded with carpet and strips of the outer tape wrap material (adhesive side against the carpet) during shipment to the project site and from the storage yard to the point of installation.
- E. Pipe shall not be stored on rocks, gravel, or other hard materials that might damage the coating. Provide padded 12-inch wide skids and chucks, sand bags, select loamy or sand berms, or suspended from cutback ends, where possible, to minimize coating damage. Pipe shall not be laid on asphalt without suitable padding at all contact points.
- F. Pipe shall be inspected by the CONTRACTOR at the project site for damage. Any damage to the pipe, lining, or coating shall be repaired as directed if, in the opinion of the ENGINEER, a satisfactory repair can be made; otherwise, the damaged section shall be replaced at the sole expense to the CONTRACTOR.
- G. No metal tools or heavy objects shall be permitted to come into contact unnecessarily with the finished coating. Workmen shall not be permitted to walk on the coating except when absolutely necessary and approved by the Engineer. When permitted, shoes with rubber or composition soles and heels or other suitable footwear that will not damage coating shall be used.
- H. Long-term Exposure: Pipe shall either be provided with UV inhibitor for lengthy of above grade exposure or covered to prevent UV degradation of outer wrap. Amount of UV stabilizers required will depend on the project location, laying schedule, anticipated length of exposure, and type of outer wrap. Manufacturer shall be consulted for recommended UV inhibitors requirements or pipe shall be stored under a protective cover. Protective covering can be colored plastic sheeting, canvas, or other UV blocking material. Clear plastic sheets are not acceptable. Areas of coating that display UV degradation shall be removed and repaired at sole cost of the CONTRACTOR.

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- I. End Caps: Pipe ends of mortar lined pipe and fittings shall be tightly closed with a plastic wrap to aid in curing and to minimize drying out of and contamination of the lining. Plastic end cap shall consist of a minimum of one 10-mil sheet of polyethylene or other suitable material. End caps shall be substantial enough to resist shipment, handling, and storage loads and firmly attached in place. The plastic end cap shall remain intact and in place until pipe installation. Damaged or missing plastic end caps shall be repaired or replaced.
- J. Bracing:
 - 1. The steel pipe manufacturer shall furnish and install adequate bracing or strutting to keep the pipe from becoming deformed or damage from occurring to the coating or linings. Strut-type bracing shall be installed as soon as possible after application of lining. Struts shall remain in place during handling, storage, transportation, and installation of pipe and fittings until after the pipe zone material is compacted.
 - 2. The struts shall be installed with pads and wedges in such a manner that the pipe lining will not be damaged and the struts will not be dislodged during shipping and handling of the pipe. If struts are welded, they shall be installed and removed in such a manner to prevent damage to the steel cylinder, lining, or coatings. All damage shall be repaired to the satisfaction of the Engineer.

PART 4 MEASUREMENT AND PAYMET

4.01 MEASUREMENT

- A. Polyurethane coating will not be measured for payment.

4.02 PAYMENT

- A. No direct payment shall be made for incidental costs associated with polyurethane coating. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

-END OF SECTION-

Special Specification

SECTION 09970

PAINTING AND PROTECTIVE COATINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment and incidentals necessary to apply protective coatings to material and equipment as specified herein, including the preparation of surfaces prior to application of coatings.
- B. Protective coatings are special coatings to be used at specific locations or on specific surfaces as indicated herein and are complementary to the coating surfaces as indicated herein, in that every surface of every description, except those which are specifically noted not to receive a coating finish.
- C. Protective coatings must be applied to the following surfaces:
 - 1. Metal surfaces located outside of buildings and other structures anywhere on the Site.
 - 2. Structural steel
 - 3. New piping
 - 4. Concrete surfaces at the following locations:
- D. Inside of valve and pipeline appurtenant structures and manholes The following must not be coated and must be protected from drips, overspray, etc. unless indicated otherwise
 - 1. Stainless steel piping, materials and equipment
 - 2. Galvanized steel piping, materials and equipment unless specifically indicated to be coated.
 - 3. Aluminum materials and equipment
 - 4. Interior electrical items
- E. Special applications for painting include the following:
 - 1. Aluminum surfaces in contact with or embedded in concrete must be treated.
 - 2. Buried pipe and valves must receive a shop applied protective coating as described in the appropriate Section of the Specifications.
- F. Contain, treat, and dispose of any dust, spray, drainage, or spillage resulting from coating operations. It is the Contractor's responsibility to determine if the materials to be disposed of are classified as Hazardous Waste. Disposed of waste, hazardous or otherwise, must be in accordance with applicable regulations. Contractor must be

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aware of and understand the regulations concerning disposal of waste generated by coating operations.

1.02 QUALITY ASSURANCE

A. Acceptable Manufacturers: Products which comply with the Contract Documents and are manufactured by the following companies will be acceptable:

1. Tnemec Company, Inc.
2. Carboline.
3. PPG Protective & Marine Coatings.
4. The Sherwin-Williams Company.
5. Akzo Nobel / International Paint, LLC.
6. ICI Devoe High Performance Coatings.
7. Plasite Protective Coatings.

It is desired that the paint products be furnished by as few manufacturers as possible to meet the requirements of the Specifications. Coating products of the same type must be supplied by the same manufacturer. Do not mix products from different sources.

B. Applicator's Qualifications: Applicators must be qualified in this line of work and have a minimum of 5 years of experience in the application of the protective coatings of the types specified herein. Submit a list of recent projects and names of references for those projects.

C. Product Quality:

1. Use only the coatings specified in this Section. Use only those thinners and solvents recommended by the manufacturer, only in the amounts necessary to produce the manufacturer's recommended spreading rate, and in amounts not exceeding the maximum quantities stated in the manufacturer's literature.
2. The coating material must not show excessive settling in a freshly opened full can and must be easily re-dispersed with a paddle to a smooth, homogeneous state. It must show no curdling, livering, caking, or color separation and must be free of lumps or skim surfaces.

D. Inspection:

1. Inspect and provide substrate surfaces prepared in accordance with the Contract Documents and the printed directions and recommendations of paint manufacturer whose product is to be applied.
2. Provide Engineer minimum 3 days' notice prior to start of surface preparation work or coating application work.
3. Perform Work only in the presence of Engineer, unless Engineer grants prior approval to perform such Work in Engineer's absence. Approval to perform

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Work in the Engineer's absence is limited to the current day unless specifically noted to extend beyond the completion of the work day.

4. Inspection by the Engineer, or the waiver of inspection of any particular portion of the Work, must not be construed to relieve the Contractor of responsibility to perform the Work in accordance with the Contract Documents.
 5. Contractor is solely responsible for testing for this Section, at no further cost to the Owner. Engineer may also make such tests if it is considered necessary. Cooperate with the Engineer, providing equipment, scaffolds, and other equipment as requested by the Engineer.
- E. Testing Equipment: Furnish the testing apparatus necessary for testing coatings, including the following:
1. One set of U.S. Department of Commerce thickness calibration plates, certified by the National Bureau of Standards, to test dry film thickness.
 2. Wet-film thickness gauges. Give one to Owner's representative. Each painter must keep one to test paint as it is applied.
 3. One electronic dry-film thickness gauge capable of measuring 0-200 mils with calibration standards approved by the Bureau of Standards.
 4. One Elcometer 319 Dewpoint Meter or approved equal.
 5. One Tinker and Rasor Model M 1 Holiday Detector and recommended wetting agent and/or High Voltage Holiday Detector if required for coating thickness specified.
 6. One set of SSPC-VIS 1, 3 and 4 - Visual Standards as applicable.
- F. Testing Reports: Submit an inspection report for each coating applied on the Project. The testing report must be completed on a form furnished by the Engineer and must bear the signature of the Contractor and the Owner's representative.

1.03 SUBMITTALS

- A. The following Product Data for products, including manufacturer's data sheets, are due prior to ordering coating and surface preparation materials:
1. Coating manufacturer's color selection literature for coating materials and caulk.
 2. Sample warranty document for products.
 3. Provide certification from the manufacturer that all coatings will not contain more than 0.06 percent by weight of lead in the cured coating for each coat applied.
 4. Coating manufacturer's Product Information and Safety Data Sheets (SDS) for each coating and caulk material. Product Information must include the following:
 - a. The manufacturer's published instructions for use in specifying and applying all proposed coatings.
 - b. Application instructions written and published by the coating manufacturer.

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- c. All limitations, precautions and requirements that may adversely affect the coating, that may cause unsatisfactory results after the application or that may cause the coating not to serve the purpose for which it was intended, must be clearly and completely stated in the instructions. Limitations and requirements must include, but are not necessarily limited to the following:
 - 1). Surface preparation.
 - 2). Method(s) of application.
 - 3). Thickness of each coat (maximum and minimum DFT).
 - 4). Drying and curing time of each coat.
 - 5). Time (minimum and maximum) allowed between coats.
 - 6). Thinner and use of thinner.
 - 7). Proper mixing of coating before application.
 - 8). Weather limitations during and after application (temperature and humidity, time weighted).
 - 9). Physical properties of coating, including percent solids content by volume.
 - 10). Equipment settings (air cap, fluid tip, equipment pressure settings, etc.).
 - 11). Pot life at various temperature and humidity conditions.
 - 12). Provide documentation that interior coating system is compatible with the cathodic protection system.
- B. The following samples are required prior to ordering the materials:
 - 1. Three samples of selected exterior finish colors for approval on 6-inch by 6-inch swatches. Label each swatch with the manufacturer's name, coating name/type, color name and number.
- C. The following Product Data is required prior to coating work:
 - 1. Coating Plan:
 - a. Anticipated coating process schedule by date, including dates when hold-point inspections are anticipated. Schedule must indicate detailed activities on a daily basis.
 - b. Detailed procedures and schedule for all pre-cleaning, surface preparation and application of coating, including touch-up and repair procedures for all coating systems.
 - c. Recoat schedule on the submitted coating materials.
 - d. Data sheets complete with a graduated scale or curve, produced by the coating manufacturer, with curing characteristics and recommendations regarding complete coating curing. The data sheets and scales or curves must include specific cure times over a wide range of temperatures and humidity.

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- e. Provide a written plan documenting how spent cleaning debris and/or paint over spray or droplets will be contained/confined to the Site and tank site during the surface preparation and coating application operations. Reasonable care must be exercised by the Contractor to prevent damage, nuisance, or hazardous conditions to adjacent or nearby property Owners. Include all materials and method to be used for protection of exterior surfaces, and allow for recovery and disposal of paint scraps and blast media.
2. Provide documentation on proposed containment system methods for blasting and coating operations.
3. Coating Manifest - Within 48 hours of coating delivery to the Site, Contractor must record the batch number stamped on each coating container and submit a typed list to the Owner's representative. Minimum information required is listed below.
 - a. Date of delivery to the Site.
 - b. Name and signature of superintendent recording the data.
 - c. List of batch number including corresponding coating identification, color, date of manufacture and volume of each container.
- D. The following Certified Test Report(s) are required prior to coating work:
 1. SDS sheets for all abrasive to be used on the Project.
 2. Certification and laboratory test results indicating recycled metallic abrasive per SSPC-AB 2 or 4 and atomic absorption test results.

1.04 STANDARDS

- A. The applicable provisions of the following standards apply as if written here in their entirety. Adhere to the latest standards and codes published by the following organizations.
- B. In the event of a conflict between the published standards, codes, and this Section, the more stringent requirement govern as interpreted by the Engineer.
 1. NSF International (NSF) / American National Standards Institute (ANSI):

NSF/ANSI Standard 61	Drinking Water Components

2. ASTM International (ASTM):

ASTM D523	Standard Test Method for Specular Gloss
ASTM D610	Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D2244	Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D3359	Standard Test Methods for Rating Adhesion by Tape Test

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ASTM D4214	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4285	Standard Test Method of Indicating Oil and Water in Compressed Air
ASTM D417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester
ASTM D4787	Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ASTM D6386	Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM D7234	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Pull-Off Adhesion Testers
ASTM E337	Standard Practice Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)
ASTM F1869	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

3. AWWA (American Water Works Association):

AWWA C210	Liquid-Epoxy Coating and Linings for Steel Water Pipelines
AWWA C222	Polyurethane Coatings and Linings for Steel Water Pipe and Fittings

4. Consumer Product Safety Act, Part 1303.

5. International Concrete Repair Institute (ICRI):

ICRI Technical Guideline No. 03732	Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers and Polymer Overlays

6. NACE International (National Association of Corrosion Engineers):

NACE TPC2	Coating and Lining for Immersion Service: Chapter Safety, Chapter 2 Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection
NACE SP0178	Design Fabrication, and Surface Finish Practices for Tanks and Vessels to be Lined for Immersion Service

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NACE SP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
NACE SP0178	Surface Finishing of Welds Prior to Coating; Weld Replica Only to be used with NACE SP0178
NACE RP0287	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape

7. National Association of Pipe Fabricators (NAPF):

NAPF 500-03	Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings

8. OSHA (Occupational Safety & Health Administration):

29 CFR 1915.35	Painting
29 CFR 1926.62	Lead

9. The Society for Protective Coatings (SSPC):

SSPC-VIS 1	Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC-VIS 3	Guide and Reference Photographs for Steel Surfaces Prepared by Power and Hand Tool Cleaning
SSPC Vol. 1	Good Painting Practices
SSPC-AB 1	Mineral and Slag Abrasives
SSPC-AB 2	Cleanliness of Recycled Ferrous Metallic Abrasives
SSPC-AB 3	Ferrous Metallic Abrasives
SSPC-AB 4	Recyclable Encapsulated Abrasive Media in a Compressible Matrix
SSPC-SP 1	Solvent Cleaning
SSPC-SP 2	Hand Tool Cleaning
SSPC-SP 3	Power Tool Cleaning
SSPC-SP 11	Bare Metal Power Tool Cleaning
SSPC-PA 1	Shop, Field and Maintenance Painting of Steel
SSPC-PA 2	Determining Compliance to Required DFT
SSPC-PA 10	Guide to Safety and Health Requirements for Industrial Painting Projects
SSPC-PA 17	Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements
SSPC Guide 6 (CON)	Containment of Debris
SSPC Guide 12	Illumination of Painting Projects
SSPC Guide 15	Retrieval and Analysis of Soluble Salts

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10. SSPC/NACE International Joint Standards:

SSPC-SP 5/NACE 1	White Metal Blast Cleaning
SSPC-SP 6/NACE 3	Commercial Blast Cleaning
SSPC-SP 7/NACE 4	Brush - Off Blast Cleaning
SSPC-SP 10/NACE 2	Near - White Metal Blast Cleaning
SSPC-SP 13/NACE 6	Surface Preparation of Concrete

11. Texas Commission on Environmental Quality (TCEQ):

30 TAC Chapter 290, Subchapter D	Rules and Regulations for Public Water Systems

1.05 DELIVERY AND STORAGE

- A. Deliver coating products to the Site in original unopened containers, with manufacturer's label and batch number attached. Do not apply products until the Owner's field representative has approved the product for use.
- B. Use one location at each site for the storage of coating products. Protect the floor from spills and other damage. Protect the products from extreme heat or cold. Keep containers covered. Keep the storage rooms clean of trash and debris. Dispose of oily or used rags daily. Under no circumstances will they be allowed to accumulate. Take precautions to prevent fires. The storage of flammable liquids must comply with the City, State, or other fire codes.
- C. Storage of coatings and other products must be in accordance with the manufacturer's requirements. Coatings that have been damaged or not stored properly must not be applied and must be removed from the Site.
- D. All products and coatings that are not approved for the Project must be removed from the Site and must not be stored at the Site.
- E. All materials must be delivered to the Site in original sealed containers with the date of manufacture and batch number stamped thereon by the coating manufacturer. Materials are subject to random observations by the Owner's representative at the Site.

1.06 ENVIRONMENTAL CONDITIONS

- A. Do not apply coatings under conditions that are unsuitable for the production of good results. Remove trash and debris from enclosed buildings and thoroughly clean prior to application of coatings. Do not begin application of coatings in areas where other trades are working, or where construction activities result in airborne dust or other debris. Do not apply coatings in conditions which do not conform to the recommendations of the coatings manufacturer.

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- B. Coatings must only be applied when conditions fall within the parameters listed in the manufacturer's printed data.
- C. Contractor must provide dehumidification equipment sized to maintain dew point temperature 5 deg. F or more below surface temperature of metal surfaces to be cleaned and painted.
- D. Do not apply any coatings when weather conditions are unfavorable. In the event that climatic conditions are not conducive for best results, postpone application of coatings until conditions conform to the manufacturer's recommendations and the provisions of this Section.
- E. Do not apply coatings to a wet or damp surface in wet or damp weather conditions, or when there is dust in the air. Surfaces exposed to direct sunlight must be shaded by awnings or other protective devices while coatings are being applied, if recommended by coating manufacturer. When necessary, provide temporary heating devices of a type that produces no fumes which will discolor the paint system.
- F. Heating and Dehumidification:
 - 1. Dehumidification equipment must be used to control the environment during surface preparation, rehabilitation, coating application and coating curing at no additional cost to the Owner, if acceptable environmental conditions cannot be met.

If the Contractor cannot meet the required environmental conditions to apply the interior coating system per this Section and the coating manufacturer's written recommendations, Contractor will cease operations until approved dehumidification equipment has been provided and acceptable environmental conditions are achieved.

If coating system is applied without dehumidification or in conditions not acceptable by this Section and by the coating manufacturer's written requirements, Contractor must fully remove coating system applied and replace per the Engineer's direction.
 - 2. The Contractor must furnish all labor, materials, equipment, fabrication and quality control inspections, and all other incidentals required to control and maintain the environment of the reservoir within the parameters stated in this Section and must incorporate these and any other expenses into its bid.
 - 3. The Owner reserves the rights, in the event the dehumidification equipment is not performing to the minimum requirements stated in this Section, to require the Contractor to modify and or add additional equipment to satisfy the conditions of this Section, at the sole cost to the Contractor.
 - 4. It is the Contractor's responsibility to provide adequate dehumidification equipment to meet the requirements of this Section and coating manufacturer's requirements. The coating manufacturer's limits of surface temperature, tank inside air temperature and relative humidity requirements will govern, if more stringent than the requirements stated within this Section.

Special Specification

G. Forced Ventilation:

1. Provide continuous forced fresh air ventilation when working inside of containment systems or enclosed areas that are not openly vented from the beginning of surface preparation through final coating operations and coating curing.
2. Forced ventilation must be supplied per the recoat time required by the coating manufacturer and at least 48 hours after the final coat has been applied.
3. From the beginning of interior wet and/or dry coating application and until this coating is cured, the Contractor must monitor the air for the lower explosion limit (LEL) as published in the coating manufacturer's product SDS's.
4. Contractor is responsible for supplying, installing and maintaining the forced ventilation system.

H. Containment System:

1. Contractor must provide containment methods, either full or partial, which allows for the containment of the environmentally sensitive waste, dust and paint over spray that will be generated during the abrasive blasting and painting operation.
2. Minimum Containment for Field Surface Preparation:
 - a. Provide a minimum SSPC Guide 6 (CON) Class 3A.D1.E3 containment system when dry abrasive blasting.
 - b. Provide a minimum SSPC Guide 6 (CON) Class 2W containment system when wet abrasive blasting. All water must be contained and properly disposed of.
 - c. Provide a minimum SSPC Guide 6 (CON) Class 2P.E3 containment system when power tool cleaning.
3. The ground surrounding the project area must be protected from all debris, emissions, dust, and other materials generated in the cleaning operations with a minimum of two layers of polyethylene covered with plywood or the same material used for the perimeter containment system.
4. Containment is not required when blasting on the interior of a completely enclosed area (i.e. roof is in place) as long as no visible emissions are created.
5. The Contractor must ensure that no spent cleaning/blasting debris, dust, overspray, coating droplets, or emissions of any kind, escape to the atmosphere, or to adjacent buildings, private property, work sites, parking lots, etc.
6. The Owner reserves the right to stop Work or require containment, additional containment or different containment methods if the Contractor's operations create a nuisance beyond the tank site property line in the sole opinion of the Owner, the Engineer, the Owner's representative, any regulatory agency, or neighbor. All costs of providing an adequate containment system must be included by the Contractor in the Base Bid.

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7. The Contractor must be responsible for all materials that are used and for any apparatus used to contain dust emissions, debris, overspray, and coating droplets. The containment system attachments to existing or proposed structures must be designed not to impose excessive loading on the structure by a professional engineer licensed in the state the Project is located. Contractor must submit the P.E. designed and sealed details of the containment system on the tank.

Any damage to the structure(s) as a direct or indirect result of the containment system must be repaired or sections replaced by the Contractor at no additional cost to the Owner. Neither the Owner nor the Owner's Engineer assumes any responsibility for the structural ability of the structure to support the containment system.

8. If tarps are used as part of the containment system, the tarps must be an impervious, solid, flame-resistant material, reinforced with a fiber mesh and must allow as much light as possible to pass through the material.

I. Visible Emissions:

1. Contractor must control visible emissions and releases while dust producing activities are underway.
2. Visible emissions more than SSPC Guide 6, Level 1 (1 percent of the workday or 5 minutes in an 8-hour shift) are unacceptable. Sustained emissions of more than 1 minute, regardless of the total time of emissions for the day is unacceptable. If unacceptable emissions are observed, Contractor must shut down immediately and correct the situation and clean up any debris generated from the release to the satisfaction of the Engineer before continuing the Work.

1.07 WORKING CONDITIONS

- A. Provide adequate lighting at any location that coatings are being applied or testing is performed. Illumination must be of sufficient intensity to achieve good results. Provide explosion-proof lighting when required.
- B. Temporary ladders and scaffolds must conform to applicable safety requirements. Erect temporary scaffolds where needed to cover large areas. Provide ladders or scaffolding during testing procedures.

1.08 WARRANTY/GUARANTEE

- A. Protective coating must be guaranteed for a period of 2 years from the date of the Owner's acceptance of the Project.
- B. A warranty inspection must be conducted prior to the end of the warranty period. Any Defective Work discovered at this date must be corrected by the Contractor in accordance with the Contract Documents at no additional cost to the Owner. Other corrective measures may be required during the 2 year warranty period.

PART 2 PRODUCTS

Special Specification

2.01 GENERAL COATING REQUIREMENTS

- A. All coatings must be free of heavy metals such as arsenic, barium, chromium, selenium, silver, lead, mercury and cadmium.
- B. All coatings in contact with potable water must be certified by the NSF Standard 61.
- C. Coatings submitted or used on this Project must not have a VOC (volatile organic content) in excess of 360 grams per liter or 3 lb. per gal.
- D. Finish coatings must be from the same batch.

