

City of Eagle Pass Waterworks and Sewer System  
Eagle Pass, Texas



Design Standards  
and  
Construction Specifications

September 2012



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This document is not intended for  
permit, bidding or construction.  
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## 100 General Requirements

### 110.01 Definitions

“Act of God” – An earthquake, flood, cyclone, or other cataclysmic phenomenon of nature.

“Addendum” – Any written or graphic modification or interpretations of the contract document issued by the Engineer.

“Bid” – The signed, written bid of the bidder on the form furnished, indicating total price for the work in completed form as per the plans and specifications.

“Bid Bond” – The form of security approved by the owner and furnished by the Contractor, guaranteeing that he will enter into a contract in accordance with the contract documents if his bid is accepted.

“Bidder” – Any individual, firm, or corporation formally submitting a proposal for the work contemplated or any portion thereof, acting directly or through an authorized representative.

“Contract Sum” – The total amount payable to the Contractor for the work, which shall include sales, use, and other consumer taxes related to the work.

“Contractor” – The individual, firm or corporation undertaking the execution of the work under the terms of the contract and acting directly through his agents or employees.

“Engineer” – The design engineer or other designated representative of the General Manager for the Eagle Pass Water Works System.

“Notice to Proceed” – The written notice given by the Owner to the Contractor fixing the date on which Contractor shall commence to perform his obligation under the contract documents.

“Owner” – Eagle Pass Water Works System, Eagle Pass, Texas.

“Payment Bond” – The form of security approved by the Owner and furnished by the Contractor and his surety guaranteeing payment of all labor, material, equipment, and all other obligations arising out of the work.

“Performance Bond” – The form of security approved by the Owner and furnished by the Contractor and his surety guaranteeing the complete and faithful performance of all of the obligations and conditions placed upon the Contractor by the contract.

“Plans” – The maps and drawings together with any supplements furnished by the Engineer.

“Product Data” - Complete catalog data for the manufactured items of equipment and all component parts, including specific performance data, material description and source,



rating, capacity, working pressure, material gauge or thickness, brand name, catalog numbers, and other necessary information.

“Right-of-Way” – The area (either temporary or permanent) provided by the owner for use in constructing the work covered by the contract, including the appurtenances thereto.

“Shop Drawings” – All diagrams, drawings, illustrations, brochures, schedules and all other data submittals required by the contract to be furnished by the Contractor illustrating fabrication, installation, dimensions and other aspects of the work.

“Specifications” – The directions, requirements, explanations, terms and provisions pertaining to the various features of the work to be done, the manner and method of performance, and the manner and method of measurement and payment (Specifications include such directions, requirements and explanations as appear on the plans).

“Subcontractor” – Any individual, firm or corporation having a contract with the Contractor or with any other subcontractor for the performance of a part of the work.

“Substantial Completion” – The date when the work or specified part thereof, in the opinion of the Owner or Engineer, is sufficiently completed in accordance with the contract so that the project or a specified part can be used for the purposes for which it was intended.

“Work” – The furnishing of all labor, materials, equipment and other incidentals necessary or convenient to the successful completion of the project or the portion of the project involved and the carrying out of all the duties and obligations imposed by the contract.

“Written Notice” – A written communication delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended or delivered or sent by mail to the last business address known to the one who gave the notice. (It shall be the duty of each party to advise the other parties to the contract as to any change in business address until completion of the contract.)



## 110 Responsibilities and Obligations

### 111 Eagle Pass Water Works System

**111.01 General:** The Eagle Pass Water Works System will ultimately be the sole judge as to the acceptable quality of work, materials, articles and any such other approvals and their decision will be final.

**111.02 Specification Deficiencies:** If omissions or ambiguities occur in these specifications, requirements of the Texas Department of Transportation and/or the Texas Commission on Environmental Quality shall govern that part of the work.

**111.03 Standard Products Lists (SPL):** The Eagle Pass Water Works System (EPWWS) Standard Products List (SPL) is considered to form a part of these Specifications. Contractors may, when appropriate, elect to use products from the SPL; however, submittal to EPWWS & the Engineer is still required.

The SPL's should not be interpreted as being a pre-approved list of products necessarily meeting the requirements for a given construction project. Items contained in