2.02 MATERIALS

- A. Coating products are to be as follows:

Type A - Alkyd-Phenolic Universal Primer	
Manufacturer	Approved Coating
Tnemec	Series 1 Purple Prime
Sherwin-Williams	Kem Kromik Universal
Akzo Nobel / International Paint, LLC	Interlac 573
Devroe Coatings	Devprime 1403
Carboline	Carbocoat 150UP
PPG	Multiprime 4360

Type B - Epoxy-Polyamide Primer	
Manufacturer	Approved Coating
Tnemec	Series 66
Sherwin-Williams	Copoxy Primer
Akzo Nobel / International Paint, LLC	Intergard 251; Intergard 269 for valves and gates, submerged structural steel and misc. metals, and submerged piping
Devroe Coatings	Devran 201V Series
Carboline	890
PPG	Amercoat 385

Type C - Penetrating Epoxy Pre-Primer	
Manufacturer	Approved Coating
Tnemec	Approved Equal
Sherwin-Williams	Macropoxy 920 Pre-Prime

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Type C - Penetrating Epoxy Pre-Primer	
Manufacturer	Approved Coating
Akzo Nobel / International Paint, LLC	Interbond 600
Devoe Coatings	Approved Equal
Carboline	Rustbond Penetrating Sealer
PPG	Amerlock Sealer

Type D - Inorganic Zinc Primer (Minimum 80% Zinc by Weight)	
Manufacturer	Approved Coating
Carboline	Carbozinc 12 VOC
Sherwin-Williams	Zinc Clad II Plus
PPG	Dimetecote 9 VOC
Approved Manufacturer	Approved Equal

Type E - Organic Zinc Primer (Minimum 80% Zinc by Weight)	
Manufacturer	Approved Coating
Carboline	Carbozinc 859
Sherwin-Williams	Corothane I Galvapac
PPG	Amercoat 68HS
Akzo Nobel / International Paint, LLC	Interzinc 52
Approved Manufacturer	Approved Equal

Type F - Alkyd Enamel	
Manufacturer	Approved Coating
Tnemec	Series 23 Enduratone
Sherwin-Williams	DTM Alkyd Enamel
Akzo Nobel / International Paint, LLC	Interlac 665
Devoe Coatings	Devlac 1431
Carboline	Carbocoat 8225
PPG	Fast Dry 35

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Type G - Epoxy-Polyamide Coatings	
Manufacturer	Approved Coating
Tnemec	Series 66
Sherwin-Williams	Macropoxy 646 Epoxy
Akzo Nobel / International Paint, LLC	Intergurd 475HS; Interseal 670HS for valves and gates, PVC pipe and conduit, submerged structural steel and misc. metals, and submerged piping
Devco Coatings	Bar-Rust 235
Carboline	Carboguard 60
PPG	Amerlock 385

Type H - Epoxy-Polyamide Coatings for Potable Water (NSF 61 Certified)	
Manufacturer	Approved Coating
Tnemec	Series N140 Pota-Pox Plus
Sherwin-Williams	Tank Clad Epoxy
Akzo Nobel / International Paint, LLC	Interline 850 or Interseal 670HS (NSF colors)
Devco Coatings	Bar-Rust 233H Series
Carboline	Carboguard 61
PPG	Amerlock 2/400

Type I - Aliphatic Polyurethane Enamel	
Manufacturer	Approved Coating
Tnemec	Series 1074 Endura-Shield II
Sherwin-Williams	Hi-Solids Polyurethane
Akzo Nobel / International Paint, LLC	Interthane 990 Series
Devco Coatings	Devthane 379 Series
Carboline	Carbothane 133HB (Satin) or Carbothane 134HG (High Gloss)
PPG	Pitthane Ultra Series

Type J - Silicone Aluminum Coatings For High Temperature	
Manufacturer	Approved Coating
Tnemec	Series 39 Silicon Aluminum

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Type J - Silicone Aluminum Coatings For High Temperature	
Manufacturer	Approved Coating
Sherwin-Williams	Silver Brite Aluminum B59S8
Akzo Nobel / International Paint, LLC	Intertherm 50 Series
Devroe Coatings	Intertherm 50 Series
PPG	Hi-Temp 500
Carboline	Carbozinc 11; Finish: Thermaline 4700 Series (up to 1000 deg. F); Thermaline 4900 (up to 450 deg. F)

Type K- Epoxy Concrete Coating	
Manufacturer	Approved Coating
Tnemec	Series 64H-413 Hi-Build Tneme-Tar
Sherwin-Williams	Tar Guard Epoxy
Akzo Nobel / International Paint, LLC	Interzone 954
Devroe Coatings	Devtar 5A Series
PPG	Amercoat 78HB Coal Tar Epoxy
Carboline	Bitumastic 300M

Type L - Epoxy Concrete Coating - High Friction Surface (HFS)	
Manufacturer	Approved Coating
Tnemec	Series 434/435 Perma-Shield System
Akzo Nobel / International Paint, LLC	Ceilcote 380/242GF Flakeline System
PPG	SFT 675
Carboline	Carboguard 510 Series / Plasite 4500 Series

Type M - High Solids Epoxy Siloxane	
Manufacturer	Approved Coating
Carboline	Carboxane 2000
Sherwin-Williams	Polysiloxane XLE-80
PPG	PSX 700 Polysiloxane
Approved Manufacturer	Approved Equal

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Type N - Epoxy Mastic	
Manufacturer	Approved Coating
Carboline	Carbomastic 15
Sherwin-Williams	Epoxy Mastic II
PPG	Amerlock 2/400 AL
Tnemec	Chembuild Series 135
AkzoNobel/International Paint, LLC	Interseal 670HS

Type O - Elastomeric Polyurethane Hybrid	
Manufacturer	Approved Coating
Carboline	Reactamine 760 Series
Sherwin-Williams	Sherflex S
PPG	Amerthane 490
Tnemec	Elasto-Shield Series 406
AkzoNobel/International Paint, LLC	Polibrid 705E Elastomeric

Type P - Glass Flake Reinforced Epoxy	
Manufacturer	Approved Coating
Carboline	Approved Equal
Sherwin-Williams	Sher-Glass FF
PPG	Amerlock 2/400 GF
Tnemec	Approved Equal
AkzoNobel/International Paint, LLC	Approved Equal

Type Q - 100% Solids Epoxy for Wastewater	
Manufacturer	Approved Coating
Carboline	Plasite 4550-S Novolac Epoxy
Sherwin-Williams	Dura-Plate 6000 Amine Epoxy
PPG	Novaguard 890 or Novaguard 810 Novolac Epoxy
Tnemec	Perma-Glaze Series G435 Modified Polyamine Epoxy
AkzoNobel/International Paint, LLC	Approved Equal

Special Specification

B. Petrolatum (Wax) Tape:

1. Petrolatum (wax) tape must be installed per the manufacturer's written recommendations. Provide all primers and appurtenant materials as required for installation per the recommendations.
2. Approved Manufacturers:
 - a. Trenton Corp. - Trenton Primer and #1 Wax-tape
 - b. Denso North America, Inc. - Denso Paste and Densyl Tape
 - c. Approved equal.

2.03 COLOR SELECTION

- A. The color chart must include the complete available range of colors, including tints and shades. Owner will select the colors during construction.
- B. Use a multi-color system coating for any surface receiving more than one coat. Each coat must be tinted differently from the preceding coat in a manner that will allow the various coats to be easily distinguished. Colors must generally be from light to dark shades, but the Contractor may have the option to select tint shades to insure coats will receive adequate coverage without bleeding or otherwise showing through the preceding coat.
- C. Piping and equipment must be color coded in accordance with the requirements of the TCEQ.

PART 3 EXECUTION

3.01 GENERAL

- A. All coatings must be applied in strict conformance with the coating manufacturer's published specifications, this Section, or as approved by the Engineer.
- B. Surfaces which will be inaccessible after installation must be coated prior to installation, or must be coated and approved in stages as the Work is installed.
- C. The Engineer will approve surfaces for application of coatings at each stage. Any material that is coated prior to the Engineer's approval will be stripped back to bare metal and repainted.
- D. At least 7 days or as required by the coating manufacturer, must be allowed for drying of finished surfaces before any machinery can be placed into service.
- E. The number of coats called for in this Section are considered the minimum required. If more coats are required for complete coverage and uniform appearance they must be provided at no additional cost to the Owner.

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3.02 STEEL SURFACE PREPARATION

- A. The adequacy of the preparation of steel surfaces will be determined by comparing the surface with SSPC-VIS 1 and SSPC-VIS 3. Prepare surfaces in accordance with the following requirements:
 - 1. SSPC-SP 1 — Solvent Cleaning.
 - 2. SSPC-SP 2 — Hand Tool Cleaning.
 - 3. SSPC-SP 3 — Power Tool Cleaning.
 - 4. SSPC-SP 5 / NACE 1 — White Metal Blast Cleaning.
 - 5. SSPC-SP 6 / NACE 3 — Commercial Blast Cleaning.
 - 6. SSPC-SP 7 / NACE 4 — Brush-Off Blast Cleaning.
 - 7. SSPC-SP 10 / NACE 2 — Near-White Blast Cleaning.
 - 8. SSPC-SP 11 — Power Tool Cleaning to Bare Metal.
- B. The resulting surface profile must be in accordance with the coating manufacturer's recommendations.
- C. "Solvent Cleaning" must be performed prior to subsequent surface preparation, including abrasive blast cleaning.
- D. All sharp edges and welds must be ground smooth to a rounded contour and all weld splatter must be removed prior to abrasive blasting. Edges of metal to be coated must be rounded to a minimum of 1/16-inch radius of chamfered a minimum of 1/16 inch at an angle of 45 degrees.
- E. Welds and adjacent areas:
 - 1. Prepared such that there is:
 - a. No undercutting or reverse ridges on the weld bead.
 - b. No weld spatter on or adjacent to the weld or any other area to be painted.
 - c. No sharp peaks or ridges along the weld bead.
 - d. Grind embedded pieces of electrode or wire flush with the adjacent surface of the weld bead.
 - 2. Weld profiles must conform to NACE RP0178, Profile 'D'.

3.03 DUCTILE IRON PIPE AND FITTINGS SURFACE PREPARATION

- A. Prepare surfaces in accordance with the following requirements:
 - 1. NAPF 500-03-01 — Solvent Cleaning.
 - 2. NAPF 500-03-02 — Hand Tool Cleaning.
 - 3. NAPF 500-03-03 — Power Tool Cleaning.
 - 4. NAPF 500-03-04 — Abrasive Blast Cleaning for Ductile Iron Pipe.

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- 5. NAPF 500-03-05 — Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
- B. “Solvent Cleaning” must be performed prior to subsequent surface preparation as specified in NAPF 500-03.

3.04 PETROLATUM (WAX) TAPE

- A. Petrolatum (wax) tape must be installed per the manufacturer’s written recommendations. Provide all primers and appurtenant materials as required for installation per the recommendations.
- B. Tape must be installed on all buried flexible couplings and at locations indicated on the Drawings and as specified.

3.05 CONCRETE SURFACE PREPARATION

- A. The adequacy of the preparation of concrete surfaces will be determined by comparing the surface with ICRI Surface Finish Comparators. Prepare surfaces in accordance with the following requirements:
 - 1. SSPC-SP 13 / NACE 6 — Surface Preparation of Concrete.
- B. Allow a minimum of 28 days curing time to elapse before coatings are applied. Concrete surfaces which are scheduled to receive coatings must be in accordance with the coating manufacturer’s moisture requirements.
- C. Bug holes, air pockets, and other voids in the concrete will be filled or patched in chemical exposure areas, secondary containment, and where specifically required.
- D. Concrete Surface Preparation Inspection:
 - 1. Adhesion Testing:
 - a. Tensile testing of the surface preparation must be performed by the Contractor using a Type 4 or Type 5 pneumatic adhesion testing equipment in accordance with ASTM D7234 using 2-inch diameter dollies for concrete surface adhesion testing. Provide a minimum of three tests (dollies) per area and coating system. Engineer will select location of test dollies.
 - b. Concrete surface or applied coating must be scored for concrete adhesion testing.
 - c. Adhesive failure greater than 50 percent of the dolly surface area indicates inadequate surface preparation.
 - d. Cohesive failures which results in loss of sound concrete will be acceptable provided the loss is greater than 50 percent of the dolly surface area.
 - e. Low adhesion cohesive failures with a thin layer of concrete due to weak concrete or laitance over 50 percent of the dolly surface will be rejected.
 - 2. Concrete Soundness:

Concrete soundness will be determined using the scratching or hammer impact methods as defined in SSPC-SP 13.

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3. Moisture Content:

Moisture must be tested as specified in SSPC-SP 13 and in accordance with ASTM D4263 and ASTM F1869. Moisture content cannot exceed the moisture content recommended by the coating manufacturer.

3.06 SURFACE PREPARATION

- A. Clean and degrease surfaces prior to abrasive blasting by solvent cleaning as specified using solvents, detergent/water, emulsions, and steam. Proposed method must be documented in the coating plan. Contractor must contain and properly dispose of all runoff and debris from cleaning.
- B. If the following conditions exist or are prevalent, surface preparation and coating must be delayed or postponed until conditions are favorable. Each day's coating must be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions or changes. No surface preparation can begin or coating applied:
 - 1. When the surface, air or material is below or above the manufacturer's printed instructions.
 - 2. When surfaces are wet or damp.
 - 3. During weather conditions of rain, snow, fog or mist.
 - 4. When the air and steel temperature is less-than or equal to 5 deg. F above the dew point temperature.
 - 5. If the relative humidity is above 85 percent.
 - 6. When it is expected that the air and/or surface temperature will be below or above the coating manufacturer's recommended temperatures within 4 hours after applications of coating, minimum. Coating manufacturer may require additional time between application and temperature and weather changes.
- C. Shop Surface Preparation:
 - 1. Notify Engineer at least 7 days prior to start of shop blast cleaning to allow for inspection of the Work during surface preparation and shop application of paints. Work is subject to the Engineer's approval before shipment to the Site.
 - 2. Items such as structural steel, metal doors and frames, metal louvers, and similar items as reviewed by the Engineer may be shop prepared and primed. Centrifugal wheel blast cleaning is an acceptable alternate to shop blast cleaning. Blast clean and prime in accordance with the Specifications.
 - 3. Prepare surfaces by abrasive blasting as specified and apply shop prime coat. Shop primed steel plates must not have primer extended within 4 inches along all edges to be welded. All primer within 4 inches of an area to be welded must be removed prior to welding. Welding of painted surfaces will not be allowed.
- D. All pre-assembled shop primed items must be prepared in accordance with these specifications and inspected by the Owner's representative before and after priming.

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E. Abrasive Blasting:

1. Prior to extensive abrasive blasting operations, the Contractor must perform a test blast to verify that the surface cleanliness and profile meet the requirements of this Section and meet the coating manufacturer's requirements for the coating to be applied. If the test section does not meet the requirements, the Contract must make changes to the abrasive materials and methods to provide suitable blast.
2. Abrasive blast only the amount of surface area which can be primed the same day or before any rust starts to form, whichever occurs first. Areas which are not painted the same day must be re-blasted on the day the prime coat is applied.
3. Shrouding or recovery of all blast material will be mandatory during all exterior blasting.
4. Contractor must contain all waste and process discharge in accordance with the accepted methods for the process and materials that are in abatement.
5. Where abrasive blast cleaning will not remove or properly prepare metal surfaces, hand and/or power tool cleaning must be used to remove such conditions as weld splatter, laminations and radius-sharp edges. Hand tool or power tool must be used on areas less than 2 feet in diameter or smaller or on corners and edges.
6. All abrasive blast equipment must be equipped with, including but not limited to the following:
 - a. Noise reducing devices.
 - b. Hose coupling safety devices.
 - c. Electrical grounding devices.
 - d. Moisture traps and filters.
 - e. Fresh air hoods for all blasters.
 - f. "Dead Man" switches on all blast hoses.
 - g. Air dryers.

F. Surface profile must be in accordance with manufacturer's printed requirements.

G. The adequacy of the preparation of surfaces must be determined by comparing the surface with SSPC-VIS 1, SSPC-VIS 3, NACE RP0178 and ICRI Surface Finish Comparators.

H. Adequate surface preparation must be verified throughout surface preparation per SSPC-PA 17. Minimum testing requirements:

1. Test the surface profile within the first 15 minutes and one additional time during each work shift or 12-hour period, whichever is shorter for each gun or blasting apparatus used or at any time the process producing the acceptable profile indicated above is changed, as interpreted by the Engineer.
2. Select a minimum of three 6-inch square locations and take two readings. The average to the two readings is a "profile measurement." The group of three

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locations is the “location average.” The location average must be within the specified profile range.

3. Contractor must report the location averages (lowest location average and highest location average, and the profile measurement for each surface preparation apparatus.
4. If the substrate has been previously coated, an existing profile may exist. Contractor must adjust blast media size to ensure that the surface profile yield meets the profile required.
- I. Wherever the words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, or “blast cleaning”, or similar words of equal intent are used in the Specifications or in paint manufacturer’s specifications, they are understood to refer to the applicable specifications indicated.
- J. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacuum-blasting methods may be required. Coating manufacturer’s recommendations for wet blast additives and first coat application will apply.
- K. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wiped with a tack cloth.

3.07 PREPARATION OF HOT-DIP GALVANIZED COATED IRON OR STEEL PRODUCTS

- A. Remove all soluble and insoluble contaminants. Prepare hot-dip galvanized coated iron and steel products in accordance with ASTM D6386 and abrasive blast per ASTM D6386 to achieve an angular anchor profile as required by the coating manufacturer.
- B. Contractor is responsible for coordinating with the coating manufacturer to verify compatibility of the specified coating system with the provided surface preparation.

3.08 PREPARATION OF EXISTING COATED OR SHOP PRIMED SURFACES

A. General:

1. Factory-applied primers to equipment must be those specified or verified by the Contractor to be compatible with the specified coating systems. Where possible, notify manufacturers which shop prime coats will be required in order to be compatible with field-applied finish coats.

Where equipment is purchased which has the manufacturer’s standard primer or a factory finish which is other than as specified in this Section, remove the factory-applied paint system or apply passivators or other special coatings as required to make the surface compatible with the finish coat specified.

2. Do not apply any coating to machinery, piping, or other surfaces before testing has been completed and systems approved. Any damage to coatings resulting

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from subsequent corrective procedures must be stripped back to bare metal and repainted with the appropriate paint system as directed by the Engineer.

3. Check for compatibility when applying coatings over existing coatings. Apply a test patch of the recommended coating system, covering at least 2 to 3 square feet or as directed by the Engineer. Allow to cure 1 week before testing adhesion per ASTM D3359 in the presence of the Engineer. If adhesion does not meet the manufacturer's published data, consult with the Engineer.
 4. Shop primed or coated surfaces must be reviewed with the Engineer to determine if the extent of damage to the coating and suitability of finish coats to adhere to shop applied coats.
 5. If a cured epoxy, polyurethane, or plural-component material is to be top coated provide brush-off blast as specified herein or as recommended by the coating manufacturer.
 6. Surface preparation recommendations of coating manufacturer are subject to approval of the Engineer.
- B. To be recoated or final coated:
1. Solvent clean.
 2. Perform touch-up repairs of existing coating.
 3. Asphaltic coated ductile iron pipe will require an application of a seal coat prior to the application of a cosmetic finish coat.
- C. Touch-Up Repairs:
1. Clean loose, abraded, or damaged coatings to substrate by power tool to bare metal per SSPC-SP 11 and/or NAPF 500-03-03 "Power Tool Cleaning."
 2. Feather surrounding intact coating.
 3. Apply one spot coat of the specified primer to bare areas overlapping the prepared existing coating.
 4. Apply one full finish coat of the specified primer or finish coat(s) overall.
- D. Application of a Cosmetic Coat:
1. The exact nature of shop-applied coatings is not known in all cases.
 2. Check compatibility by application to a small area prior to starting the coating.
 3. If lifting or other problems occur, request disposition from the Engineer.

3.09 APPLICATION

- A. Contractor and painting technicians are responsible for the application of the coating system and must have current applicator approvals from the coating manufacturer, as required.
- B. After abrasive blast cleaning, dust and spent abrasive must be removed from the surfaces by vacuum process or with clean, dry, oil-free compressed air.

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- C. The prime coat must be applied as soon as possible after the blasting and surface cleaning is completed, inspected and approved by the Inspector. Blasted surfaces must be coated before rust forms on the surface. No prepared surface will be allowed to receive a coating if “rust bloom” or surface discoloration has occurred. All blasted surfaces must be coated to within 6 inches of the edge of a blasted area. No visible rust must be coated under any circumstances, including rust bloom or if discoloration has occurred, regardless of elapsed time between blasting and coating.
- D. Provide mist coat if recommended by the coating manufacturer.
- E. All weld seams, gaps, edges, bolts and difficult areas to coat must receive a stripe coat. Stripe coat must be a contrasting color. Stripe coat may be applied with intermediate or finish coating.
- F. Contractor must apply each coat at the rate and in the manner specified by the coating manufacturer, except as may be modified herein. If material has thickened or must be diluted for application, coating must be built up to the same dry film thickness as specified for each coat of the complete system.
- G. Maximum and minimum DFT must be per the supplied coating manufacturer’s printed requirements and as required by this Section. DFT will be measured per SSPC-PA 2, Level 3 with an allowable measurement of spot DFT of:
 - 1. 80 percent of minimum DFT specified.
 - 2. 120 percent of maximum DFT specified.
- H. Contractor and painting technicians are responsible for the application of coating system and must have current applicator certifications from the coating manufacturer. Submit certifications with coating submittal.
- I. Coatings which have an expired shelf or pot life may not be used and must be removed from the Site.
- J. Coating must be applied by skilled workmen and must be brushed out or sprayed evenly, without runs, crazing, sags, or other blemishes.
- K. Sand between coats to remove over spray and dry fall.
- L. Apply the first coat to the surface, including cutting in around edges, before the second coat is applied. The second coat and any successive coats must not to be applied before notifying the Owner’s field representative and obtaining approval. Each coat must be tested before the successive coat is applied.
- M. The coating curing period must be adjusted to compensate for less than adequate weather conditions, as recommended by the coating manufacturer, for complete curing of the entire coating system. The full curing time recommended by the manufacturer must be provided.
- N. Coating must be continuous and must be accomplished in an orderly manner to facilitate proper inspection control.
- O. Where a roller or brush is used to apply the coating, additional coats may be necessary to achieve the recommended dry film thickness and/or to achieve total

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coverage of the underlying surface. Coated surfaces must be totally free of all roller nap, roller marks, brush bristles and brush marks.

- P. When using conventional coating spray equipment for coating operations, effective oil and water separators combined with after coolers or deliquescent dryers must be used in compressed air lines to remove detrimental oil and moisture from the air. Separators must be placed as far as practical from the compressor. Compressors may be tested periodically by the Owner's representative for oil and water contamination of compressed air. Testing must follow ASTM D4285. All compressor units found to produce unacceptable amounts of oil and or water, as determined by results of ASTM D4285 test data and interpretation of data by the Owner's representative must be replaced with a compressor that is acceptable.
- Q. For porous surfaces, such as concrete or masonry, a prime coat may be thinned to provide maximum penetration and adhesion. The type and amount of thinning must be determined by the coating manufacturer and is dependent on surface density and type of coating.

3.10 FIELD QUALITY CONTROL

- A. Field Tests: Make wet film tests during painting operations to ensure proper thicknesses of coating are being applied. After each coat has been applied, test the paint film thickness with a nondestructive, magnetic type thickness gauge. The total dry-film thickness for each coat must be per Paragraph [3.09.G]. Apply additional coats until the specified thickness is reached or exceeded.
- B. Holiday Testing
 - 1. Holiday testing must be performed in accordance with ASTM D5162 for steel substrates and ASTM D4787 for concrete substrates.
 - 2. Test the entire surface of coated steel and piping in moderate or severe environments, as determined by the Engineer, with a holiday detector. For thickness between 10 and 20 mils (250 to 500 microns) a non-sudsing type wetting agent, as recommended by the holiday detector manufacturer, must be added to the water prior to wetting the detector sponge.
 - 3. Holiday detect coatings in excess of 20 mils with high voltage holiday testers as recommended by the coating manufacturer.
 - 4. Mark and repair failures in accordance with the manufacturer's printed instructions, then retest failure areas. No failures or other irregularities will be permitted in the final coats. Areas containing holidays must be repaired until tests indicate no holidays.

3.11 PROTECTION OF SURFACES NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted.

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- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering the motors.

3.12 DAMAGED COATINGS, PINHOLES, AND HOLIDAYS

- A. Feather edges and repaired in accordance with the recommendations of the paint manufacturer.
- B. Repair fusion bonded coatings to be as recommended by the original applicator. Applicator must provide liquid repair kits for this purpose as recommended by the coating manufacturer.
- C. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.13 UNSATISFACTORY APPLICATION

- A. If the item has an improper finish color, or insufficient film thickness, clean and topcoat surface with specified paint material to obtain the specified color and coverage. Obtain specific surface preparation information from the coating manufacturer.
- B. Hand or power sand visible areas of chipped, peeled, or abraded paint and feather the edges. Follow with primer and finish coat in accordance with the Specifications. Depending on the extent of repair and its appearance, a finish sanding and topcoat may be required.
- C. Evidence of runs, bridges, shiners, laps, or other imperfections are cause for rejection.
- D. Repair defects in coating system per written recommendations of coating manufacturer.
- E. Leave all staging up until the Engineer has inspected the surface or coating. Replace staging removed prior to approval by Engineer.

3.14 COATING INSPECTION

- A. General:
 - 1. All coats will be subject to inspection by the Engineer and the coating manufacturer's representative.
 - 2. Visually inspect concrete, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
 - 3. Give particular attention to edges, angles, flanges, and other areas where insufficient film thicknesses are likely to be present and ensure proper millage in these areas.

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B. Coating Thickness Testing:

1. Owner's representative may conduct coating thickness testing as necessary and without limitation.
2. Measure coating thickness specified in mils with an electronic type dry film thickness gauge.
3. Check each coat for the correct millage.
4. Tests for concrete coating thickness may be taken using a Tooke Gauge or gauge approved for testing coatings over concrete substrates. Contractor must repair coating after thickness testing, if required.

C. Coating Continuity (Holiday) Testing: Owner's representative will witness holiday testing performed by the Contractor.

3.15 CLEANING AND ADJUSTING

- A. Promptly remove trash and debris resulting from painting operation from the Site. Remove drop cloths, masking tapes and other protective coverings. Remove paint spills, splatters, overlap of paint from adjacent material and other defects. Spot paint nicks and other defects.
- B. Remove paint containers and waste products. Thoroughly clean paint storage rooms, removing spilled paint from walls and floors.
- C. Damages due to over spray on buildings, vehicles, trees, or other surfaces not specified to be painted would be the responsibility of the Contractor.

3.16 SCHEDULE

- A. Protective coatings must be applied in accordance with the following paint schedule. If additional or alternate primers, etc. are recommended by the coating manufacturer for any of the coatings specified, they must be provided at no additional cost to the Owner to provide a complete and compatible coating system, as approved by the Engineer.

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PROTECTIVE COATINGS PAINT SCHEDULE

System	Application Description	Surface Prep	Product Type	No. of Coats	DFT/Coat (mils)
No. 1	Submerged Metal - Potable Water All metal surfaces new and existing below a plane 1 foot above the maximum liquid surface, metal surfaces above the maximum liquid surface which are a part of the immersed equipment, concrete embedded surfaces of metallic items under submerged or buried conditions, such as wall pipes, pipes, wall or floor sleeves, access manholes, gate guides and thimbles, and structural steel. Not to be used for potable water storage tanks. All coatings must be NSF 61 certified.	SSPC-SP 1 SSPC-SP 10 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05	TYPE H - Epoxy-Polyamide	1	4.0
			TYPE H - Stripe Coat	2	4.0
			TYPE H - Epoxy-Polyamide		
Total Minimum Dry Film Thickness					12 mils
No. 2	Above-Grade Interior/Exterior Steel and D.I. Piping Non-Immersion/Non-Corrosive Environment All metal surfaces new and existing, such as inside pump station buildings, exterior piping and valves, exterior structural steel, etc. Application Notes: 1. Intact Factory Applied Epoxy Coatings on Valves and Piping - Abrade surface to create a surface profile and spot prime with Epoxy Mastic. Coat with penetrating sealer and continue with stripe, intermediate and top coat as indicated. 2. Previously Coated and Corroded Piping and Valves - Prepare as indicated to the right and provide full coat of Epoxy Mastic and continue with stripe, intermediate and top coat as indicated.	For New Piping and Valves: SSPC-SP 1 SSPC-SP 6 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05 For Previously Coated Piping and Valves: SSPC-SP 1 SSPC-SP 3 NAPF 500-03-01 NAPF 500-03-03	TYPE N - Epoxy Mastic	1 1 1	5.0
			TYPE C - Penetrating Epoxy Pre-Primer		2.0
			TYPE M - Stripe Coat Type M - HS Epoxy Siloxane		5.0 - 7.0
Total Minimum Dry Film Thickness					12 mils

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System	Application Description	Surface Prep	Product Type	No. of Coats	DFT/Coat (mils)		
No. 3	Electrical Equipment - Exterior All new and existing exterior electrical panels and equipment with factory coatings. Not for pumps and motors.	SSPC-SP 1 SSPC-SP 2	TYPE A - Alkyd-Phenolic Universal Primer	1	2.0		
			TYPE F - Stripe Coat TYPE F - Alkyd Enamel	2	3.0		
			Total Minimum Dry Film Thickness			8.0 mils	
No. 4	Above-Grade Interior and Exterior PVC Pipe Exterior surfaces PVC piping.	SSPC-SP 1 Light Sanding	TYPE B - Epoxy-Polyamide Primer	1	3.0		
			TYPE I - Aliphatic Polyurethane Enamel	1	3.0		
			Total Minimum Dry Film Thickness			6.0 mils	
No. 5	New and Existing Metal Piping and Valves within Vaults and Under Insulation Moderate to Severe Environment All metal surfaces new and existing that will be installed in areas where temporary submerged conditions can occur, such as within vaults and for piping and valves covered with insulation. Application Notes: 1. Intact Factory Applied Epoxy Coatings on Valves and Piping - Abrade surface to create a surface profile and spot prime with Epoxy Mastic. Coat with penetrating Sealer and continue with stripe, intermediate and top coat as indicated. 2. Previously Coated and Corroded Piping and Valves - Prepare as indicated to the right and provide full coat of Epoxy Mastic and continue with stripe, intermediate and top coat as indicated.	For New Piping and Valves: SSPC-SP 1 SSPC-SP 6 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05 For Previously Coated Piping and Valves: SSPC-SP 1 SSPC-SP 3 NAPF 500-03-01 NAPF 500-03-03	TYPE N - Epoxy Mastic TYPE C - Penetrating Epoxy Pre-Primer TYPE G - Stripe Coat TYPE G - Epoxy-Polyamide	1	4.0		
				1	2.0		
				2	4.0		
				Total Minimum Dry Film Thickness			12 mils

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END OF SECTION

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SECTION 13110

CATHODIC PROTECTION SYSTEM

PART 1 - GENERAL

1.1 THIS SECTION INCLUDES

- A. The WORK of this Section includes providing a complete cathodic protection (CP) system for the following structures as outlined in this Section and on the Drawings:
- B. Segment 2C comprises approximately 2.8 miles of 48" diameter of polyurethane coated steel pipe. Combined segment 3 pipe comprises approximately 13.7 miles of 48" diameter of polyurethane coated steel pipe. Electrical isolation is required 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 CP system.
- C. Electrical bonding is required of all non-insulated, non-welded pipe joints and mechanical joints.
- D. Installation of rectifiers, anode beds, insulating joints, test stations, other components associated with the CP system, and all other work described herein and on the Drawings.
- E. Provision of electrical power for rectifiers, including any easements, permits, trenching, conduits, services meters, and other items as required. Not all required items are shown on the Drawings.
- F. Testing of CP system during installation.
- G. Cleanup and restoration of work site.
- H. Final System Checkout: Testing of CP system after installation and backfill.

1.2 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 at no additional cost to the owner.
- 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 CP material supplier or subcontractor.

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- E. All electrical WORK shall be in accordance with NEC and local requirements.

1.3 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. Section 300 – Concrete
 2. Section 301 – Reinforcing Steel
 3. Section 307 – Concrete Structures
 4. Section 902 – Construction Safety and Health Program
 5. Section 550 – Trench Excavation Safety Protection
 6. Section 02571 – Steel Pipe, Mortar Lined
 7. Section 09970 – Painting and Protective Coatings

1.4 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.	B3	Standard Specification for Soft or Annealed Copper Wire
c.	B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
d.	B80	Standard Specification for Magnesium-Alloy Sand Castings
e.	C94	Standard Specification for Ready-Mixed Concrete
f.	D1248	Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
g.	D1785	Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
2.	AASHTO	American Association of State Highway and Transportation Officials
a.	H20	Specification for Highway Bridges

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3. NACE International, the Corrosion Society
 - a. RP0375 Field-Applied Underground Wax Coating Systems for Underground Pipelines: Application, Performance, and Quality Control
 - b. SP0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems
 - c. SP0286 Electrical Insulation of Cathodically Protected Pipelines
 - d. SP0572 Design, Installation, Operation and Maintenance of Impressed Current Deep Anode Beds
 - e. TM0497 Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems
 4. NFPA National Fire Protection Association
 - a. 70 National Electric Code (NEC)
 5. 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 Tubing
 6. UL Underwriters Laboratories
 - a. 6 Rigid Metal Conduits
 - b. 467 Grounding and Bonding Equipment
 - c. 506 Standard for Specialty Transformers
 - d. 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.

1.5 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 CP system.

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- B. The CONTRACTOR shall contact Texas One Call System 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. If traffic control is necessary, it shall satisfy the requirements of the governing locality.
- D. The CONTRACTOR shall be responsible for reviewing the rectifier locations to determine whether there are any conflicts with obtaining power at the indicated locations. The CONTRACTOR shall report any conflicts to the ENGINEER prior to proceeding with the Work.
- E. The CONTRACTOR shall submit an application to the local power company for AC power to the new rectifiers. The CONTRACTOR shall be responsible for all fees and expenses (including easements) associated with providing power to the rectifiers.

1.6 QUALITY ASSURANCE

- A. Installation of the CP equipment shall be performed by individuals having at least five years of experience in the installation of the CP equipment described herein.
- B. All testing required to be performed by a “Corrosion Technician” shall be performed by a NACE certified Corrosion Technician under the supervision of a Corrosion Engineer. A Corrosion Technician is a NACE CP1 (CP Tester), CP2 (CP Technician), CP3 (CP Technologist), or CP4 (CP Specialist). A Corrosion Engineer is a Registered Professional Corrosion Engineer or a NACE CP4 (CP Specialist).
- C. All well drilling shall be performed by a licensed Well Drilling CONTRACTOR.
- D. All deep well installations shall be installed in accordance with and the applicable sections on wells from local regulations.

1.7 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. Statement that the equipment and materials proposed meet the Specifications and the intent of the Specifications.
 - 3. Statement of installation experience required.
 - 4. Schedule, including the expected start date and planned completion date.
 - 5. Copy of well drilling or surface disturbance permits, if permit(s) are required by local jurisdiction.

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6. Description of power system to be provided for rectifiers, including cut sheets, meter sizing, power company requirements, and copy of 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. Final System Checkout 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 (O&M) manual with instructions for CP system and components. O&M manual may include rectifier operations and instructions for adjustments, CP measurements at recommended frequencies, and testing documentation guidelines.
 2. List of spare parts recommended for two years of successful operation.

1.8 INTERFERENCE AND EXACT LOCATIONS

- A. The locations of CP 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, foreign pipeline, 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 to meet minimum clearance requirements.

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PART 2 - PRODUCTS

2.1 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.

2.2 RECTIFIERS

- A. Rectifiers shall be air-cooled, single-phase, 115/230 V_{AC} input, with V_{DC} output and A_{DC} output as indicated in the corresponding pipeline segment rectifier schedule on the Drawings. Rectifiers shall be manufactured by Universal Rectifiers, Corpro, JA Electronics, or an 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: Two-winding, insulating type that meets the requirements of NEMA and UL 506.
- D. 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.
- E. 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 1,000 peak inverse volts.
- F. All rectifiers shall have overload and lightning protection for both AC and DC circuits.
- G. A digital voltmeter and ammeter shall be provided. Voltmeter and ammeter shall be calibrated and adjusted at the factory.
- H. 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

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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

I. The following shall be provided for each rectifier. Each item shall be provided in a waterproof bag or container.

1. Operations and Maintenance Manual
2. Circuit Diagram
3. Electrical Test Report

2.3 RECTIFIER CABINETS

- A. Rectifier cabinets shall be NEMA 250 Type 3R and sized as shown on the Drawings.
- B. Rectifier cabinets shall be made of steel that is either shop coated with a baked enamel finish, galvanized per ASTM A123, or pre-galvanized sheet finished with a powder coat.
- C. Cabinets shall have a single door with a full length hinge and a lockable latch. Hinge, latch, and other miscellaneous metallic components on the cabinet shall be 304 or 316 stainless steel.
- D. Rectifiers shall be equipped with permanent identification tags affixed to the outside front door. The identification tag shall have white engraving for identification of the rectifier. Minimum height of lettering shall be 3/4 inch.

2.4 JUNCTION BOXES

- A. Junction boxes shall be NEMA 250 Type 4 enclosure and sized as shown on the Drawings.
- B. Junction boxes shall be made of 304 or 316 stainless steel.
- C. Junction boxes shall have a single door with a neoprene gasket, full length hinge, and lockable latch. Hinge, latch, and other miscellaneous metallic components on the cabinet shall be 304 or 316 stainless steel. Junction box latch shall have a 1/4-diameter hole for installation of a padlock.
- D. Junction boxes shall be equipped with permanent identification tags affixed to the outside front door. The identification tag shall have white engraving for identification of the junction box. Minimum height of lettering shall be 3/4 inch.

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2.5 HIGH-SILICON CAST IRON (HSCI) ANODES

- A. HSCI anodes shall meet the requirements of ASTM A518 Grade 3. Anodes shall be manufactured by Anotec, Corpro, or equivalent.
- B. HSCI anodes shall be tubular type anodes with centered wire connection. Anodes shall have the following size, form, and shape as shown on the drawings.

Anode Type	Length (inch)	Diameter (inch)	Weight (lb)	Surface Area (ft ²)
2260Z or TACD	60	2 to 2.2	32 to 36	2.8 to 2.9
2284Z or TA2	84	2 to 2.2	46 to 50	4.0
2660Z or TAD	60	2 to 2.7	45 to 50	3.5
2684Z or TA3	84	2 to 2.7	63 to 70	4.9
3860Z	60	2.9	62	3.8
3884Z	84	2.9	90	5.3

- C. Anode lead wire:
1. The wire attached to the anodes shall be of the size and type indicated on the Drawings. The anode lead wire shall conform to the specifications given for “Wires” in this specification.
 2. The wire shall be connected to the interior of the anode and sealed by the manufacturer. The 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.
 3. Anode lead wires shall be of one continuous length, without splices, unless otherwise indicated on the Drawings, 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. Precautions 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.
- D. The resistance of each anode wire connection shall not exceed 0.004 ohms. Each anode wire connection should be tested by the manufacturer 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:

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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
- E. 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.

2.6 GALVANIC ANODES

- A. High-potential magnesium anodes: Cast magnesium anodes shall conform to ASTM B843 Type M1C. Anodes shall have an open circuit potential of -1.70 volts or more electronegative and a current efficiency of at least 48% when tested in accordance with ASTM G97. Anodes shall have the following size, form, and shape as indicated on the drawings. Anodes shall be manufactured by Farwest, Corpro, Mesa, Matcor, or equivalent.

Ingot				Packaged		
Weight (lb)	Width (inch)	Height (inch)	Length (inch)	Weight (lb)	Diameter (inch)	Length (inch)
60	4 to 5	4	60	126 to 130	6 to 7	64

- B. Anode lead wire:
1. The wire attached to the anodes shall be of the size and type indicated on the Drawings. The anode lead wire shall conform to the specifications given for “Wires” in this specification.
 2. Connection of wire to the anode shall have a pulling strength that exceeds the wire’s tensile strength.
 3. Anode lead wires shall be of one continuous length, without splices, unless otherwise indicated on the Drawings or as approved by the ENGINEER, from the anode connection to the test station.

2.7 CALCINED COKE BREEZE

- A. Backfill material for impressed current anodes shall be calcined coke breeze.
- B. Calcined coke breeze shall have a resistivity of 25 ohm-cm or less when tested with an applied pressure of 2 psi and a bulk density of 64 to 74 pounds per cubic foot. The particle size shall be between 200 mesh and 18 mesh and shall be dust free. The minimum calcination temperature of base materials shall be 1250 °C.
- C. Calcined coke breeze shall have the following chemical properties:
1. Fixed carbon 98% minimum

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- 2. Ash 0.6% maximum
- 3. Volatile matter 1.0% maximum
- 4. Moisture 1.0% maximum
- D. Calcined coke breeze shall be Loresco SC-3, Asbury 251, or approved equivalent when installed by pumping down the hole. If installed via the freefall method, calcined coke breeze shall be Loresco RS-3, Ashbury 218-L, or equivalent.

2.8 ANODE VENT PIPING

- A. Anode vent piping for the impressed current anode vent piping shall be 2-inch diameter PVC, Schedule 80, conforming to ASTM D1785 Type 1 Grade 1.
- B. Slots and perforations shall be provided in the immediate vicinity of the anodes and throughout the coke breeze and sized such that coke breeze does not enter vent pipe. The vent pipe shall be capped at both ends during the backfilling operation to mitigate infiltration of backfill material or mud.
- C. Above ground portions of anode vent piping shall be rated for sunlight resistance.
- D. Above ground outlet for vent piping shall have a vent screen with an orientation preventing rainfall accumulation and bug intrusion.

2.9 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 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall be in accordance with ASTM C94, permit requirements, and the Specification section for cast-in-place concrete.

2.11 REINFORCING STEEL

- A. Reinforcing steel shall be in accordance with ASTM A615, permit requirements, and the Specification section for reinforcing steel.

2.12 POST-MOUNTED TEST STATION

- A. Post-mounted test boxes shall be Testox manufactured by Gerome, Big Fink manufactured by Cott, or equivalent.

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- B. Pole shall be painted yellow. Pole surface shall be prepared for painting (if necessary) per SSPC SP16 or ASTM A6386. Pole shall be painted with a coating system that is compatible with long-term outdoor weathering. An acceptable coating system would be a polyamide epoxy primer and aliphatic polyurethane topcoat.
- C. The connection hardware associated with the test station terminal board shall be nickel-plated brass.
- D. All wires shall be terminated with copper ring terminals to be landed on the terminal board with the connection hardware.

2.13 FLUSH-MOUNTED TEST STATION

- A. Flush-mounted test station boxes shall be traffic boxes rated to withstand AASHTO H20 traffic loading.
- B. The traffic boxes shall be G05 Utility Boxes, as manufactured by Christy Concrete Products, Inc.; No. 3RT Utility Box, as manufactured by Brooks Products; or an approved equivalent.
- C. Traffic box covers for test stations shall be cast iron with welded bead legend and labeled "CP TEST," "DEEP WELL ANODE," or "GROUND," as required.

2.14 TERMINAL BOARDS

- A. Terminal boards shall be made of 1/4-inch thick phenolic plastic and sized as indicated on the Drawings.
- B. Connection hardware shall be brass or bronze. All connections shall be double nutted bolts with serrated lock washers. A minimum of 12 inches of wire slack shall be provided.
- C. Copper bus bar shall be 1/8-inch thick and sized to fit. The copper bus bar shall be per ASTM B187 with 98% conductivity.

2.15 MECHANICAL LUGS

- A. Mechanical lugs shall be brass or copper with a brass, copper, or stainless-steel set screw. Tin plating on the lugs is optional. Aluminum lugs shall not be permitted. Zinc-plated steel set screws shall not be permitted. The lug shall be listed per UL 467, suitable for direct burial, and appropriately sized for the incoming wires. The lug shall be ILSCO Type XT-6DB, Burndy GKA8C, or an approved equivalent.

2.16 SHUNTS

- A. Shunts shall be the selected by the size indicated on the Drawings.
- B. 0.001-ohm, 25-amp shunts shall be Type SS, as manufactured by Holloway, or equivalent for use with impressed current anodes.

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2.17 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 Schedule 80 PVC in accordance with NEMA TC2 and NEMA TC3.
- C. Conduit and fittings placed above grade shall be rigid steel. Rigid Steel conduit shall be galvanized and conform to UL 6.
- D. Conduit clamps shall be galvanized steel, 304 stainless steel, or 316 stainless steel.
- 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, conform to NEMA FB 1, and be listed to UL 514B.
- F. Union couplings for conduit shall be Erickson or Appleton Type EC, 0-Z Gedney 3-piece Series 4, or equivalent.

2.18 CAUTION TAPE

- A. The caution tape shall be an inert plastic film designed for prolonged underground use. The caution tape shall be a minimum of 3 inches wide and a minimum of 4 mils thick.
- B. The caution tape shall be continuously printed over the entire length with the wording "CAUTION: CATHODIC PROTECTION CABLE BURIED BELOW."
- C. The wording shall be printed using bold black letters. The color of the tape shall be red.

2.19 WIRES

- A. Conductors shall consist of stranded copper of the gauge indicated on the Drawings. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall be in conformance with ASTM B3 and ASTM B8.
- B. Wire Type and Colors: As shown on the Drawings.
- C. Insulation:
 - 1. High molecular weight polyethylene (HMWPE) wires shall be rated for 600 volts and shall conform to ASTM D1248, Type 1, Class C, Grade 5.
 - 2. Halar/HMWPE wires (CP wire) shall be rated for 600 volts and have dual insulation. The primary layer of insulation shall be a homogeneous 20 mil wall of ECTFE fluoropolymer (Halar), and the jacket shall be a 65 mil wall of HMWPE conforming to ASTM D1248, Type 1, Class C, Grade 5. Halar/HMWPE wire shall be UL listed as Cathodic Protection Wire.

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2.20 WIRE IDENTIFICATION TAGS

- A. Wire identification tags 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 height shall be 3/16 inch at minimum.

2.21 EXOTHERMIC WELDS

- A. Exothermic welds shall be in accordance with the manufacturer's recommendations. Exothermic welds shall be Cadweld manufactured by Erico, Thermoweld manufactured by Burndy, or an approved equivalent.
- B. Prevent molten weld metal from leaking out of the mold, where necessary, by using Duxseal packing manufactured by Johns-Manville, Thermoweld packing material manufactured by Burndy, Cadweld T403 Mold Sealer manufactured by Erico, or an approved equivalent.
- C. The shape and charge of the exothermic weld shall be chosen based on the following parameters:
 - 1. Pipe material
 - 2. Pipe size
 - 3. Wire size and requirement for sleeves
 - 4. Number of wires to be welded
 - 5. Orientation of weld (vertical or horizontal)

2.22 CABLE-TO-PIPE COATING MATERIAL

- A. After exothermic welding, repair coatings and linings in accordance with the coating and lining manufacturers recommendations.
- B. Coating material for exothermic weld connections to the pipelines shall be Roybond 747 Primer and Handy Cap, as manufactured by Royston, or equivalent.

2.23 DIELECTRIC INSULATING FLANGE KITS

- A. Insulating flange kits shall include full-faced gaskets, insulating sleeves and washers, and 316 stainless 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. Sleeves, gaskets, and insulating washers shall have a minimum dielectric constant of 300 volts per mil. Stainless 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.
 - 1. Insulating gasket shall be full-faced, Type E, and 1/8-inch thick. Acceptable gasket materials include nitrile faced phenolic, G-10, or a material with equivalent or increased performance. Acceptable seal materials include EPDM, PTFE, or a material with equivalent or increased performance.

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2. Insulating sleeves shall be 1/32-inch thick and equal the number of bolts on the flange. Acceptable materials include Mylar, G-10, or a material with equivalent or increased performance.
 3. Insulating washers shall be 1/8-inch thick and equal to twice the number of bolts on the flange. Acceptable materials include G-10 or a material with equivalent or increased performance.
- B. Dielectric insulating flange kits shall be manufactured by Advance Products & Systems Inc., GPT Industries, or an approved equivalent.

2.24 MONOLITHIC INSULATING JOINTS

- A. Monolithic insulating joints shall be designed to provide for the electrical isolation of piping sections and shall be completely factory assembled. Monolithic insulating joints shall be designed so that they are welded into the field piping during installation.
- B. Monolithic insulating joints shall have the same or better pressure rating and hydrostatic performance as the pipeline where it will be installed.
- C. The electrical resistance in dry air shall be greater than or equal to 5 M Ω at 1000 V_{DC}. The breakdown voltage in dry air shall be at least 3 kV_{AC} at 50 Hz for 1 minute.
- D. Monolithic insulating joints shall be manufactured by Advance Products & Systems Inc., GPT Industries, or an approved equivalent.

2.25 CASING END SEAL

- A. Casing end seal shall seal the annular space between the carrier pipe and casing. A casing end seal shall be installed on each end of the casing. The casing end seal shall be designed to last the life of the piping system.
- B. Casing end seal shall be at least 1/8-inch thick neoprene, nitrile, or EPDM. The seal shall be secured with 316 stainless steel banding straps.

2.26 PETROLATUM WAX TAPE

- A. Petrolatum wax tape system shall be Trenton Primer and #1 Wax-tape manufactured by Trenton, Denso Paste and Densyl Tape manufactured by Denso North America, or an approved equivalent.

2.27 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 CP splices. Splice kit shall be Scotchcast 85-14 CP Resin Splicing Kit, as manufactured by 3M, or an approved equivalent.

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2.28 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, as manufactured by 3M, or an approved equal.

2.29 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, as manufactured by 3M, or an approved equivalent.

2.30 PERMANENT REFERENCE ELECTRODE

- A. Reference electrodes shall be copper-copper sulfate and designed for continuous use for a minimum of 20 years. The reference electrode shall have a wire which will extend to the junction box or panel board, without splicing, as indicated on the Drawings.

2.31 ISOLATION MAT

- A. Isolation mat shall be neoprene and of the dimensions shown on the Drawings.

PART 3 - EXECUTION

3.1 MATERIAL AND EQUIPMENT STORAGE

- 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 another method, as appropriate.

3.2 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.

3.3 RECTIFIER

- A. Approximate rectifier locations are shown on the Drawings. The CONTRACTOR may propose an alternative rectifier location to the SAWS for review and approval.

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- B. Rectifier installation includes provision of AC power to the rectifier by the CONTRACTOR. CONTRACTOR shall furnish and install all required wiring, poles, conduits, cables, meters, splice boxes, and equipment necessary for operation of the rectifier and as required by the local power agency.

3.4 DEEP ANODE WELL

- A. Impressed current anode beds shall be installed in accordance with NACE SP0572, local 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. At minimum, 48-hour 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 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, re-drilled, 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

Special Specification

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 adjustable stainless steel bands.
3. 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 should be installed and be accessible to the ENGINEER during the 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.
4. 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 breeze shall be placed using a slurry pump that pumps the coke into the bottom of the hole using a tremie pipe, allowing the hole to be filled from the bottom up. Coke breeze 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. Minimize the risk of bridging by ensuring the hole has sufficient water and the backfilling rate is controlled. In the event that voids or bridging does occur, the CONTRACTOR shall correct the deficiency to the satisfaction of the ENGINEER.

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3. Backfill settling and anode coverage will be determined by measuring the anode-to-earth resistance from the digital resistance meter. During coke breeze backfilling, 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. At least 20 feet of coke breeze shall be added 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.
4. 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.
5. Incomplete coverage of each anode with coke breeze shall be cause for rejection of the anode well.
6. 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 and 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 used only with prior approval of the ENGINEER.
2. Drilling mud and cuttings shall be disposed of by the CONTRACTOR at a suitable disposal site.

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3.5 TEST STATIONS AND JUNCTION BOXES

- A. Test stations shall be installed at the approximate locations shown on the Drawings. Test stations shall be located within the pipeline easement. Test stations shall be located in areas not subject to vehicular traffic, such as sidewalks, unless otherwise approved by the ENGINEER.
- 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 field verify final location of the test stations. The CONTRACTOR shall provide global positioning system (GPS) coordinates for each test station location with a minimum accuracy of 1 meter or 3 feet. The CONTRACTOR shall submit the GPS coordinates of the test stations to the ENGINEER after installation.

3.6 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 12 inches of slack (coiled) shall be left for each wire at each flush-to-grade and post mounted test station. Wire slack shall be sufficient to allow removal of wire extension for testing.
- C. Wire shall not be bent into a radius of less than eight times the overall cable diameter.
- D. 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.

3.7 WIRE IDENTIFICATION TAGS

- A. All wires shall be coded with wire identification tags within 4 inches of the wire end.
- B. Wire identification tags shall be placed on all wires prior to backfill and installation of test stations.

3.8 EXOTHERMIC WELD CONNECTIONS

- A. Exothermic weld connections shall be installed in the manner and at the locations indicated. Exothermic welds shall be spaced at least 6 inches apart from other exothermic welds, fittings, and circumferential welds.

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- B. Coating materials shall be removed from the surface over an area of sufficient size to make the connection as indicated on the Drawings. The surface shall be cleaned to bare metal per SSPC SP11 prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed.
- C. A copper sleeve shall be fitted over the conductor as required. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold.
- D. 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.
- E. 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.
- F. 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.
- G. All exposed surfaces of the copper and steel shall be covered with insulating materials. Coating repairs shall be performed in accordance with coating manufacturer's recommendations.
- H. 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.
- I. 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.

3.9 JOINT BONDS

- A. Bond wires shall be provided across flexible couplings and all non-welded joints to ensure electrical continuity, except where insulating joints have been installed to provide electrical isolation. Joint bonds shall be of the size, length, and number shown on the Drawings and installed as indicated. The bond wires shall allow at least 2 inches of movement in the pipe joint. The wire shall be attached by exothermic welding. At least 2 bond wires shall be provided between all discontinuous joints.

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3.10 PETROLATUM WAX TAPE

- A. Petrolatum wax tape systems shall be applied on dielectric insulating joints and as indicated in the Drawings. Petrolatum wax tape systems shall be applied in accordance with NACE RP0375, these Specifications, and the Manufacturer's recommendations.
- B. All loose scale shall be removed from the surface to be coated with hand tools (wire brush, scraper, and rags). Debris and moisture shall be wiped from surface with clean rag. Petrolatum wax 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.

3.11 REFERENCE ELECTRODES

- A. Reference electrodes shall be installed as shown on the Drawings.
- B. Reference electrode lead wire shall be terminated on the panel board as shown on the Drawings.

3.12 WIRE CONNECTIONS

- A. After installation, all wire connections shall be tested to ensure electrical continuity at the test station locations by the CONTRACTOR to ensure that they meet the requirements and intent of the Contract Documents.

3.13 ISOLATION TESTING ON INSULATING JOINTS

- 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 an approved equivalent. If the testing results indicate less than 100% insulation, then 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 ± 100 mV, then additional testing shall be performed, as follows. Temporary CP 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.

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3.14 ISOLATION TESTING ON 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. Before backfill, the CONTRACTOR shall test the integrity of the insulators by using a Gas Electronics Model No. 601 Insulation Checker or an approved equivalent. If the testing results indicate less than 100% insulation, then the casing insulators 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 on the pipeline and the casing at both ends of the casing. If the difference in native pipe-to-soil potentials is greater than 100 mV, then 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 100 mV, then additional testing shall be performed, as follows. Temporary CP 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, then the pipe is not isolated from the casing and shall be repaired and retested at the CONTRACTOR's expense.

3.15 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 should 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, if test station locations are available. 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. 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.

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- E. Alternative continuity testing methods can be submitted to the ENGINEER for consideration and approval.

3.16 FINAL SYSTEM CHECKOUT

- A. Upon completion of the installation, the CONTRACTOR shall provide testing of the completed system by a Corrosion Technician, and the data shall be reviewed by a Corrosion Engineer to ensure conformance with the Contract Documents, NACE SP0169, and NACE SP0286.
- 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, junction boxes, and locations of exposed pipe as soon as possible after installation of the CP system.
- D. Testing shall include the following and shall be conducted in accordance with NACE TM0497:
 - 1. Measure and record native pipe-to-soil and casing-to-soil potentials at all test locations.
 - 2. Verify electrical isolation at all insulating joints and casing insulators per NACE SP0286.
 - 3. Confirm electrical continuity of the cathodically protected pipeline or 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 after the structure has been given adequate time to polarize.
 - 5. Measure and record the current output of each anode when the CP system is initially turned on and again after it has been given adequate time to polarize.
- 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 mV 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.

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PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Rectifier installation shall be measured by the unit of each assembly as shown on the plans and described in the contract documents.
- B. Cathodic Protection Test Station installation shall be measured by the unit of each assembly as shown on the Drawings and described in the contract documents.

4.2 PAYMENT

- A. Payment for Rectifier installation shall be made at the contract unit price bid for each assembly as shown on the plans and described in the contract documents. This item shall be paid upon CONTRACTOR'S demonstration of compliance with requirements of the contract documents and SAWS.
- B. Payment for Cathodic Protection Test Station installation shall be made at the contract unit price bid for each assembly as shown on the plans and described in the contract documents. This item shall be paid upon CONTRACTOR'S demonstration of compliance with requirements of the contract documents and SAWS.

**** END OF SECTION ****

Special Specification

SECTION 15103

BUTTERFLY VALVES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment and incidentals necessary to install butterfly valves. All products furnished shall be in conformance with ANSI/AWWA C504 (latest version thereof). All coatings in contact with potable water shall be certified to N.S.F. 61. A proof of design certification shall be provided upon request.

1.02 DEFINITIONS

All definitions are defined according to ANSI/AWWA C504

- A. Actuator: A device attached to the valve for the purpose of rotating the valve disc to an open, closed, or intermediate position; preventing discover travel; and maintaining the disc in any position.
- B. Butterfly Valve: A valve that uses a disc rotatable through an angle of approximately 90 degrees as a closure member. The valve is closed when the disc is perpendicular to the flow way, open when parallel to the flow way, or used for throttling when positioned between open and closed.
- C. Disc: The closure member that is positioned in the flow stream to permit flow or to obstruct flow (depending on closure position) and that rotates through an angle of 90 degrees from full open to full shutoff.
- D. Rubber Seat: A rubber ring around the inside of the valve body to affect a seal against the metal seating surface when the disc is closed. Or resilient seats shall be located on the valve disc and shall provide a 360 degrees continuous, uninterrupted seating surface. Seats shall be mechanically retained with a stainless steel retaining ring and stainless steel Nylok cap screws, which shall pass through both the resilient seat and the retaining ring. The resilient seat's mating surface shall be to a 360 degrees continuous, uninterrupted stainless steel body seat ring. The retaining ring shall be continuous or investment cast with overlapping sections serrated grooves, and shoulders. Resilient seats shall be field adjustable and replaceable.

1.03 QUALITY ASSURANCE

- A. Manufacturers shall have an ASME or I.S.O. 9001 registered commercial quality system. If on receipt of butterfly valves they are found to be noncompliant the manufacturer shall replace the defective butterfly valves according to butterfly valve size with a butterfly valve that meets the San Antonio Water System's

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specifications. The defective butterfly valves will be returned to the manufacturer, freight collect, and the manufacturer shall replace the butterfly valve, freight prepaid. If San Antonio Water System audits, product inspection and performance data review in accordance with these specifications determine excessive butterfly valve non-compliance, the manufacturer will be subject to removal by the Products Standards Committee. If the butterfly valve becomes defective during the manufacturer's specified warranty period a San Antonio Water System quality assurance and manufacturer review will ensue. If the review determines manufacturing non-conformance the manufacturer shall replace the butterfly valve according to size with a butterfly valve that meets the San Antonio Water System's specifications. The defective butterfly valve removed from the field will be returned to the manufacturer, freight collect, and the manufacturer shall replace the butterfly valve, freight prepaid. If the nonconformance product amounts are excessive and result in increased product replacement by San Antonio Water System field staff the manufacturer may be subject to time and material charges.

B. Acceptable Manufacturers:

Class 250:

1. DeZurik – BAW
2. Henry Pratt Company –HP250
3. Mueller Company – Lineseal XP
4. Val-Matic Series 2000

Class 350:

1. Henry Pratt Company – HP350

- C. Experience Requirements:** The Manufacturer shall have had successful experience in manufacturing tight-closing, rubber-seated butterfly valves for this type service in the sizes indicated. The Manufacturer shall have at least 10 years' experience in the manufacture of valves.
- D. Manufacturer's Representative for Startup and Testing:** The Valve Vendor or Manufacturer shall provide the services of a competent manufacturer's representative for an indefinite period of time as required to insure proper adjustment, installation, and operation of the valve.

1.04 SUBMITTALS

Submittals shall include:

- A. Shop Drawings.
- B. Operation and Maintenance Manuals.

1.05 STANDARDS

Special Specification

- A. The applicable provisions of the following standards shall apply as if written here in their entirety:
1. American National Standards Institute (ANSI) Standards:

ANSI B16.1 Cast Iron Pipe Flanges and Fittings
 2. American Society for Testing and Materials (ASTM) Standards:

ASTM A48 Standard Specification for Gray Iron Castings

ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

ASTM A276 Standard Specifications for Stainless Steel Bars

ASTM A536 Standard Specification for Ductile Iron Castings

ASTM B148 Standard Specifications for Aluminum Bronze Coatings
 3. American Water Works Association (AWWA) Standards:

AWWA C504 Standard for Rubber-seated Butterfly Valves

AWWA C550 Standard for Protective Interior Coatings for Valves and Hydrants

PART 2 PRODUCTS

1.06 VALVE CONSTRUCTION

- A. Except as otherwise modified or supplemented herein, AWWA Standard C504 or the latest revision thereof, shall govern the design, component material construction, manufacture and testing of all butterfly valves.
- B. The San Antonio Water system reserves the right to limit the purchase of Butterfly valves form manufacturers and to the models specified, provided such butterfly valves conform to the provisions contained herein.
- C. Class 250 valves shall of the short-body type with a 250 psig bidirectional shut-off rating, a 500 psig hydrostatic body shell test. Class 350 valves shall be of the short-body type with a 350 psig bidirectional shut-off rating, a 700 psig hydrostatic body shell test. All valves shall have a maximum upstream line velocity rating according to the table listed below unless specified otherwise.

Diameter	Velocity
4 inch through 20 inch	16 feet per second
24 inch through 72 inch	8 feet per second

- D. Valve shall be in the same alignment as a horizontal pipe and shall be for buried service, unless otherwise specified. Valve shall be configured with a horizontal valve shaft and a vertical actuator shaft with standard 2" AWWA operating nut. The actuator shall be side mounted.

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- E. Valve body shall be of cast iron conforming to ASTM Specification A-126, Class B or Ductile Iron ASTM A536, Grade 65-45-12.
- F. Valve body ends for Class 250 and 350 valves shall be flat-faced flanged in accordance AWWA C207 Class F with ANSI B16.1, Class 250 bolt size and drilling required to meet pipe class as specified when mating steel pipe to steel pipe or mating steel pipe to a valve with Class 250 bolt and drilling. All flanges must match the pipe drilling pattern and pressure rating of the specified flange. All flanges shall be rated to meet the valve pressure rating. All valves shall conform to AWWA C504, Table 2 of Section 3.1 Valve Bodies.
 - 1. Provide design for special flanges when mating steel pipe to a valve with ANSI B16.1 Class 125 bolt and drilling.
 - 2. Submit flange information including design calculations for ASME Boiler Pressure Vessel Code flange thickness certified by steel pipe manufacturer and flange supplier. Submit information and calculations on the selected bolt and nut hardware.
 - 3. Submit information and calculations on the selected bolt and nut hardware. Bolting shall be selected based on certified calculations indicating the required bolts strengths for each flange size. Select the stronger or most suitable of the referenced ASTM A354 Grade BD or ASTM A193 B7, or B8M bolt standards. Allowable stress values used in bolt calculations shall be per ASME Section II-D Table 3 and the available bolt area shall be confirmed as adequate for bolt loading at the specified surge pressures. Provide ASTM A194 2H or ASTM A563 Grade DH nuts with ASTM F436 washers. Steel hardware shall have minimum hot dipped galvanized finish for corrosion protection as required.
- G. Valve shall be of such design that the disc will seat at 90 degrees with the pipe axis.
- H. Valve shall be of such design that the disc will not flutter or vibrate when operated in a throttled position.
- I. Valves disc shall be of Cast Iron A-48, class 40 Cast Iron A-126, class B or Ductile Iron ASTM A-536, grade 65-45-12 and shall be of disc design to provide 360 degree uninterrupted seating.
- J. The valve seat shall be natural or synthetic rubber applied integrally to the body or disc. For valves 24 inches or larger, the rubber seat shall be capable of mechanical adjustment in the field and shall be field replaceable. Special tools required for seat adjustment shall be provided with the valve. Special tools required for seat replacement shall be furnished with the replacement seat. Mechanical adjustment or attachment of the seat and seat ring does not include welding. The mating seat surface shall be type 304 or type 316 stainless steel, ni-chrome or monel. Sprayed or plate mating seat surfaces are not acceptable.
- K. Valve shafts shall be type 304 stainless steel conforming to ASTM A-276 and shall have a diameter equal to or greater than that shown for Class 250B and 350B in Table 3 of AWWA C504. Shafts shall conform to the requirements of Section 3.3, Valves Shaft of AWWA C504 for one-piece or stub shaft types. Connection

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between the shaft and disc shall be dowel or taper pins, which are mechanically secured.

- L. The valve assembly shall be furnished with a factory-set, non-adjustable disc shaft thrust bearing that insures the valve disc is centered within the valve body seat at all times.
- M. Valve shaft bearings shall be permanent, self-lubricated, bearings, which provides continuous, low-friction maintenance-free operation. Shaft bearing shall be contained in integral hubs of the valve body.
- N. Valve shaft seal shall consist of O-ring, V-type, or U-cup type packing where the shaft projects through the valve body for the actuator connection.
- O. The valve shall be provided with a fully enclosed, permanently lubricated actuator of the traveling nut or worm gear design. The actuator shall be connected to the valve shaft by means of a key and keyway connection
- P. All valves shall be configured to “open right”.
- Q. All actuators shall have adjustable, mechanical stop limits in accordance with AWWA C504 Section 4.2.8. All valve actuators shall be capable of withstanding 450 ft-lbs of input torque against the open or closed stops without damage.
- R. Valves for below ground applications shall be provided with an AWWA wrench nut. The wrench nut shall have an arrow cast thereon, indicating the direction on of opening. The wrench nut shall be suitably fastened to the actuator input shaft. If the shaft is smooth, the wrench nut shall be fastened to the input shaft by means of a minimum 5/16" diameter steel pin passing entirely through the shaft and the wrench nut. Key with keyway will be acceptable. If the shaft is splined, the wrench nut shall be formed to fit the splined shaft. The actuator shall be designed to produce the specified torque with a maximum input of 150 ft-lbs applied to the wrench nut.
- S. Valves for aboveground applications shall be provided with a handwheel. The handwheel shall have an arrow thereon, indicating the direction of the opening. The handwheel shall be suitably fastened to the actuator input shaft. Actuators equipped with handwheels shall be designed to produce the specified torque with a maximum pull of 80 pounds of the handwheel rim.
- T. The requirement for either wrench nut or handwheel and the direction of opening will be specified on each purchase order.
- U. The bidder shall submit with his proposal three sets of certified drawings showing the principal dimensions, general construction and material specification of the valve proposed. The number of turns to open (close) shall be clearly noted in the valve information submitted with the proposal documents.
- V. The supplier/manufacturer shall provide Affidavit of Compliance with applicable sections of AWWA C504 and/or San Antonio Water System Specification 21-05 to include the following: Results of ASTM testing procedures and requirements for materials will be provided to the OWNER upon request, Manufacturer's Quality Assurance Program, leak-tightness testing and proof of design testing of

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representative actuators in accordance with AWWA C504 Section 3.8.5.2 as modified herein (450 ft.- lbs.). Compliance assurance will be required in accordance with AWWA C504 Section 5.1.2, Affidavits. Results of performance tests, proof of design test, AWWA C504 Section 5.2.4, hydrostatic test, leakage test, and Affidavit of Compliance shall be provided with the bid or with the shipping documents and shall be approved by the San Antonio Water System.

PART 3 EXECUTION

1.07 WORKMANSHIP

- A. All parts of the butterfly valve shall be designed and manufactured to the tolerances specified in ANSI/AWWA C509 or latest version thereof and this specification.
- B. All parts of the butterfly valve manufactured by a given manufacturer shall be interchangeable with like parts from another butterfly valve of the same model and size and by the same manufacturer.

1.08 PAINTING

- A. Shop Coating:
 - 1. The exterior ferrous surfaces of the valve shall be thoroughly cleaned of all scale, dirt, grease, or other foreign matter, and thereafter primed at the shop.
 - 2. All internal and external ferrous surfaces shall be coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness in accordance with AWWA C550.
 - 3. Ferrous surfaces that are not to be painted shall be given a shop coat of grease, slush oil, or other suitable rust resistant coating.
 - 4. Special care shall be taken to protect uncoated items and plastic items from environmental damage.
- B. Field Coating: Valves shall receive an additional field coating protection in accordance with Section 09970, Painting and Protective Coatings.

1.09 INSTALLATION

Installation shall be in accordance with the Manufacturer's instructions. Valve shaft shall be truly vertical or horizontal as indicated.

1.10 FIELD QUALITY CONTROL

Upon completion of installation of the butterfly valves an acceptance test shall be conducted to verify the satisfactory operation of the valves. The valves must perform in a manner acceptable to the Engineer before final acceptance will be made by the OWNER.

1.11 TESTING

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- A. Performance Tests: Performance tests shall be performed on each valve in accordance with Section 5.2.1 Testing of ANSI/AWWA C504 or latest revision thereof.
- B. Leakage Tests: Leakage tests shall be performed on each valve in accordance with Section 5.2.2 Testing of ANSI/AWWA C504 or latest revision thereof.
- C. Hydrostatic Tests: Hydrostatic tests shall be performed on each valve in accordance with Section 5.2.3 Testing of ANSI/AWWA C504 or latest revision thereof.
- D. Proof-of-Design Tests: Proof-of-Design tests shall be performed on each valve in accordance with Section 5.2.4 Testing of ANSI/AWWA C504 or latest revision thereof.
- E. An Affidavit of Compliance certifying that all required tests have been performed shall be provided.
- F. The Affidavit of Compliance and the records of all tests performed on the valves shall be kept and provided in a single hard cover bound notebook.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Butterfly valve and valve box installation shall be measured by the unit of each assembly of the various size butterfly valves, valve operators/boxes, vault, harness couplings, appurtenances and details as shown on the project Drawings and Details.

4.02 PAYMENT

- A. Payment for this item shall be made at the contract unit price bid for each assembly of the various size butterfly valves, valve operators/boxes, vault, harness couplings, appurtenances and details as shown on the project Drawings and Details. This item shall be paid upon CONTRACTOR'S demonstration of compliance with requirements of the contract documents and SAWS.

-END OF SECTION-

Special Specification

SECTION 15117

COMBINATION AIR VALVE ASSEMBLY

PART 1 GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment and incidentals necessary to install air release and air and vacuum valves of the sizes and types indicated on the Drawings. Furnish the necessary isolating valves, piping and concrete vault.

1.02 QUALITY ASSURANCE

- A. The manufacturers shall provide certification that products furnished under this specification are manufactured in an ISO 9001 certified facility or documentation from an accredited facility that ISO 9001 certification is in process.
- B. Acceptable Manufacturers – Combination Air Valves (Inlet x Orifice)

<u>Manufacturer</u>	<u>6" Flange</u>	<u>6" Flange</u>
Vent-O-Mat	150 RBX 2561 E4	150 RBX 4061 E4

Actual model numbers, setup and configurations shall be coordinated by the Contractor with his supplier and manufacturer to match the needs of these contract documents.

1.03 SUBMITTALS

Submittals shall include:

- A. Shop Drawings, Certificate of Adequacy of Design, and Operation and Maintenance Manuals for the material included in this Section. Copies of those submittals will be provided to the Owner.

PART 2 MANUFACTURED PRODUCTS

2.01 MANUFACTURED PRODUCTS

A. General:

1. Air valves shall meet AWWA C512 standards.
2. Each air valve shall have a 316 stainless steel or ductile iron body, and 316 stainless steel trim. Float shall be dimensioned or baffled to prevent air from blowing valve closed until air is exhausted. Elastomers shall be EPDM
3. Valve body, float, and assembly shall be designed for the pipeline's overall maximum working pressure and shall seat at the minimum pressure. The

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minimum operating pressure shown is under steady state conditions and does not include minimum surge pressure.

4. Contractor shall coordinate the threaded connection or flange drilling patterns between pipe and valves.
 5. Valve outlet shall be threaded or flanged for connection to vent piping for treated water systems. Valve outlet shall be fitted with a cover and screen.
 6. Valve inlet shall be N.P.T. for 2-inch and smaller valves. Valve inlet shall be ANSI Class 150 for 3-inch and larger valves. For valves with working pressure class at 300 psig, valve inlet shall be ANSI Class 300, or AWWA C228 Class F/SF, flange for 3-inch and larger valves. Valve and flange rating shall equal or exceed the maximum working pressure.
 7. Valves 3-inches and larger shall have an outlet at the bottom of the valve housing. The outlet shall be fitted with a ½-inch gate valve as shown on the Drawings.
 8. Interior components that are not stainless steel shall be painted in accordance with Section 09970 "Painting and Protective Coatings."
- B. Air Release Valves (AR): Air release valves shall be designed to automatically release accumulated air pockets within the pipeline while the pipeline is in operation and under pressure. Air and Vacuum Valves (AV): Air and vacuum valves shall be designed to allow large volumes of air to escape through the valve orifice when filling a pipeline and to close watertight once the air has been expelled. Air and vacuum valves shall also permit large volumes of air to enter through the valve orifice when the pipeline is being drained, to break the vacuum. Combination Air Valves (CAV):
1. Combination air valves shall be designed to exhaust large volumes of air as the pipeline is being filled; permit large volumes of air to enter the pipeline during pipeline drainage; release accumulated pockets of air while the pipeline is in operation and under pressure; and dampen surge pressures caused by water column separation or rapid air discharge.
 2. Combination air valves shall be heavy-duty, single-chamber air and vacuum valves with disc floats. Floats shall include discs drilled with the small and large orifices, and an anti-surge float. Internal clearances around the floats shall be equal to the inlet/outlet area. The anti-surge float should be normally opened and have drilled orifices to throttle water flow.
 3. Combination air valve inlet/outlet cross-sectional area shall be equal to the nominal size of the valve. CAV outlet for raw water use shall be fitted with a cover or with a vent pipe where indicated on the drawings. Combination air valves outlets for treated water use shall be connected to piping to vent air out of the manhole.
- E. Combination Air and Vacuum Valves for Pump Discharge (PAV): Pump air and vacuum valves shall be designed to allow large volumes of air to escape through the valve orifice during pump startup and to close watertight once the air has been

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expelled. Pump air and vacuum valves shall also permit large volumes of air to enter through the valve orifice when a pump stops to break the vacuum. PAVs shall be on the pump discharge and sized for the minimum duration pump ramp up time. The PAV shall not breach the OSHA or Owner standard for hearing protection, whichever is more stringent.

- F. Manufacturers shall be one of the following:
 - 1. Vent-O-Mat
 - a. Combination Air Valves: RBX Series

PART 3 EXECUTION

3.01 INSTALLATION AND TESTING

- A. Carefully handle and install valves vertically in such a manner as to prevent damage to any part of the valves. Installation shall be in accordance with the manufacturer's instructions. Provide nuts, bolts, and gaskets where applicable.
- B. Air valve and gate valve shall be braced adequately to withstand normal pipeline operation pressures and avoid undue stresses on the pipe.
- C. Valves shall be installed in such a manner as to provide adequate access and room for valve operation, maintenance, and removal.
- D. The exterior of atmospherically exposed metal surfaces shall be coated in accordance with Section 09 97 00 "Painting and Protective Coatings."
- E. Conduct testing described in Section 4 and Section 5 of AWWA C512. Provide test results to the Owner or Owner's Representative.
- F. Testing: The San Antonio Water System may, at no cost to the manufacturer, subject random valves to testing by an independent laboratory for compliance with these standards. Any visible defect or failures to meet the quality standards herein will be grounds for rejecting the entire order.

3.02 TAGGING AND COATINGS

- A. Valves shall be permanently tagged with a brass tag indicating the model number, working pressure rating, and station location.
- B. Shop Coating:
 - a. All interior and exterior ferrous surfaces of the valve, including the disc, shall be coated with epoxy, N.S.F. 61 certified. The epoxy shall have a nominal thickness of 8 mils, and shall be in accordance with AWWA C550, latest revision
 - b. Coating shall be holiday tested and holiday free in accordance with AWWA C550.

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- C. Field Coating: Valves installed above grade, exposed valves, and valves in vaults shall be shop coated, and shall receive additional field coating protection in accordance with Section 09970, PAINTING AND PROTECTIVE COATINGS.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Combination air valve assemblies shall be measured by the unit of each such assembly of the various sizes and types installed as shown on the project Drawings and Details.

4.02 PAYMENT

- A. Payment for this item shall be made at the contract unit price bid for each assembly of size and pressure ratings as shown on the project Drawings and Details. This item shall not be paid until CONTRACTOR'S demonstration of compliance with requirements of the contract documents and SAWS.

-END OF SECTION-

Supplemental Specification

SECTION SS 804A

CONTAMINATED SOIL AND WATER CONTROL

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section is a supplement to Item No. 804 of the SAWS Specification for Water and Sanitary Sewer Construction.
- B. This Section describes the requirements associated with the removal of contaminated materials if encountered during excavation and trenching operations required by the Work. Should contaminated soil, rock, or water be encountered during installation of the facilities that are part of the Contract, their removal will be mandated according to applicable regulations.

1.02 SCOPE OF WORK

- A. In the event contaminated materials are encountered during the course of this Work, the CONTRACTOR shall follow the provisions outlined herein for their removal and proper disposal. Such work shall proceed only after execution of a change order and shall include screening, sampling, testing, removal, segregation, transportation and ultimate disposal of contaminated soil and water.
- B. The CONTRACTOR shall notify the OWNER and all required federal, state, and local agencies. The CONTRACTOR shall comply with all federal, state, and local licensing and certification requirements, as applicable, and obtain all necessary permits, approvals, and manifests in conjunction with waste material hauling and disposition as may be required. All sampling and testing shall be done at the expense of the CONTRACTOR by a qualified independent certified environmental laboratory. Disposal of contaminated materials shall occur at a facility licensed by the state of Texas to accommodate such waste.
- C. CONTRACTOR shall be compensated by (1) a negotiated Change Order; or (2) the OWNER may elect to use a third party to accomplish the work described in this Section so as to expedite this project.

1.03 REFERENCE STANDARDS

The following publications, of editions in effect on the date of the Invitation to Bid, shall govern in the execution of the Work:

Supplemental Specification

- A. Department of Labor Regulations
 - 1. 29 CFR Part 1910 - Occupational Safety and Health Standards
 - 2. 29 CFR Part 1518 - Safety and Health Regulations for Construction
- B. United States Environmental Protection Agency (EPA) Publications
 - 1. 40 CFR 257 - Criteria for Development of Solid Waste Disposal Facilities
 - 2. 40 CFR 258 - Criterion for Municipal Solid Waste Landfills
 - 3. 40 CFR 260 - Hazardous Waste Management System: General
 - 4. 40 CFR 261 - Identification and Listing of Hazardous Waste
 - 5. 40 CFR 263 - Transporters of Hazardous Waste
 - 6. 40 CFR 264 - Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - 7. 40 CFR 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - 8. EPA/SW 846 - Test Methods for Evaluating Solid Waste Physical/Chemical Methods, latest revision
 - 9. EPA 600/4-79/20 - Methods for Chemical Analysis of Water and Wastes, latest revision
 - 10. EPA 600/4-79-019 - Handbook for Analytical Quality Control in Water and Wastewater Laboratories
 - 11. EPA 600/4-84-076 - Characterization of Hazardous Waste Sites - A Methods Manual: Volume 11, Available Sampling Methods, latest edition
- C. Department of Transportation (DOT)
 - 1. 49 CFR 172 - Transportation of Hazardous Materials
- D. Texas Commission on Environmental Quality (TCEQ)
 - 1. 30 TAC 334 - Underground and Aboveground Storage Tanks
 - 2. 30 TAC 335 - Industrial Solid Waste and Municipal Hazardous Waste

1.04 RELATED WORK

Related work not found in this Section can be found in the following sections:

Supplemental Specification

- A. Section SS 804C Excavating, Trenching and Backfill

1.05 SUBMITTALS

- A. In the event contaminated materials are encountered, the following submittals shall be submitted to the OWNER prior to beginning screening, sampling, testing, removal, segregation, transportation, or ultimate disposal of the contaminated soil or water.
- B. CONTRACTOR shall submit proof of registration as a TCEQ Registered Corrective Action Specialist (RCAS). If the CONTRACTOR retains a subconsultant to assist or manage the contaminated material, the subconsultant should be clearly identified to the OWNER.
- C. CONTRACTOR shall upon receiving authorization from SAWS submit a copy of all notifications required by TCEQ, EPA, and other agencies prior to commencing work. These copies are to be submitted to OWNER in order to confirm that proper notification has been made.
- D. CONTRACTOR shall submit for approval a Plan for Temporary Storage and Disposal of Petroleum Substance Wastes. This plan must be submitted at least 30 days prior to commencement of trenching operations and shall comply with the provisions of 30 TAC 334. It must address procedures associated with storage, transportation, and disposal of petroleum substances encountered during construction.
- E. CONTRACTOR shall submit for approval a Plan for Temporary Storage and Disposal of Class 1, Class 2 (non-hazardous), or Hazardous Wastes. This plan must be submitted at least 30 days prior to commencement of trenching operations and shall comply with the provisions of 30 TAC 334. It must address procedures associated with storage, transportation, and disposal of Class 1, Class 2 (non-hazardous), or hazardous wastes encountered during construction.
- F. CONTRACTOR shall submit a Sampling and Analysis Plan for approval prior to conducting any testing.
- G. CONTRACTOR shall submit the results of all testing conducted in accordance with the Sampling and Analysis Plan.
- H. CONTRACTOR shall submit all records associated with waste classification, waste coding, shipping and disposal of petroleum substances, Class 1, Class 2 (non-hazardous), or hazardous wastes encountered as part of this Work on a daily basis.
- I. CONTRACTOR shall submit for approval a written report documenting the handling of contaminated materials, if encountered during the Work.
- J. CONTRACTOR shall submit for approval laboratory qualifications for contaminated soil and water testing.

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- K. CONTRACTOR shall submit for approval qualifications of sampling personnel.
- L. CONTRACTOR, transporter, and disposal facility certifications for proper handling, transporting and disposal of contaminated materials.

PART 2 PRODUCTS

2.01 MATERIALS

Geosynthetic Membrane Liner. Geosynthetic membrane liner used in isolating contaminated soil from the surrounding environment shall have a minimum thickness of 10 mils.

2.02 LABORATORY QUALIFICATIONS

The laboratory shall have a minimum of five years of experience in providing testing services associated with water and soils contaminated with petrochemicals.

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

A. Notification

In the event that contaminated materials are encountered or suspected by the CONTRACTOR to be encountered, the CONTRACTOR shall stop work in the area and notify the OWNER by submitting a RFI.

B. Contaminated Materials Screening

1. The CONTRACTOR shall visually screen all excavation and groundwater for contamination. Potentially contaminated materials shall be identified by odor, stain, discoloration from native earth materials and by utilizing field detection devices.
2. Approved detection devices include: photo ionization detector, flame ionization detector, or organic vapor analyzer.

C. Sampling

1. Before disposal activities are initiated, the CONTRACTOR must acquire samples and perform the required testing in order to properly classify the waste. Sampling shall be done in accordance with the following procedures:
 - a. Samples shall be taken by qualified personnel that have at least 2 years of experience collecting hazardous waste samples and are under the direct control of the testing laboratory. All sampling data

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shall be recorded in a bound log book. As a minimum, the following shall be noted:

1. Date and time of sampling
 2. Date and time of excavation
 3. Sample identification and location, including station
 4. Stockpile or water volume
 5. Sample depth
 6. Visual description of material sampled
 7. Description of sampling methods and equipment used
 8. Description of sample handling techniques (containers, preservation, chain of custody)
 9. Field instrumentation readings
 10. Weather conditions
 11. Printed name of sampling personnel
- b. Potentially contaminated materials shall be sampled in accordance with the following schedule:
1. Total Petroleum Hydrocarbon (TPH) testing - One sample shall be taken for every 50 cubic yards of excavated materials.
 2. Toxicity Characteristic Leaching Procedure (TCLP) for benzene and lead - One sample shall be taken for every 200 cubic hundred yards of excavated materials.
 3. Groundwater seepage or surface water inflow that collects into known or suspected areas of contamination in quantities large enough to require its removal must be sampled at a frequency equal to one per 5,000 gallons unless otherwise indicated by the OWNER or required by the disposal facility.
 4. Rinsate water used in washing equipment used in known or suspected contaminated areas shall be collected, sampled, and analyzed for waste characterization and disposal. Sampling and testing frequency shall be equal to that specified for groundwater seepage or surface water inflow.

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- c. All sampling equipment shall be cleaned immediately prior to use with a laboratory grade non-phosphate detergent solution followed by rinses with distilled de-ionized water. Sampling tools shall consist of stainless steel trowels or other sampling devices consistent with the required analysis.
- d. Excavated soils shall be sampled in the stockpiles to obtain a representative coverage of all the materials for the full depth of the stockpiles. Water samples shall be collected with a stainless steel or teflon bailer, dipper, pond sampler, or similar device.
- e. Care shall be exercised to capture any observed floating oils so as to collect representative samples. Each sample container shall be clearly identified with a label that shows the field sample number, date/time of sampling, sample location, and names of sampling personnel. All information shown on the label must be written in indelible ink.
- f. Containers shall be placed in zip-lock bags and stored in an iced cooler. The samples must remain in a refrigerated condition at all times, including transportation. Field and trip blanks shall be included in accordance with the Sampling and Analysis Plan procedures. Chain of custody documentation shall accompany each sample group or shipment.

D. Testing

- 1. Soil and water samples shall be analyzed for the parameters listed in Table 1.

Table 1					
Parameters for Sample Analysis					
Parameter	Matrix	Extraction Method	Container	Preservation	Holding Time
TPH	Soil	418.1	250 ml glass	Ice to 4° C	28 days
TPH	Liquid	418.1	2x1-L amber glass	HCL to pH<2 and ice to 4° C	28 days
TCLP (benzene)	Soil	40 CFR 261 App. 11/1311	2x125 ml glass Septa jars	Ice to 4° C	14 days
TCLP (lead)	Soil	40 CFR 261 App. 11/1311	1x125 ml glass Septa jars	Ice to 4° C	6 mos.
Total lead	Liquid	3050/7380	1x125 ml glass Septa jars	Ice to 4° C	6 mos.

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2. All test methods shall conform to TCEQ and EPA requirements. The minimum detection limit shall not be greater than 0.1 ppm.
3. Data shall be submitted to the OWNER as they are received, but at least within four weeks of sample collection. A series of periodic (weekly) data submittals may result. Unanticipated results shall be reported to the OWNER immediately.
4. Data submittals shall include the results of all analyses, including duplicate sample results and any unusual observations. Minimum data reporting shall include laboratory sample IDs which match field sample IDs. Supplemental quality control and related information (method blanks, etc.) shall be made available upon request.

E. Temporary Storage of Contaminated Materials

1. Prior to stockpiling contaminated materials for staging and classification, the CONTRACTOR shall establish the location and security measures for an exclusion zone to prevent unauthorized entrance.
2. Soils suspected to be contaminated shall be stockpiled in areas of sufficient size to permit and facilitate sorting and staging, as well as sampling and waste classification activities.
3. Stockpiles shall be isolated from the environment using impervious geosynthetic membrane liners (10 mil minimum thickness) beneath and over the contaminated soil and rock. Berms shall also be constructed around the stockpiles to contain the materials and to prevent contamination of storm water runoff that may flow adjacent to the site.
4. Before disposal activities are initiated, the existence of contamination shall be confirmed in accordance with this Section. Soil and rock that have been identified as being contaminated shall be separated from soil and rock identified as being clean. If the CONTRACTOR fails to properly protect the stockpiles, and any materials become contaminated or otherwise unsuitable for use as backfill, such materials shall be removed, properly disposed of, and replaced with clean, satisfactory materials from approved sources at the CONTRACTOR'S expense.

F. Disposal of Contaminated Water

If water within excavations is known or suspected to be contaminated, it shall be removed, sampled, tested, classified, and then properly disposed of. Water removed from excavations shall be placed in containers provided by the CONTRACTOR and disposed of at an approved disposal facility.

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G. Transportation and Disposal of Contaminated Materials

1. The CONTRACTOR shall utilize appropriate vehicles and operating practices to prevent spillage of contaminated or hazardous materials from occurring enroute to the disposal facility.
2. All operations for loading and hauling shall be in accordance with appropriate U.S. Department of Transportation regulations and TCEQ regulations.
3. The OWNER will sign the required manifest as the generator of the waste. The CONTRACTOR shall immediately notify SAWS of any problems completing shipment and disposal. Copies of all documents relating to the shipment and transportation of contaminated materials shall be provided to the OWNER on a daily basis.
4. The CONTRACTOR shall dispose of contaminated materials only at facilities approved by the OWNER and that are in compliance with 30 TAC 334 or 335 requirements, and with 40 CFR, Part 261, Subpart D.

H. Report Requirements

In the event that contaminated materials are encountered during installation of the Work, the CONTRACTOR shall prepare a written report documenting the handling of the waste. This report, as a minimum, shall contain the following information:

1. Field notes documenting the date of removal and volume of soil or water. Notes must include documentation indicating concurrence of the OWNER regarding the quantities that were measured.
2. All acquired laboratory data.
3. Labeled photographs that document monitoring, sampling, excavation, and disposal.
4. Copies of all manifests and chain of custody documents.

I. CONTRACTOR Certification

Upon completion of the Work, the CONTRACTOR shall submit to the OWNER the following:

1. Written certification, signed by the CONTRACTOR, that all contaminated materials encountered during installation of the Work were removed from the site as specified and in accordance with all applicable rules and regulations.

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2. The shipper's certification that the material was transported in accordance with all rules and regulations and under the proper federal, state, and local transportation permits.
3. Written certification from the party responsible to receive the waste that the landfill is permitted by the state.
4. Completed manifests documenting signatures by the generator, transporter, and disposal facility within 5 days after final disposal.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Measurement for removal of contaminated soils, if encountered, shall be made by the Lump Sum for soil deemed by testing to be contaminated and required to be removed from the site. The import of non-contaminated soils that are replacing the exported contaminated soils shall be included in this item, NSPI.
- B. Measurement for removal of contaminated water , if encountered, shall be made by the Lump Sum.

4.01 PAYMENT

- A. Payments for removal of contaminated water and soils, if encountered, will be made in accordance with negotiations between SAWS and Contractor in accordance with Article VI – CONTRACT CHANGES, in the General Conditions.
- B. The import of non-contaminated soils that replacing the exported contaminated soils will be paid for as part of the Lump Sum price for soil removal.
- C. The Owner may elect to use a third party to accomplish the work described in this Section, to expedite this project.
- D. All sampling and testing shall be done at the expense of the Contractor by qualified personnel and a qualified independent certified environmental laboratory.

.- END OF SECTION -

Supplemental Specification

SECTION SS 804B

CONTROL OF GROUNDWATER AND SURFACE WATER

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section is a supplement to Item No. 804 of SAWS Specification for Water and Sanitary Sewer Construction.
- B. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations, and foundation beds in a stable condition, and controlling groundwater conditions for tunnel excavations. Requirements for dewatering of pipeline trenches are found in Section SS 804C, Excavating, Trenching and Backfill.
Furnish labor, materials, equipment, and incidentals necessary to operate pumps, piping and other facilities to assist in the removal of surface water and groundwater, and provide protection from flood waters. Build and maintain the necessary temporary impounding works, channels, and diversions. Remove the temporary works, equipment, and materials after completion in strict accordance with this section of the specifications and the applicable drawings. The cost for care and control of groundwater and surface water are incidental to the contract price.
- C. Protecting work against surface runoff and rising flood waters.
- D. Disposing of removed water.

1.02 REFERENCES

- A. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49 kg) Rammer and 12-inch (304.8 mm) Drop.
- B. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
- C. Federal Register 40 CFR (Vol. 55, No. 222) Part 122, EPA Administered Permit Programs (NPDES), Para.122.26 (b)(14) Storm Water Discharge.

1.03 DEFINITIONS

- A. Groundwater control includes both dewatering and depressurization of water-bearing soil layers.

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1. Dewatering includes lowering the water table and intercepting seepage, which would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts, and disposing of removed water. The 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 the 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 the Work from any source of surface water.
- D. Equipment and instrumentation for monitoring and control of the groundwater control system includes piezometers and monitoring wells, and devices, such as flow meters, for observing and recording flow rates.

1.04 PERFORMANCE REQUIREMENTS

- A. CONTRACTOR shall conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems.
- B. Design a groundwater control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 550 Trench Excavation Safety Protection to produce the following results:
1. Effectively reduce the hydrostatic pressure affecting:
 - a. Excavations.
 - b. Tunnel excavation, face stability or seepage into tunnels.
 2. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities, and other work.
 3. Prevent the loss of fines, seepage, boils, quick condition, or softening of the

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foundation strata.

4. Maintain stability of sides and bottom of excavations.
- C. Groundwater control systems may 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 the excavation. Excavation drainage may include placement of drainage materials, such as 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 groundwater control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.
- G. Assume sole responsibility for groundwater 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 the groundwater control operations. Modify groundwater 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 groundwater control systems or resulting from failure of the system to protect property as required.
- H. Provide an adequate number of piezometers installed at the proper locations and depths as required to provide meaningful observations of the conditions affecting the excavation, adjacent structures, and water wells.

1.05 SUBMITTALS

- A. Submit a Groundwater and Surface Water Control Plan for review by the CONSULTANT prior to start of any fieldwork. The Plan shall be signed by a Professional Engineer registered in the State of Texas. Submit a plan to include the following:
 1. Results of subsurface investigation and description of the extent and characteristics of water bearing layers subject to groundwater control.
 2. Names of equipment suppliers and installation subcontractors.
 3. A description of proposed groundwater control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria, and operation and maintenance procedures.

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4. A 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. A 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 groundwater 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.
- B. Submit the 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.
- C. Submit the following records on a weekly basis 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 groundwater control installations, piezometers, and monitoring wells.
 3. Submit the following records at end of work. Decommissioning (abandonment) reports for monitoring wells and piezometers installed by other during the design phase and left for CONTRACTOR'S monitoring and use.

1.06 ENVIRONMENTAL REQUIREMENTS

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- A. Comply with requirements of agencies having jurisdiction.
- B. Comply with Texas Commission on Environmental Quality regulations and Texas Water Well Drillers Association, and Edwards Aquifer Authority for development, drilling, and abandonment of wells used in dewatering system.
- C. Obtain permit from TCEQ under the Texas Pollutant Discharge Elimination System (TPDES), for storm water discharge from construction sites. Refer to Section 540 Temporary Erosion, Sedimentation and Water Pollution Prevention and Control for COSA Storm Water Pollution Prevention Plan requirements.
- D. Obtain all necessary permits from agencies with control over the use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Because the review and permitting process may be lengthy, take early action to pursue and submit for the required approvals.
- E. Monitor groundwater discharge for contamination while performing pumping in the vicinity of potentially contaminated sites.

PART 2 PRODUCTS

2.00 EQUIPMENT AND MATERIALS

- A. Equipment and materials are at the option of CONTRACTOR as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review of the CONSULTANT through submittals required in Paragraph 1.05, Submittals.
- B. Eductors, well points, or deep wells, where used, must be furnished, installed and operated by an experienced CONTRACTOR regularly engaged in groundwater control system design, installation, and operation.
- C. All equipment must be in good repair and operating order.
- D. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

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PART 3 EXECUTION

3.00 GROUNDWATER CONTROL

- A. Perform a subsurface investigation including, by borings, as necessary to identify water bearing layers, piezometric pressures, and soil parameters for design and installation of groundwater control systems. Perform pump tests, if necessary, to determine the drawdown characteristics of the waterbearing layers. The results shall be presented in the Groundwater and Surface Water Control Plan (See Paragraph 1.05-B).
- B. Provide labor, material, equipment, techniques and methods to lower, control and handle groundwater in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent structures and property.
- C. Install, operate, and maintain groundwater control systems in accordance with the Groundwater and Surface Water Control Plan. Notify CONSULTANT in writing of any changes made to accommodate field conditions and changes to the Work. Provide revised drawings and calculations with such 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 that the system lowers groundwater piezometric levels at a rate required to maintain a dry excavation resulting in a stable subgrade for prosecution of subsequent operations.
- F. Excavations shall be continuously dewatered using groundwater control systems meeting the requirements of Federal Regulations 29 CFR Part 1926 to produce the following results:
 - 1. For shaft excavations, reduce the piezometric level or level observed from within the exaction to at least 5-feet below the excavation bottom elevation.
 - 2. 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. Allowable piezometric elevations shall be defined in the Groundwater and Surface Water Control Plan.
- G. The CONTRACTOR shall consider the impact of anticipated subsurface soil/water when selecting methods of excavation and temporary dewatering and drainage systems. When groundwater levels are above the proposed bottoms of excavation, a pumped dewatering excavation will be required for pre-drainage of the soils to at least 2-feet below the lowest tunnel level, and 5-feet below the lowest shaft level, until construction has been completed, such that the foundation, structure, pipe, conduit, or fill will not be floated or otherwise damaged. The type of dewatering

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system, spacing of dewatering units and other details of the work are expected to vary with soil/water conditions at particular locations, and will be approved individually for each groundwater control plan for each construction or retrieval shaft, or individual tunnel.

- H. Remove groundwater control installations.
 - 1. Remove pumping system components and piping when groundwater control is no longer required.
 - 2. Remove piezometers, including piezometers installed during the design phase investigations and left for CONTRACTOR'S use, upon completion of testing.
 - 3. Remove monitoring wells when directed by the CONSULTANT.
 - 4. Grout abandoned well and piezometer holes in accordance with the TCEQ, and the Edwards Aquifer Authority well abandonment procedures. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.
- I. During backfilling, dewatering may be reduced to maintain water level a 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.
- J. Provide a 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.
- K. Extent of construction groundwater control for structures with a permanent perforated underground drainage system may be reduced, such as for units designed to withstand hydrostatic uplift pressure. Provide a means of draining the affected portion of underground system, including standby equipment. Maintain drainage system during operations and remove it when no longer required.
- L. Remove system upon completion of construction or when dewatering and control of surface or groundwater is no longer required.
- M. Compact backfill to not less than 98 percent of the maximum dry density in accordance with ASTM D 698.

3.01 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

- A. For aboveground piping in groundwater control system, include a 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header so that discharge from each installation can be visually

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monitored.

- B. Install sufficient piezometers or monitoring wells to show that all 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 CONTRACTOR'S selected method of work.
- C. Install piezometers or monitoring wells not less than one week in advance of beginning the associated excavation.
- D. Dewatering may be omitted for portions of underdrains or other excavations, but only where auger borings and piezometers or monitoring wells show that soil is predrained by an existing system such that the criteria of the groundwater control plan are satisfied.
- E. Replace installations that produce noticeable amounts of sediments after development.
- F. Provide additional groundwater control installations, or change the methods, in the event that the installations according to the groundwater control plan does not provide satisfactory results based on the performance criteria defined by the plan and by the specification. Submit a revised plan according to Paragraph 1.05B.

3.02 EXCAVATION DRAINAGE

CONTRACTOR may use excavation drainage methods if necessary to achieve well drained conditions. The excavation drainage may consist of a layer of crushed stone and filter fabric, and sump pumping in combination with sufficient wells for groundwater control to maintain stable excavation and backfill conditions.

3.03 MAINTENANCE AND OBSERVATION

- A. Conduct daily maintenance and observation of piezometers or monitoring wells while the groundwater control installations or excavation drainage are operating in an area or seepage into tunnel is occurring. Keep system in operational 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 the excavation area when groundwater control operations are complete. Remove and grout monitoring wells when directed by the CONSULTANT.

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3.04 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 groundwater recovery. These records shall be obtained daily until steady conditions are achieved and twice weekly thereafter.
- B. Observe and record elevation of water level daily as long as groundwater control system is in operation, and weekly thereafter until the Work is completed or piezometers or wells are removed, except when CONSULTANT determines that more frequent monitoring and recording are required. Comply with CONSULTANT'S direction for increased monitoring and recording and take measures as necessary to ensure effective dewatering for intended purpose.

3.05 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. The 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 such agencies.
- C. The CONTRACTOR is responsible for handling and diverting any flood flows, stream flows, or any other water, including groundwater encountered during the progress of the work. Build, maintain, and operate cofferdams, channels, flumes, sumps, and other temporary works as needed to pass floodwater or divert stream flow or pass other surface water through or around the construction site and away from construction work while it is in progress. Unless otherwise approved by the OWNER, a diversion must discharge into the same natural watercourse in which its headworks are located. Construct permanent work in areas free from water. Full responsibility for the successful dewatering of the work areas rests with the CONTRACTOR. Remove protective works, after they have served their purpose, in a manner satisfactory to the OWNER or his representative.
- D. Unless otherwise specified on the drawings, maintain the borrow areas in drainable condition or otherwise provide for timely removal of surface waters that accumulate, for any reason, within the borrow areas.

3.06 SPECIFIC REQUIREMENTS FOR TREATMENT OF TUNNEL WATER

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- A. Water from the tunnel invert including infiltrated groundwater and expended service water from construction processes (i.e., tunnel water) shall be handled separately from shaft and trench discharge water. All tunnel water shall be treated within the construction limits in the vicinity of the construction shaft.
- B. Tunnel water shall be considered to be contaminated with suspended solids from the excavation operations, oil, hydraulic fluid, grease, and diesel fuel from CONTRACTOR's operations, natural and man-made petroleum products infiltrating with the groundwater. CONTRACTOR shall design, furnish, operate and maintain a treatment plant for tunnel water in accordance with this specification.
- C. Remove all tunnel water from the construction site via discharge pipes. Do not employ the use of trenches or open ditches to control tunnel water. Discharge all tunnel water in a manner that will not cause soil erosion at the discharge point or siltation/flooding in any stream, storm sewer, or adjacent property.
- D. Tunnel water shall be subject to all required permits obtained by CONTRACTOR from the authority having jurisdiction over the discharge permit. The handling of water shall be in accordance with an accepted Water Control Plan, and consistent with the obtained permits. Obtain and comply with the requirements of all necessary permits, rules, regulations, laws, and permissions, and also obtain approval of the Water Control Plan prior to installation of treatment plants and discharge systems.
- E. For discharge of tunnel water to designated locations, CONTRACTOR shall perform the following:
 - 1. Obtain acceptance for the discharge quantity, quality, discharge points, and facilities.
 - 2. Install a temporary pipeline, buried under road crossings, from the launch shaft site to the discharge location.
 - 3. Provide barricades to restrict access if grating or hatches open are planned to receive the discharge pipe. Protect existing facilities at the plant and make repairs resulting from damages to existing structures, roadways, and grounds.
 - 4. If CONTRACTOR modifies any facilities to receive the tunnel water discharge, restore modified facilities to original condition upon completion of the project.
- F. Tunnel water treatment system shall meet all requirements of the governing discharge permit. In addition, the minimum standards for the tunnel water treatment plant design shall be as follows:
 - 1. Design plans and specifications for the treatment system shall be signed and sealed by a Professional Engineer registered in the State of Texas with at least ten years of experience in the design of wastewater treatment plant systems.

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2. Design shall be consistent with all laws of the United States, State of Texas, and the City of San Antonio.
3. Total capacity shall include all infiltration plus additional capacity to include all service water introduced for CONTRACTOR's operations and water coming into boreholes and holes drilled for CONTRACTOR's convenience. Design treatment plant to be capable of expansion if greater capacity becomes necessary during the construction period.
4. Include in the design of the treatment plant CONTRACTOR's expectation for solids and contamination generated from its excavation operations. Design the treatment plant to remove cement fines generated during CONTRACTOR's concrete placement operations.
5. Remove solid contaminants by use of sedimentation basins and mechanical wastewater treatment plants;
 - a. Include a water-tight sedimentation basin for settling solids out of water. Provide means for effectively removing and the proper disposal of the solids from the site.
 - b. Design the water treatment unit to be capable of producing an effluent that complies with the governing discharge permit effluent limits for discharge. The design of water treatment unit shall be signed and sealed by a Professional Engineer registered in the State of Texas.
 - c. Include additional frac tanks as necessary.
6. Include oil/water separation facilities sized by CONTRACTOR's design engineer based upon the types of hydraulic oils, rock drill oils, and oils of other types to be used by CONTRACTOR in the tunnel, plus additional capacity to handle all naturally occurring and man-made petroleum products entering the tunnel via infiltration of groundwater. Include the ability to expand the facilities during construction based upon actual quantities of oil in the tunnel water. Install such additional capacities when needed to treat these contaminants.
7. Include a grease interceptor sized by CONTRACTOR's design engineer based upon the types of grease to be used by CONTRACTOR in the tunnel and quantities of tunnel water anticipated in the tunnel invert over the life of the project.
8. Pumps, sumps, pipelines, and discharge lines shall be of sufficient capacity to effectively pump tunnel water to the tunnel water treatment plant and treated effluent to the approved discharge point.

PART 4 MEASUREMENT AND PAYMENT

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4.01 MEASUREMENT

- A. Control of groundwater and surface water will not be measured for payment, the cost of which is incidental to the contract price.

4.01 PAYMENT

- A. No direct payment shall be made for costs associated with control of groundwater and surface water. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.

- END OF SECTION -

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SECTION SS 804C

EXCAVATION, TRENCHING AND BACKFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section is a supplement to Item No. 804 of SAWS Specification for Water and Sanitary Sewer Construction.
- B. The CONTRACTOR shall furnish all labor, materials and equipment and perform all operations in connection with the excavation, trenching, bedding, and backfilling required to install pipes, conduits and appurtenances as shown on the Drawings and as specified.
- C. Excavation shall include the removal of all earth, rock, and materials of any nature, including water to install the pipes, conduits and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.
- D. Backfill shall include the refilling, consolidation and compaction of the fill in trenches and excavations up to the existing ground surface or finished grade as shown on the Drawings and as specified.
- E. Where construction enters the limits of the U.S. Government, City, State or County rights-of-way, the requirements of these agencies shall be met if those requirements, in the opinion of the OWNER, are more restrictive than those specified.
- F. CONTRACTOR shall become familiar with, and comply with, all applicable codes, ordinances, statutes, and bear sole responsibility for the penalties imposed for noncompliance.
- G. Earth removed from excavations, which is not required for backfill, shall be removed from the site by the CONTRACTOR at his own expense, unless arrangements are made with the landowner or OWNER through his representative to allow disposal on site. CONTRACTOR shall provide written agreement with landowner and submit record of agreement to OWNER and OWNER's representative. If permitted, dump and spread excess earth in a manner agreed upon by the CONTRACTOR and the OWNER. Cover excess material with topsoil.

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1.02 SUBMITTALS

- A. The following submittals are required.
1. Subgrade Filler, Bedding and Initial Backfill Data. Data on soil classification, gradation, and percentage of wear shall be submitted for materials to be used for subgrade filler, bedding and initial backfill.
 2. Site Fills and Embankments and Secondary Backfill Data. Data on soil classification and gradation shall be submitted for materials to be used for site fills and embankments and secondary backfill.
 3. Flowable Fill. Complete mix design data for the flowable fill shall be submitted in accordance with SAWS Item 299 Flowable Fill. Data submitted shall include 3-day and 28-day unconfined compressive strength.
 4. Filter Fabric and Polyethylene Film Data. Complete descriptive and engineering data for the filter fabric and polyethylene film shall be submitted. Data submitted shall include:
 - a. A 12 inch square sample of fabric and film.
 - b. Manufacturer's descriptive product data for fabric and film.
 - c. Installation instructions for fabric and film.
- B. Trenching Plan. Prior to commencement of any excavation activities, the CONTRACTOR shall submit a plan for accomplishing the pipeline trenching work in accordance with the Drawings, this Section, and recommendations from the manufacturer of the pipe to be installed.
- C. Sheeting, shoring and excavation support systems shall be designed by a professional engineer registered in the State of Texas. The CONTRACTOR shall submit for record purposes only, and not for review or approval, shop drawings showing the location and layout of proposed sheeting, shoring, and excavation support systems.
- D. Test Reports. Field test reports shall be submitted within 24 hours of the completion of the test.

1.03 SAFETY

- A. The CONTRACTOR shall at all times conform to all applicable regulations of Subpart "P" entitled, "Excavation, Trenching, and Shoring of OSHA Safety and

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Health Regulations for Construction"; and all applicable state and local rules and regulations.

- B. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, CONTRACTOR shall employ a competent person and, when necessary based on the regulations, a registered professional engineer in the State of Texas, to act upon all pertinent matters of the Work of this Section.
- C. Provide and maintain barricades, flags, torches, and other safety devices as required by local, State, and Federal codes and conduct work to create minimum inconvenience to the public. Temporary suspension of work does not relieve responsibility for the above requirements.

1.04 QUALITY CONTROL AND ASSURANCE

- A. Reference SAWS Standard Specification 804 for additional quality control testing requirements and procedures.
- B. Required Tests. For planning and bidding purposes, the following guidelines shall be used for frequency of field tests. Additional tests shall be performed as necessary for job conditions, number of failed tests or as determined by the OWNER. In the event that a lift fails a compaction test, all costs for retesting for compliance shall be the CONTRACTOR's responsibility. Test results shall be submitted per paragraph 1.02.
 - 1. Two initial gradation tests and two percent of wear tests shall be made for each type of subgrade filler, bedding, initial backfill, secondary backfill, Site fill, embankment or other material, and one additional gradation test shall be made for each additional 500 tons of each material delivered to the Site or proposed for use on the Project. In addition, one set of initial Atterberg Limits tests shall be made for each fill material containing more than 20 percent by weight passing the No. 200 sieve. One additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to the Site or proposed for use on the Project.
 - 2. Two moisture density (Proctor) tests in accordance with TEX-114-E or two maximum index density tests in accordance with ASTM D4253, whichever is applicable, for each type of subgrade filler, bedding, initial backfill, secondary backfill, site fill and embankment, or other material proposed for use on the Project.
 - 3. In-place field density and moisture tests at intervals of 400 feet maximum for each 12" loose lift along the trench.

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4. One in-place field density and moisture test for every 200 cubic yards of initial backfill and secondary backfill. For cohesionless aggregate fill on which it is not practical to control the density by "Proctor" conduct field testing per field compaction mold method correlated to ASTM D4253 and D4254.
5. One in-place density and moisture test whenever there is a suspicion of a change in the quality of moisture control or effectiveness of compaction.
6. At least one test for every full shift of compaction operations on mass earthwork.
7. Additional gradation, Proctor, and maximum index density tests whenever the source or quality of material changes.
8. The in-place density and moisture content shall be determined by any one or combination of the following methods:
 - a. ASTM D2922 (density of soil and soil aggregate in-place by nuclear methods - shallow depth).
 - b. ASTM D1556 (density and unit weight of soil in-place by sand cone method).
 - c. ASTM D2216 (laboratory determination of water content of soil and rock).
 - d. ASTM D3017 (water content of soil and rock - shallow depth in-place by nuclear methods).
9. Testing of Flowable Fill shall be as follows:
 - a. Compressive Strength. For every 200 cubic yards of flowable fill placed, fill four 6 by 12 inch plastic cylinder molds to overflowing and then tap sides lightly. Cure cylinders in the molds covered until time of testing, or at least 14 days. Strip the cylinders carefully using a knife to cut away the plastic mold. Cap the cylinders with high strength gypsum plaster or other capping process that will not break these low strength materials. Test cylinders in accordance with ASTM C39. Two cylinders shall be tested at 3 days and the other two cylinders shall be tested at 28 days.
 - b. Flow of Fill. Once each day that flowable fill is placed, test the fill material in accordance with ASTM C939 for the efflux time. Wet screening may be required to remove coarse particles.

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- c. Unit Weight and Yield. Once each day that flowable fill is placed, determine unit weight and yield in accordance with ASTM C138.
 - d. Air Content. Once each day that flowable fill is placed, determine air content in accordance with ASTM C231.
 - e. Penetration Resistance. Once each day that flowable fill is placed, determine early bearing strength in accordance with ASTM C403 penetration procedure.
- C. The OWNER may request additional testing to be performed by an independent testing laboratory for his guidance and quality assurance of the Work. Payment for such tests will be the responsibility of the OWNER. Testing by the OWNER is for the sole benefit of the OWNER and shall not be considered a substitute for the specified testing by the CONTRACTOR. CONTRACTOR shall cooperate with OWNER's quality assurance testing work by leveling small test areas designed by the OWNER. CONTRACTOR shall backfill quality assurance test areas at the CONTRACTOR's expense. The OWNER may test any lift of fill at any time, location, or elevation.
- D. Bidders must satisfy themselves as to the actual existing subsurface conditions prior to the submittal of a proposal to complete the proposed work.

1.06 DELIVERY AND STORAGE

Excavated materials to be used for backfill may be deposited in stockpiles at points convenient for re-handling the material during the backfilling process. The location of stockpiles must be within the limits of construction easements or other locations coordinated and submitted by CONTRACTOR. The location of stockpiles is subject to the approval of the OWNER or the OWNER's representative. Keep drainage channel clear of stockpiled materials.

1.07 JOB CONDITIONS

Place no embedment or backfill material during freezing weather or upon frozen subgrades or previously placed frozen embedment or backfill materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Subgrade Filler. Subgrade filler is defined as backfill located below the bedding of the pipe. It is to be used in areas where the bottom of the trench is determined to be unstable. Subgrade filler shall conform to the requirement below.

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Subgrade Filler Material Requirements

<u>Sieve Size</u>	<u>Percent Retained</u>
1½"	0
1"	0-5
3/8"	40-75
No. 4	90-100
No. 8	95-100

- B. Bedding. Pipe bedding is defined as backfill that begins six inches below the bottom of the pipe and extends to the outside face of the pipe bottom, as shown on the Drawings. Pipe bedding shall be TxDOT Grade 5 material, as modified below.

Modified Grade 5 Material Requirements

<u>Sieve Size</u>	<u>Percent Retained</u>
½"	0
3/8"	0-5
No. 4	20 -80
No. 10	75-100
No. 20	98-100

In addition, if at any time the material retained on the No. 4 sieve for TxDOT Modified Grade 5 material deviates more than 10 percent (plus or minus) than initially submitted, then the CONTRACTOR shall resubmit the revised gradation for OWNER's review and acceptance. If the OWNER accepts, the new material shall be supplied for the remainder of the Project. No further changes shall be made without permission of the OWNER. Bedding material shall not be soft, and shall not form mud or muck when submerged in water. Bedding material shall have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or ASTM C535. Light weight aggregate that weighs less than 80 pounds per cubic foot is not acceptable.

- C. Initial Backfill. Initial backfill is defined as backfill having a thickness from the surface of the pipe bedding to a point twelve inches above the top of the pipe. Initial backfill shall conform to the same gradation and other requirements as specified for bedding.
- D. Secondary Backfill. Secondary backfill is defined as backfill from twelve inches above the top of the pipe to the top of the trench. Top of the trench is natural ground unless topsoil has been stripped to be replaced or a pavement section is to be placed over the trench. To the maximum extent available, excess suitable material obtained from structure and trench excavations shall be used for secondary backfill.

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Additional material shall be provided as required from CONTRACTOR's off-site sources. If material is obtained from off-site sources it shall not contain more than 35 percent passing the No. 200 standard sieve as determined by ASTM D1140, and the Plasticity Index of the material passing the No. 200 sieve shall not be in excess of 20 as determined by ASTM D4318.

All materials used for secondary backfill shall be free from rocks or stones larger than 4 inches in their greatest dimension, brush, stumps, logs, roots, vegetative matter, debris, cinders, corrosive materials, and other organic or deleterious materials.

- E. Site Fills and Embankments. Material for site fills and embankments shall conform to the requirements for secondary backfill, except that materials placed in site fills and embankments shall be free from rocks or stones larger than 6 inches in their greatest dimension. Rocks or stones within the allowable size limit may only be incorporated in the site fills and embankments, provided they are distributed so that they do not interfere with proper compaction.
- F. Flowable Fill. Flowable fill is a low strength concrete material suitable as a backfill for utility trenches, abandoned pipes, manholes and valves. It is a heavy material and will exert a high fluid pressure against any forms, embankment or wall used to contain the flowable fill. Materials shall conform SAWS Item No. 299, Flowable Fill.
- G. Groundwater Barrier. Groundwater barriers shall be soil plugs constructed from soil meeting ASTM D2487 classification GC, SC, CL, or ML. No separate pay item.
- H. Filter Fabric. Filter fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust and debris. Filter fabric shall be provided for installation at locations shown on the Drawings and as specified. Filter fabric shall be a nonwoven fabric consisting of only continuous chains of polymeric filaments or yarns of polyester formed into a stable network by needle punching. The fabric shall be inert to commonly encountered chemicals; shall be resistant to mildew, rot, ultraviolet light, insects and rodents; and shall have the following properties:

	Test Method		Minimum Average Roll Value*
Property		Unit	
Fabric Weight	ASTM D3776	oz/yd ²	8.0
Grab Strength	ASTM D4632	lb	215
Grab Elongation	ASTM D4632	percent	50

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Property	Test Method	Unit	Minimum Average Roll Value*
Mullen Burst Strength	ASTM D3786	psi	375
Apparent Opening Size	CW-02215	US Standard Sieve Size	70
* Minimum average roll value in weakest principal direction.			

- I. Polyethylene Film. Polyethylene film beneath concrete slabs or slab base course material shall be Product Standard PS17, 6 mil minimum thickness.
- J. Water. Water used in fill materials for compaction shall be clean and free from oil and grease. It shall not contain any organic matter or any other deleterious substances.
- K. Compaction Equipment. Compaction equipment shall be suitable for the type of material being placed, adequate to obtain the densities specified without causing damage to the pipe and existing facilities, and capable of compacting in restricted areas next to structures and around piping. The equipment used for compaction shall be that designed for the specific purpose. Improvised equipment such as the bucket of an excavator shall not be used for compaction. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort. If inadequate densities are obtained, larger and/or different types of additional equipment shall be provided by the CONTRACTOR. Compaction equipment used for compacting all backfill shall be heavy mechanized equipment. Roller compaction wheels or vibratory plates shall be used for consolidation and compaction of initial backfill.
- L. Moisture Control Equipment. Equipment for applying water shall be of a type and quality adequate for the Work, shall not leak, and shall be equipped with a distributor bar or other approved device to assure uniform application. Equipment for mixing and drying out material shall consist of blades, discs or other accepted equipment.

PART 3 EXECUTION

3.01 GENERAL

- A. The work performed under this Section shall be constructed to the lines, grades, elevations, slopes and cross sections shown on the Drawings and as specified. The CONTRACTOR shall be responsible for setting and maintaining grade

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stakes. Graded surfaces shall present a neat, uniform appearance upon completion of the Work.

- B. It shall be the CONTRACTOR's responsibility to maintain adequate safety measures and working conditions and to take measures necessary during the performance of the Work to protect areas affected by the Work from storm damage, flood hazard, caving of trenches and embankments, and sloughing of material. It shall be the CONTRACTOR's responsibility to maintain completed areas throughout the Project duration.
- C. The CONTRACTOR shall take steps to prevent and reduce dust arising from the construction activity. Adequate water trucks shall be on hand to water, as necessary, the areas where dust may arise. The CONTRACTOR shall cooperate fully and water immediately, when directed by the OWNER. Only potable water sources shall be used for dust suppression and watering shall be done in such a manner as to not cause damage or flooding.
- D. The CONTRACTOR shall provide the necessary storm water pollution prevention measures so as to prevent siltation of waterways and drainage courses.
- E. Prior to start of construction, communicate with local representatives of utility companies, including but not limited to oil, gas, telephone, and communications companies, as well as local water and sewer utilities operating in the location of the proposed construction area. CONTRACTOR shall call One-Call to locate all existing utilities shown or not shown on the drawings. Existing utility lines and structures which are to remain in service shall be protected from damage during construction. Where utility lines, underground pipes and conduits, or structures not shown on the Drawings are encountered, the CONTRACTOR shall report them to the OWNER where needed for revised line and grade approval. The CONTRACTOR shall bear the cost of repair or replacement of utility lines or structures which are broken or damaged by his operations.
- F. All excavation is unclassified. No extra payments will be made to the CONTRACTOR on account of rock, mud, muck, gravel, water, or other stable or unstable materials or conditions encountered. The CONTRACTOR shall make subsurface investigations as he deems are necessary prior to bidding the Work to account for these situations and bid accordingly.
- G. Blasting or other use of explosives for excavation will not be permitted.
- H. CONTRACTOR shall establish existing (original) and final grades along the pipeline alignment. Unless otherwise shown on the Drawings, final grades shall be the same as existing grades.

3.02 PRE-INSTALLATION INSPECTION PROCEDURE

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Prior to the start of any pipe laying activities, the CONTRACTOR shall lay 500 linear feet of pipe for inspection purposes at the location shown on the Drawings or as determined by the OWNER. The purpose of this inspection is to demonstrate how the trench will be excavated, the bedding will be placed, and the initial and secondary backfill placed and compacted. The pre-installation inspection procedure shall be as follows:

- A. CONTRACTOR shall excavate trench as specified.
- B. Pipe bedding shall be placed and compacted in bottom of trench as specified.
- C. Pipe sections shall be placed on pipe bedding in trench as specified.
- D. Initial and secondary backfill shall be placed and consolidated and/or compacted as specified. The in-place density shall be measured after each lift of initial and secondary backfill as specified. Additional lifts of initial and secondary backfill shall not be placed until the previous lift has met the specified density. If tests on a lift of backfill show that the specified density is not obtained, the CONTRACTOR shall increase the amount of coverages, decrease the lift thicknesses or obtain a different type of compactor until the specified densities are obtained.

The CONTRACTOR shall demonstrate to the OWNER precautions taken as to not disturb the compaction of the backfill when moving the trench box.

- E. Pipe deflection shall be measured 48 hours after the completion of backfilling. The maximum deflection shall be as specified. If the pipe deflection exceeds the specified deflection, the installation shall be judged to not meet this Section and the CONTRACTOR shall repeat the pre-installation inspection procedure.
- F. After the pipe has met the deflection requirements, the CONTRACTOR shall uncover the buried sections of pipe by removing the secondary backfill and the initial backfill to the pipe springline. The pipe shall be removed from the trench with care so as not to disturb or allow sloughing of the initial backfill. The bedding shall be inspected for voids under the pipe haunches. If the OWNER determines that the haunch area of the pipe contains voids, the installation shall be judged to not meet this Section and the CONTRACTOR shall repeat as many times as necessary, the pre-installation inspection procedure until the OWNER is satisfied that the CONTRACTOR's installation procedures result in the initial backfill directly in contact with the pipe under the haunches and without any voids.
- G. After acceptance, the CONTRACTOR may start work. The CONTRACTOR may reuse the pipe sections used in the pre-installation inspection procedure

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provided there is no damage to the pipe. The CONTRACTOR shall use the pipe pre-installation procedure, which was accepted by the OWNER, for the installation of the pipeline. If during the course of work, it is determined that the accepted procedure is not producing the specified results, the CONTRACTOR shall repeat the pre-installation inspection procedure to determine a new installation procedure which will produce the desired results and is acceptable to the OWNER. The CONTRACTOR shall repeat the pre-installation inspection procedure at no cost to the OWNER. In addition, any change in means, methods, and trench conditions, including excavation, bedding and pipe zone materials, in situ soils, water conditions, and backfill and compaction methods may require, at OWNER's sole discretion, another successful pre-installation inspection procedure before additional pipe installation.

3.03 EXCAVATION

A. Trench Excavation.

1. Trench Walls. The practice of undercutting at the bottom will not be permitted. The trench walls shall remain from the bottom of the trench to at least one foot above the top of the pipe.
2. Minimum Width of Trench. Except when maximum trench width is required for certain conduits, trenches shall be excavated to the minimum trench widths shown on the Drawings. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, bedding and backfilling. Bell holes are required for joint installation and shall provide adequate clearance for tools and methods used for installing pipe. To prevent point loading, no part of any bell or coupling shall be in contact with the trench bottom, trench walls, or bedding when the pipe is jointed. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints. Minimum sidewall clearances shown on the Drawings are not minimum average clearances but are minimum clear distances which will be required to the trench excavation or the trench protective system. Cutting trench banks on slopes to reduce earth load to prevent sliding and caving shall be used only in areas where the increased trench width will not interfere with surface features or encroach on right-of-way limits.
3. Maximum Width of Trench. The maximum allowable width of trench shall be as shown on the Drawings.
4. Maximum Length of Open Trench. Except with special permission by the OWNER, only that amount of pipe construction will be permitted which

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can be completed in one day, including excavation, construction of pipeline, and backfill in any one location. Maximum length of open trench shall never exceed 400 feet. This length shall include open excavation, pipe laying, and appurtenant construction and backfill which has not been temporarily resurfaced.

B. Excavation for Structures.

1. Conform to elevations and dimensions shown on the Drawings within a tolerance of plus or minus 0.10 foot and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and inspection.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive structural fill or concrete. The bottom of excavation shall be inspected by the OWNER to ensure adequate bearing for the structure. No concrete or other work shall be placed until OWNER's acceptance has been obtained.

C. Stockpiling of Excavated Materials. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner a sufficient distance from the banks of the trench to prevent slides or cave-ins. The location of stockpiles must be within the limits of construction easements or other locations coordinated and submitted by CONTRACTOR. The location of stockpiles is subject to the approval by the OWNER or the OWNER's representative. All excavated materials not required or not suitable for backfill shall be removed and properly disposed of by the CONTRACTOR, as specified.

D. Additional Excavation.

1. For trenches, if unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper to suitable bearing and replace the excavated material with subgrade filler. Unsuitable material shall include organic soil, soft or loose bearing material, vegetation, cinders, debris, trash and other material of inadequate bearing.
2. For structures, if unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper to suitable bearing and replace the excavated material with subgrade filler. Unsuitable material shall include organic soil, soft or loose bearing material, vegetation, cinders, debris, trash and other material of inadequate bearing.

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3. Removal of unsuitable material below required subgrade elevations and its replacement with the specified material will be considered an incidental cost to the project and not a separate pay item.
 4. All excavation in this Contract is unclassified. There will not be a separate pay item for rock excavation.
- E. Unauthorized Excavation. Unless otherwise directed by the OWNER, the CONTRACTOR shall not overexcavate materials beyond indicated subgrade elevations or dimensions. All unauthorized over-excavation and repair shall be at the CONTRACTOR's expense. The method of remediation for such unauthorized excavation shall be as follows:
1. Fill unauthorized excavation under footings or foundation bases by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation as accepted by the OWNER.
 2. Backfill and compact unauthorized excavations in pipe trenches with subgrade filler.
 3. Fill and compact unauthorized excavations in fills and embankment areas outside structure footprints with material specified for site fills and embankments unless otherwise directed by the OWNER.
- F. Stability of Excavations. Slope sides of excavations to comply with codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- G. Sheet piling, Shoring and Bracing. Provide materials for sheet piling, shoring, and bracing, such as sheet piling, uprights, stringers and crossbraces, in good serviceable condition.
1. Trench shoring and bracing shall comply with codes and authorities having jurisdiction.
 2. Maintain shoring and bracing in excavations. Carry down shoring and bracing as excavation progresses and as required for safety and stability.
 3. Trench sheet piling shall not be pulled after backfilling. Where trench sheet piling is left in place, it shall not be braced against the pipe, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe to support sheet piling may be removed after secondary backfill has been

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completed. Trench sheeting shall not be removed unless otherwise permitted by the OWNER. Trench sheeting will not be removed, if in the opinion of the OWNER, removal of the sheeting will cause damage to the facility it is protecting. If left in place, only metal parts shall be allowed to be left in place and the sheeting shall be cut off 12 inches or more below finished grade. The design of the support system shall be such as to permit complete removal while maintaining safety and stability at all times.

- H. Drainage and Dewatering. CONTRACTOR shall remove drainage water from the construction operations, and grading shall be done as necessary to prevent storm water and wastewater from reaching the construction area. The CONTRACTOR shall be responsible for any damages to persons or property on or off the Site caused by storm water flows that were diverted due to construction operations. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, floatation, or other cause will result.
1. Do not allow water to accumulate in excavations or at subgrade level. Remove water to prevent softening of subgrades, foundation bottoms and soil changes detrimental to stability of subgrades and foundations.
 2. Convey water removed from excavations and rainwater to collecting or runoff areas away from buildings and other structures. Establish and maintain temporary drainage ditches and other diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.
 3. Dewatering devices shall be provided with filters to prevent the removal of fines from the soil.
 4. Upon completion of the dewatering work, the CONTRACTOR shall remove all equipment and leave the construction area in a neat, clean and acceptable condition.
 5. Maintain groundwater table at least 24 inches below the prevailing and finished excavation subgrade at all times and until there is no possibility of damage.
 6. Obtain from the appropriate agencies and authorities, the dewatering and storm water discharge permits required to remove and dispose of groundwater, surface water, and any other water used in

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CONTRACTOR's operations. CONTRACTOR shall obtain permits prior to start of construction.

- I. Dewatering Performance. Performance of the dewatering system for lowering groundwater shall be measured by observation wells or piezometers installed in conjunction with the dewatering system, and these shall be read at least daily. The CONTRACTOR shall maintain a log of these readings and submit them to the OWNER on a weekly basis.
- J. Water in Existing Utilities. The CONTRACTOR is responsible for handling and diverting any water contained in or flowing through utilities altered during the progress of work. Furnish, prepare and maintain all works required to sustain construction progress including, but not limited to temporary piping, valves, plugs, drains, dikes, ditches and pumps. Full responsibility for the successful handling of utility water rests with the CONTRACTOR. Remove any temporary works, after they have served their purpose, in a manner satisfactory to the OWNER or the OWNER'S representative. The CONTRACTOR is responsible for restoring utilities to full operating status unless specified otherwise. In the event a utility is temporarily removed from service or impaired, the CONTRACTOR shall work to restore the utility in a diligent and expeditious manner.

3.04 PLACEMENT AND COMPACTION

- A. Backfilling (All Classes).
 - 1. Backfill areas to the required contours and elevations, as shown on the Drawings and specified.
 - 2. Use a placement method that does not disturb or damaged newly installed pipe and structures or existing facilities and structures.
 - 3. Backfill simultaneously on each side of pipe in trench.
 - 4. Slope grade away from exposed structures minimum 2 inches in 10 feet, unless noted otherwise.
 - 5. Make grade changes gradually. Blend slopes into level areas.
 - 6. No fill shall be placed on soft, yielding, spongy, porous or wet subgrade. All subgrade shall be firm, dewatered, and free of standing water prior to fill placement.
 - 7. Do not damage waterproofing when placing backfill.

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- B. Backfilling Excavations. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Observation, testing and recording of locations of underground piping, ductwork, and other conduits.
 2. Removal of concrete formwork.
 3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
 4. Removal of trash and debris.
- C. Compaction. All materials requiring compaction shall be compacted (consolidated) by mechanical means. Flooding or jetting will not be permitted. If compaction tests indicate that compaction or moisture content is not as specified, material placement shall be terminated and corrective action shall be taken by the CONTRACTOR prior to continued placement. The gross weight of compacting equipment shall be limited in the vicinity of the wall of any existing structure or completed structure under this Contract to that which would not cause damage.
- D. Moisture Control. During all compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of secondary backfill, site fills and embankments. Maintain moisture content uniform throughout the lift. Insofar as practicable, add water to the material at the site of excavation. Supplement, if required, by sprinkling the secondary backfill, site fills and embankments. At the time of compaction, the water content of the material shall be at the laboratory optimum moisture content, plus or minus 2 percent. CONTRACTOR shall provide equipment capable of adding measured amounts of water to the material to bring it to a condition within the specified range of the required moisture content. Do not attempt to compact secondary backfill, site fills and embankment material that contains excessive moisture. The CONTRACTOR shall provide equipment capable of discing, aerating, and mixing the soil to insure reasonable uniformity of moisture content throughout the material and to reduce the moisture content of the material by air drying if necessary. If the subgrade material must be moisture conditioned before compaction, the material shall be sufficiently mixed or worked on the subgrade to insure uniform moisture content throughout the lift of material to be compacted. Materials at moisture content in excess of the specified limit shall be dried by aeration or stockpiled for drying. No material shall be placed when free water is standing on the surface of the area where the material is to be placed. No compaction of material will be permitted with free water on any portion of the material to be compacted. No material shall be placed or compacted in a frozen condition or on top of frozen material.

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- E. Subgrade Filler. Subgrade filler shall be placed in 8-inch loose lifts to depths determined by the OWNER. Filter fabric shall be used between the soil subgrade and the subgrade filler and shall extend to 12 inches above the top of the subgrade filler. Each lift of subgrade filler material shall be compacted by a vibratory compactor to not less than 98 percent of the maximum index density as determined by ASTM D4253.
- F. Bedding. The CONTRACTOR shall excavate at least to a depth of 6 inches below the pipe for the full width of the trench. If conditions are stable, the CONTRACTOR shall backfill the trench with bedding material from the bottom of the trench to the bottom of the pipe. If conditions are unstable, the CONTRACTOR shall over-excavate to a depth satisfactory to the OWNER, place filter fabric and then backfill from the bottom of the trench to a point 6 inches below the bottom of the pipe with subgrade filler. The CONTRACTOR shall then use bedding material to backfill from the top of the subgrade filler to the bottom of the pipe. Before pipe is lowered in place, the trench bottom or bedding shall be prepared so that each pipe will have a firm and uniform bearing over the entire length of the barrel and the width of the trench. Adjustments in line and grade shall be made by scraping away or filling and tamping in under the barrel of the pipe. Wedging or blocking is not permitted. Prevent the pipe from rolling in the trench.
- G. Initial Backfill. The initial backfill shall be considered from the surface of the pipe bedding to 12 inches above the top of the pipe. Place initial backfill as specified herein in the trench simultaneously on each side of the pipe for the full width of the trench in lifts not to exceed 24 inches in depth (loose measurement) or as needed to achieve the specific density. Care shall be taken not to damage pipe and coatings on the pipe. Each lift of initial backfill material shall be consolidated and/or compacted by a vibratory compactor or roller compaction wheel acceptable to OWNER to not less than 95 percent of the maximum index density as determined by ASTM D4253.
- H. Secondary Backfill. After the pipe has been laid in the trench and has been inspected and approved and initial backfilling is complete, the remainder of the trench shall be backfilled with materials specified for secondary backfill. Each lift of secondary backfill material shall be mechanically compacted to not less than 98 percent of maximum dry density as determined by TxDOT TEX-114-E. Where a pavement section is to be placed over the trench, each lift of secondary backfill material shall be mechanically compacted to not less than 98 percent of maximum dry density as determined by TxDOT TEX-114-E. Where existing utilities fall within the secondary backfill, each lift of secondary backfill material shall be mechanically compacted to not less than 98 percent of max dry density as determined by TxDOT TEX-114-E. Maintain material at optimum moisture content, plus or minus 2 percent. Mechanically compacted backfill shall be placed in horizontal layers not more than 12 inches in depth (loose measurement).

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Each layer shall be evenly spread; the moisture content brought to within the specified moisture content and then tamped or rolled until the specified compaction has been attained. Make allowance for topsoil and pavement structure where required.

- I. Site Fills and Embankments. All material shall be placed in horizontal loose lifts not exceeding 12 inches in thickness and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Each lift of site fill and embankment shall be compacted to not less than 98 percent of maximum dry density as determined by TxDOT TEX-114-E. Maintain material at optimum moisture content, plus or minus 2 percent. Material shall be placed to the lines and grades shown on the Drawings. Make allowance for topsoil and pavement structure where required. Particular care shall be taken to compact site fills and embankments, which will be beneath pipes, roads, or other surface construction or structures. In addition, wherever a trench passes through site fills and embankments, the site fills and embankment shall be placed and compacted to an elevation twelve inches above the top of the pipe before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.
- J. Flowable Fill. Flowable fill shall be used as backfill in areas as shown on the Drawings. The following procedures shall be used while using flowable fill:
 - 1. Flowable fill shall be placed in a trench or excavation prepared for the pipe to the depth shown on the Drawings. The pipe shall be secured against floatation during placement of the flowable fill.
 - 2. Consistency. Consistency shall be tested by filling an open-ended three inch diameter cylinder 6 inches high to the top with flowable fill on a flat non-absorbent surface. The cylinder shall be immediately pulled straight up and the correct consistency of the flowable fill shall produce a minimum 8-inch diameter circular-type spread with no segregation.
 - 3. Batch Mixing and Transportation. Materials are to be measured by weight and/or volumetric methods. The flowable fill may be mixed in a central concrete mixer, a ready mix truck, or by other acceptable methods. The flowable fill shall be transported to the point of placement in a revolving drum mixer.
 - 4. Placing. For pipe trench backfill, provide bulkheads at each end of fill placement sufficient to confine backfill. Bulkheads are to be as shown on the Drawings.
 - 5. Covering. Flowable fill may be covered when it adequately supports the weight of construction equipment, but not less than 24 hours after

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completion of placement except temporarily with steel plates as required in roadways.

6. Limits. Flowable fill, where required, shall be placed the full width of trench and as shown vertically on the Drawings. No payment will be made for flowable fill extending further than 18 inches to either side of the pipe or more than 6 inches below the pipe, regardless of quantity placed.
- K. Minimum Cover. The total cover from the top of the pipe to final grade shall be adequate to resist construction loads as determined by CONTRACTOR, but in no instance shall cover be less than 5 feet, unless shown on the Drawings.
- L. Groundwater Barrier. Groundwater barriers shall be soil plugs of 3 feet in length, extending the full depth and width of granular material. Groundwater barriers shall be compacted to 95 percent of maximum dry density as determined by TxDOT TEX-114-E. Maintain material at optimum moisture content, plus or minus 2 percent.
- M. Filter Fabric. Filter fabric shall be placed as specified herein and at locations shown on the Drawings.
 1. Filter fabric shall be protected at all times during construction from contamination by foreign substances and damage. Any contaminated or damaged filter fabric shall be replaced with new filter fabric at no additional cost to the OWNER.
 2. The Work shall be scheduled so that covering of the filter fabric with subgrade filler or other specified material is accomplished as soon as possible, but not more than 3 days after placement of the filter fabric.
 3. Filter fabric shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. A minimum overlap of 2 feet between adjacent roll ends and adjacent strips shall be provided. Filter fabric shall be pinned or stapled to the subgrade. The pins or staples shall be placed to prevent filter fabric slippage or movement during placement of subsequent materials. The overlap shall also be secured to the subgrade with pins or staples.
 4. The material above the filter fabric shall be placed by end dumping on to the filter fabric from the edge of the fabric or over the previously placed material. Tracked or rubber tired construction equipment shall not be operated directly upon the filter fabric. The CONTRACTOR shall demonstrate that the placement technique will prevent damage to the filter fabric. Tension in the fabric shall be minimized to prevent puncture.

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Should the filter fabric be damaged, the CONTRACTOR shall replace the fabric to the OWNER's satisfaction at no additional cost to the OWNER.

3.05 FINAL GRADING AND PLACEMENT OF TOPSOIL

- A. After other outside work has been finished, and backfilling and embankments completed and settled, all areas disturbed or damaged by CONTRACTOR's operations shall be restored to the original grades, elevations, slopes, and contours, unless otherwise shown on the Drawings. All cuts, fills, embankments, and other areas which have been disturbed or damaged by construction operations shall be surfaced with topsoil as specified in Section SS 520A Revegetation.
- B. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage.
- C. Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.
- D. CONTRACTOR shall be required to verify that no deviations from original ground elevations occurred. No separate payment will be made for such verification.

3.06 SPOIL AND EXCESS EXCAVATED MATERIALS

Onsite material deemed unsuitable by the OWNER, either from tests or visual inspection, for use as fill or backfill shall be removed from the Site. Construction debris and other debris contained within this material shall be removed and disposed of as specified. All excess excavated materials and waste generated on the Project shall become the property of the CONTRACTOR and shall be disposed of by the CONTRACTOR at his expense. The CONTRACTOR shall arrange for a disposal site outside the Project limits, shall obtain written approval for disposal and provide copy to the OWNER, and shall not place fill within a designated 100-year flood plain, drainage easement or so as to block or alter drainage. No separate pay item will be made for removal and disposal of spoil and excess excavated material.

3.07 CLEAN-UP

As a condition for final acceptance and payment, the CONTRACTOR shall remove rubbish, debris, temporary materials, and waste excavated materials from the Site. Such materials shall be disposed of in accordance with applicable laws, regulations, and permits. The CONTRACTOR shall obtain written approval from the owner of the property upon which the material will be disposed, and provide a copy to the OWNER. The CONTRACTOR shall restore staging and storage areas, temporary roads and areas disturbed by CONTRACTOR's operation to original or better condition or as shown on

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the Drawings to the satisfaction of the OWNER. Construction equipment and implements of service shall be removed, and the entire area involved shall be left in a clean condition acceptable to OWNER. All clean-up operations shall be in compliance with the Project Stormwater Pollution Prevention Plan.

3.08 SETTLEMENT

- A. CONTRACTOR shall be responsible for all settlement of trench backfill and site fills and embankments which may occur within the correction period stipulated in the General Conditions.
- B. CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement for a period of 2 years from final completion within 30 days after notice from OWNER.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Excavation, Trenching and Backfill will not be measured for payment.
- B. Measurement of Trench Dams, shall be by unit price per each installed.

4.01 PAYMENT

- A. No direct payment shall be made for incidental costs associated with quality control testing, excavation, trenching and backfilling. All costs in connection with this work shall be included in the applicable contract price for the item to which the work pertains.
- B. Trench Dams measured as provided above, will be paid for at the contract unit price per each, which shall be full compensation for work herein specified in the contract documents, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

- END OF SECTION -

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SECTION SS 841A

HYDROSTATIC TESTING OPERATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers field pipeline cleaning, hydrostatic pressure and leakage testing of all piping installed under this Contract. The term "piping" shall be used in this Section to refer to piping systems, pipelines, or sections thereof.

1.02 GENERAL REQUIREMENTS

- A. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals to perform flushing, cleaning, and pressure, and/or leakage testing of all pipeline segments and appurtenant piping in accordance with the Contract Documents.
- B. The CONTRACTOR shall be responsible for coordinating testing and providing adequate and safe access to all pipeline segments.
- C. The OWNER shall be present during testing and shall be notified of the time and place of testing at least 3 days prior to commencement of testing. All testing shall be performed to the satisfaction of OWNER and in accordance with all governing standards and regulations.
- D. The CONTRACTOR shall be responsible for furnishing the water for filling, depressurizing and testing the piping, including makeup water. Potential sources of water are identified in this Section. Should the contractor use chlorinated water for hydrostatic testing, then the chlorinated water shall be dechlorinated before disposal per TCEQ regulations.
- E. Unless otherwise permitted, during testing, the water shall be kept out of the remainder of the piping not being tested
- F. As a conservation measure, the water shall be collected for reuse in subsequent testing.
- G. CONTRACTOR shall notify federal, state, and local regulatory agencies to determine if any special procedures or permits are required for disposal of water used for pipeline testing and cleaning and to identify acceptable locations for disposal of the water. All requirements and costs associated with notifications and obtaining any discharge permit or approvals shall be responsibility of CONTRACTOR. In addition to complying with any federal, state, or local

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requirements regarding water disposal, following completion of testing, CONTRACTOR shall dispose of water in a manner acceptable to OWNER.

- H. For air and other testing of gasketed and other joints as applicable, refer to the associated pipe specification.

1.03 RELATED WORK

- A. Section 02571 – Steel Pipe, Mortar-Lined

1.04 SUBMITTALS

- A. A testing schedule, including proposed plans for water source and conveyance, control, and disposal shall be submitted in writing for acceptance a minimum of 10 work days before each test is to start. The schedule shall indicate the proposed time and sequence of testing of the piping.
- B. Written pressure and leakage test procedures, required pipeline appurtenances, and testing personnel qualifications. The test procedures shall establish the limits of the piping to be tested, the positions of all valves during testing, the locations of temporary bulkheads, and all procedures to be followed in performing the testing.
- C. Record data documenting the results of the hydrostatic pressure and leakage tests.
- D. Gauges and water meter calibration reports.

PART 2 PRODUCTS

2.01 GENERAL

Makeup water is defined as the quantity of water required to be pumped into the newly laid pipe, or any valved section of it, necessary to maintain the specified test pressure after the pipe has been filled with water and the air expelled.

2.02 TEST EQUIPMENT

- A. All necessary connections between the piping to be tested and the water source, together with pumping equipment, water meter, pressure gauges, backflow prevention and all other equipment, materials, and facilities required to perform the specified tests, shall be furnished by the CONTRACTOR. All required blind flanges, valves, bulkheads, bracing, and other sectionalizing devices shall also be provided. The CONTRACTOR shall use temporary bulkheads, which shall be removed upon completion of testing. The removal of the temporary bulkheads shall be performed in a manner to minimize damage to the cement mortar lining and coating systems. The CONTRACTOR may use an air gauge and a skip

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method of cutting to remove the temporary bulkheads or any other bulkhead removal method as recommended by the pipe manufacturer. Vents shall be provided in test bulkheads where necessary to expel air from the piping to be tested. No materials shall be used which would be injurious to the construction or its future function.

Each test plug or bulkhead shall be designed to withstand the test pressure on either side with only atmospheric pressure on the opposite side. Each test plug or bulkhead specified shall have a 30-inch access manhole in one side of the plug and a 12-inch flanged outlet on the other side of the plug as shown in the contract drawings. The CONTRACTOR shall furnish and install on each plug a 6-inch gate valve (AWWA C-515), piping, and fittings as required to jump water from one side of the plug to the other when transferring water for testing of an adjacent section of pipe is necessary. Plugs, outlet, gate valve, piping, and fittings shall be rated for the same pressures as the adjacent transmission pipeline, shall have a 150 psi drilling pattern per ANSI B16.1, and shall become the property of the OWNER after construction. Supply per specification SAWS Item No. 828, Gate Valves and Section, 02571 Steel Pipe, Mortar-Lined.

- B. Test pressures shall be applied by means of a force pump sized to produce and maintain the required pressure without interruption during the test.
- C. The water necessary to maintain the test pressure shall be measured through a water meter satisfactory to the OWNER.
- D. Water meters and pressure gauges shall be accurately calibrated and shall be subject to review and acceptance by the OWNER.
- E. Pressure gauges shall be ANSI/ASME B40.1, Grade 1A and shall meet or exceed the test pressures specified in this Section. Pressure gauges shall be calibrated to an accuracy of plus or minus 1 percent minimum over the entire range of the gauge. The gauges shall be laboratory bench tested for accuracy just prior to field testing.
- F. Permanent gauge connections shall be installed at each location where test gauges are connected to the piping during the required tests. Field drilling and tapping of pipe walls will not be permitted. Upon completion of testing, each gauge connection shall be fitted with a removable plug or cap acceptable to the OWNER.
- G. Permanent or temporary fill and vent connections shall be installed as needed for the required test. Drilling and tapping of pipe walls will not be permitted. Upon successful completion of testing, each permanent fill and vent connection shall be fitted with the permanent fill or vent piping, and each temporary fill and vent connection, if used, shall be fitted with a permanent sealed plug or cap acceptable to the OWNER.

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2.03 WATER FOR TESTING

Potential water source alternatives for CONTRACTOR's use for pipeline filling, testing, and cleaning are as follows:

- A. San Antonio Water System
 - 1. The CONTRACTOR shall coordinate with SAWS on approved locations of water connections for Hydrostatic Testing Operations.
 - 2. The CONTRACTOR shall coordinate with SAWS regarding approved water operations and the timing of obtaining water. The CONTRACTOR shall note any SAWS drought limitations and plan accordingly.

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR may test the pipeline in sections when all the pipe in a particular section has been completely backfilled and in place for at least 28 days. Associated restrained joint piping shall also be complete prior to testing.
- B. Unless otherwise acceptable or indicated in the Contract Documents, during testing of the pipeline, all valves shall be in the open position and temporary bulkheads shall be provided so that the test pressures are not applied to existing or new closed valves and hydrants, or to existing water lines, or to any portion of water lines installed under this Contract that have already been put into service. Testing against closed valves shall be allowed only if the pressure rating of the valve exceeds the test pressure.
- C. Prior to testing, place temporary bulkheads in the pipe and fill the line slowly with water at a rate less than or equal to 1fps in the main pipeline. Care shall be taken to ensure that all air release valves and vents are properly installed and in the open position during the filling. Hand operated vent valves shall not be closed until an uninterrupted stream of water is flowing from each valve. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves. Filling shall be at a reasonable velocity and all the air within the pipeline shall be properly purged. In no case shall the filling rate result in a flow velocity of more than 0.5 foot per second as measured using the full cross-sectional area of the pipe.
- D. After the line or section thereof had been completely filled, it shall be allowed to stand under a slight pressure for at least 48 hours to allow the lining to absorb what water it will and to allow the escape of air from any air pockets. During this period, the bulkheads, valves, manholes, and connections shall be examined for leaks. If any are found, these shall be repaired.

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- E. Piping shall be adequately anchored and supported before the test pressure is applied.
- F. During filling and testing, the CONTRACTOR shall monitor the pipeline alignment for signs of leaks. If leaks are found, the testing shall be halted until the leaks are repaired. Water damage due to testing operations shall be corrected at the CONTRACTOR's expense including leakage, runoff and erosion to areas outside of the pipeline easement or leakage that may cause damage to installed facilities. The CONTRACTOR shall maintain equipment on site, including earthmoving equipment, to mitigate and repair any damage from leaks.
- G. CONTRACTOR shall furnish all necessary equipment and make tests at no additional cost to the OWNER.

3.02 PIPELINE CLEANING

The CONTRACTOR is required to keep the pipe interior free of all debris. The CONTRACTOR shall completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, grouting of joints and any necessary interior repairs prior to testing the completed pipeline. The CONTRACTOR shall clean by broom sweeping or other means that will not destroy or damage the inside lining and joint protection system as recommended by the pipe manufacturer and accepted by the OWNER.

3.03 HYDROSTATIC PRESSURE AND LEAKAGE TESTS

- A. Test Section Length. Pressure and leakage tests will be required to be performed by the CONTRACTOR at the completion of the first one mile of the pipeline. After demonstration within allowable leakage, the next test section, if accepted by the OWNER, may be increased to approximately two miles.
- B. Water Reuse. Upon successful completion of both tests for the first two sections of the pipeline, the CONTRACTOR shall reuse the remaining available water in addition to the required amount of makeup water to test subsequent sections along the pipeline. This procedure shall be repeated until each section within the pipeline has successfully passed both tests.
- C. Hydrostatic Pressure Test Procedure. The hydrostatic pressure test shall consist of applying and maintaining the test pressure on the pipeline, without interruption and within a range of plus 5 psi or minus 2 psi of the test pressure, for a period of 4 hours plus any additional time required for the OWNER to examine all piping being tested and for CONTRACTOR to locate any defective joints and pipe materials. The test pressure gradients for each segment shall be 100 percent of the hydrostatic test pressure as shown on the Drawings. The maximum test pressure shall be measured at the lowest point of the pipeline section being tested.

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During the test, the entire route of the pipeline section being tested shall be inspected to locate any leaks or breaks. Any defective joints, cracked or defective pipe, fittings, valves, or welds discovered during this hydrostatic pressure test or visual inspection shall be removed and replaced with sound material and the test shall be repeated until satisfactory results are obtained at no additional cost to the OWNER.

- D. Valve Pressure Test. Pressure test valves, as installed in the field, and adjust valves as necessary for drip-tight performance. Valves shall be tested with pressure equal to the pressure class of the valve or pipeline hydrostatic test pressure, whichever is less. Test pressure shall be applied to each side independently, and the valve tested for drip-tight performance with zero pressure on the other side of the valve. Provisions satisfactory to the OWNER shall be made for verifying "0" leakage within the duration of the test. Test duration shall be 2 hours plus any additional time required by the OWNER for examination. If pressure class of valve is less than the pipeline hydrostatic test pressure at the valve location, the valve shall then be opened for the pipeline hydrostatic test.
- E. Leakage Test Procedure. Following completion of hydrostatic pressure testing and acceptance by OWNER, the piping shall be subjected to a leakage test.
 - 1. The duration of the leakage test shall be 2 hours plus the additional time required for the OWNER to make an accurate determination of leakage.
 - 2. The hydrostatic pressure maintained during the leakage test shall be at least 75 percent, but not more than 100 percent, of the pressure specified for pressure testing of the piping and shall be maintained within plus or minus 5 psi during the entire time that leakage measurements are being performed.
 - 3. Measurement of leakage shall not be attempted until all trapped air has been vented and a constant test pressure has been established. After the pressure has stabilized, piping leakage shall be measured with a suitable water meter installed in the pressure piping on the discharge side of the force pump.
 - 4. The term "leakage", as used herein, refers to the total amount of makeup water which must be added into the piping during the leakage test to maintain the test pressure.

The pipeline installation will not be accepted until or unless the make up water is less than:

- a. 1 gallon per mile per 24 hours per inch of nominal pipe diameter for rubber gasketed joints
- b. 0.5 gallon per mile per 24 hours per inch of nominal pipe diameter for welded and flanged joints

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- F. All pipelines and directly connected appurtenant piping shall have no visually detectable leakage and shall not exceed the maximum allowable leakage during the test period. If leakage is detected by testing or by visual inspection, determine the cause of the leakage, take corrective measures necessary to repair the leaks, and again test the pipelines until satisfactory results are obtained at no additional cost to the OWNER. A successful “passed” test shall be defined as a test where the amount of water required to be pumped into the piping to maintain the leakage test pressure for the specified duration is less than or equal to the specified allowable leakage.
- G. All joints in piping shall be free from visible leaks during the leakage test. Each leak which is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of CONTRACTOR regardless of the amount that the total leakage may have been below the specified allowable leakage rate during the leakage test.
- H. Pipelines that fail to pass the specified leakage test will be considered defective WORK, and the CONTRACTOR shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall retest the pipeline.
- I. Leave the pipeline full of water upon completion of the hydrostatic test, except where internal test plugs must be removed to allow construction to continue.

3.04 COMBINED HYDROSTATIC PRESSURE AND LEAKING TEST PROCEDURES

- A. The CONTRACTOR may be allowed to perform a combined hydrostatic pressure and sonic leakage test in lieu of separate hydrostatic pressure test and leakage test.
- B. The combined hydrostatic pressure and leakage test may begin after the cement mortar lined pipe is filled with water and allowed to stand for 24 hours to permit maximum absorption of water by the lining. After the piping to be tested has been filled with water, the test pressure shall be applied and maintained without interruption within plus or minus 5 psi of test pressure for 4 hours plus any additional time required for the OWNER’s Representative to examine all piping being tested and for CONTRACTOR to locate any defective joints and pipe materials. The test pressure gradients for each segment shall be 100 percent of the design pressure. The design pressure shall be the greater of the hydraulic pressure or the mitigated transient pressure associated with the ultimate flow rate. Leakage testing shall be as specified in paragraph 3.04. If leakage volume exceeds allowable volume then the test shall be repeated.

3.05 DISPOSAL OF WATER

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- A. After the final section in each pipeline segment has been successfully tested, the CONTRACTOR shall reuse the test water in the next pipeline segment or shall discharge the test water in a manner that will not cause erosion to areas outside of the pipeline easement or damage to installed facilities. The velocity of pipeline drainage for the carrier pipe shall not exceed 0.5 ft/s. Draining shall be controlled by locating an orifice plate to be designed by the CONTRACTOR in the 12-inch section of the drain pipe prior to discharge.
- B. At the CONTRACTOR's option, the hydrostatic test water may be disposed of by the following methods
1. Conveying the water to be treated via local sewers if approved by the OWNER.
 2. Discharging to local drainage ditch, creek, stream, river, or other surface water body.
- C. If CONTRACTOR selects the first option and it is approved by the OWNER, water removed from the pipeline after testing shall be drained to the nearest sewer along the alignment. The rate of discharge shall not exceed the capacity of the sewer. The proposed drainage rate of the tested pipelines shall be submitted to and confirmed by the OWNER prior to draining activities. The CONTRACTOR shall monitor the levels in the manholes during discharge of hydrostatic test water. The water level in the manholes shall not be allowed to exceed the crown of the pipe. Pipe draining shall take place during off peak sewer hours recommended by the OWNER.
- D. If CONTRACTOR selects the second option, he must comply with general permit number TXG670000 from the Texas Commission on Environmental Quality (TCEQ) for discharges of hydrostatic test water into or adjacent to waters of the state. CONTRACTOR shall submit a notice of intent to the TCEQ unless the following exemptions to the permit for new facilities (TAC 30 Part 1 Chapter 321 Subchapter G Rule 321.103) are met:

1. The discharge meets the following effluent criteria:

Maximum Discharge Effluent Concentrations	
<u>Constituent</u>	<u>Daily Maximum Limit (mg/l)</u>
Chemical Oxygen Demand	250.00
Total Organic Carbon	85.00
Oil & Grease	15.00
Chlorine	0.10

2. Water used for the hydrostatic test does not contain corrosion inhibitors, anti-freeze compounds, or other chemical additives.

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3. The discharge is controlled at a rate to prevent flooding and/or erosion of the discharge area.
 4. The discharge does not cause any nuisance conditions to adjacent land owners along the discharge route.
- E. The TCEQ requires that one grab sample be taken during the first hour and last hour of discharge to analyze water quality. OWNER will be responsible for collecting and testing the grab samples in accordance with Standards Methods for the Examination of Water and Wastewater. CONTRACTOR shall notify OWNER at least 3 days prior to the start of discharge of water.
- F. CONTRACTOR shall be responsible for complying with any other Federal, State, or local requirements regarding water disposal, including notifications and any discharge permit or approvals that may be required.

PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Hydrostatic testing operations shall be measured by the horizontal linear foot.

4.02 PAYMENT

- A. Payment for hydrostatic testing operations shall be made at the contract unit price per horizontal linear foot for "Hydrostatic Testing Operations". Payment shall not be made until the water main has been successfully tested and accepted in compliance with requirements of the contract documents and SAWS.
- B. The cost of water to be paid by the CONTRACTOR shall be subtracted from the payment for Hydrostatic Testing Operations. The CONTRACTOR is to pay the water fee at the rate specified by SAWS. The cost of connecting to SAWS water lines and transferring water shall be incidental to the Hydrostatic Testing Operations cost.

-END OF SECTION-

Supplemental Specification

SECTION SS 847A

DISINFECTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section is a supplement to Item No. 847 of the SAWS Specification for water and Sanitary Sewer Construction.
- B. Disinfect the facilities for pumping, storing, or conveying potable water to comply with the standards for potable water of the regulatory agency of jurisdiction. Potable water is defined as any water that has been filtered, disinfected or otherwise treated to the meet regulatory standards.
- C. Disinfect piping systems that are used to convey water, solutions, or chemicals to the potable water facilities.
- D. Test water from the disinfected system per regulatory standards to verify that water is acceptable. Repeat procedure if tests do not meet standards.

1.02 REFERENCES

The following is a list of standards which may be referenced in this section:

- A. American Water Works Association (AWWA):
 - 1. B300, Hypochlorites
 - 2. B301, Liquid Chlorine
 - 3. B303, Sodium Chlorite
 - 4. C651, Disinfecting Water Mains, Dechlorination
 - 5. C652, Disinfection of Water Storage Facilities
- B. Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, American Water Works Association, and the Water Environment Federation.

1.03 SUBMITTALS

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- A. Plan describing and illustrating conformance to appropriate AWWA standards and this Specification.
- B. Procedure and plan for cleaning and flushing the system.
- C. Procedures and plans for disinfection and testing.
- D. Proposed locations within system where samples will be taken.
- E. Type of disinfecting solution and method of preparation.
- F. Certification that employees working with concentrated chlorine solutions or gas have received appropriate safety training.
- G. Method of disposal for highly chlorinated disinfecting water.
- H. A water supply plan for disinfection. Note where water will be obtained and how much will be needed.
- I. Submit proposed arrangement of temporary piping and appurtenances including pressure sustaining valves, backflow prevention, and fittings.

PART 2 PRODUCTS

2.01 WATER FOR DISINFECTION

- A. Clean, uncontaminated and potable.
- B. CONTRACTOR is responsible for obtaining all water required for disinfection. Disinfection water will be paid for by the CONTRACTOR. Water may be available from SAWS.
- C. CONTRACTOR shall make arrangements for water supply and convey water in disinfected pipelines or containers.

2.02 MATERIALS

- A. Liquid Chlorine: Meeting the requirements of AWWA B301.
- B. Calcium Hypochlorite: Meeting the requirements of AWWA B300.

2.03 CONTRACTOR'S EQUIPMENT

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- A. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection. CONTRACTOR shall provide all necessary valves, piping, backflow prevention devices, pressure sustaining valves, fittings, and any other appurtenances to convey disinfection water to the pipeline as NSPI.
- B. Provide protection as required by AWWA C651 05, Disinfecting Water Mains, Section 4.3.9 against cross-connections.

PART 3 EXECUTION

3.01 GENERAL

- A. Disinfection procedures shall conform to AWWA C651 05, Disinfecting Water Mains and this Specification.
- B. Disinfect the following items installed or modified under this project, intended to hold, transport, or otherwise contact potable water:
 - 1. 48" Pipeline and all appurtenances.
- C. During construction keep basins, pipe, fittings, equipment, and appurtenances free from dirt and debris.
 - 1. Seal the open ends of pipe with water-tight plugs when pipe is not being laid.
 - 2. Pump water from trenches before removing the plug when water accumulates in the trench.
- D. Wash the surfaces to be disinfected.
- E. Pipelines: disinfect new pipelines that connect to existing pipelines up to point of connection.
- F. Disinfect surfaces of materials that will contact finished water, both during and following construction. Disinfect prior to contact with finished water. Take care to avoid recontamination following disinfection.
- G. Prior to application of disinfectants, clean pipelines of loose and suspended material. Use water suitable for flushing and disinfecting.
- H. Conform to AWWA C651 for pipes and pipelines, except as modified in these Specifications.

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- I. Allow freshwater and disinfectant solution to flow into pipe or vessel at a measured rate so that chlorine-water solution is at specified strength. Do not place concentrated commercial disinfectant in pipeline or other facilities to be disinfected before it is filled with water.

3.02 SEQUENCING AND SCHEDULING

- A. Commence disinfection after completion of following:
 1. Completion and acceptance of pipeline installation
 2. Pneumatic testing, hydrostatic testing, pressure testing, and acceptance of pipelines.

3.03 PIPELINES

- A. Flushing:
 1. Before disinfecting, flush all foreign matter from pipe in accordance with AWWA C651. Provide hoses, temporary pipes, ditches, and other conduits as needed to dispose of flushing water without damage to adjacent properties.
 2. Flush service connections and hydrants. Flush distribution lines prior to flushing hydrants and service connections.
 3. Operate valves during flushing process at least twice during each flush.
- B. Disinfecting Procedure: In accordance with AWWA C651, unless herein modified.
- C. The minimum quantity of water used for flushing must exceed the capacity of the line to insure that clean water has traversed the entire length of the pipe.

3.04 DISPOSAL OF HEAVILY CHLORINATED WATER

- A. Chlorinated water used in flushing and disinfecting pipelines prior to connection to the distribution system shall be disposed of by the CONTRACTOR in an acceptable manner. Chlorinated water must be “de-chlorinated” prior to disposal to eliminate adverse impacts to the surrounding environment. Water released to the environment shall meet all AWWA, EPA, and TCEQ regulatory requirements.
- B. With the written permission of the OWNER of the system, chlorinated water may be disposed of in a sanitary sewer system in compliance with any requirements specified by the OWNER. In the case of larger pipelines and the larger volumes of water involved, the CONTRACTOR may not be permitted to use the sanitary sewer system for disposal even if one is available.

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- C. See the appendix of AWWA C651 for acceptable neutralization methods.

3.05 TESTING

- A. Collection of Samples:

1. Coordinate activities to allow samples to be taken in accordance with this Specification.
2. Provide temporary sampling facilities, including valves, as indicated on the details and as directed by the engineer or inspector. Flexible tubing shall not be used.
3. Provide access to sampling points.

- B. Test Equipment:

1. Clean containers and equipment used in sampling and make sure they are free of contamination.
2. Obtain sampling bottles with instructions for handling from OWNER'S laboratory.

- C. Chlorine Concentration Sampling and Analysis:

1. Collect and analyze samples in accordance with AWWA C651.
2. Dechlorinated Disinfecting Wastewater Residual Samples: A minimum of 2 grab samples are to be taken for every hour that discharge occurs.
3. Analysis to be performed by OWNER'S laboratory. Samples will be analyzed using method for free chlorine as described in latest edition of Standard Methods for Examination of Water and Wastewater.

- D. After pipelines have been cleaned, disinfected, and refilled with potable water, OWNER will take water samples and have them analyzed for conformance to bacterial limitations for public drinking water supplies and other requirements of the regulatory agency of jurisdiction for potable water. Monitor the system for two (2) days.

- E. If minimum samples required above are bacterially positive, disinfecting procedures and bacteriological testing shall be repeated until bacterial limits are met.

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PART 4 MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Disinfection shall be measured by the horizontal linear foot.

4.02 PAYMENT

- A. Payment for disinfection shall be made at the contract unit price per horizontal linear foot for “Disinfection”. Payment shall not be made until the water main has been successfully tested and accepted in compliance with requirements of the contract documents and SAWS.

-END OF SECTION-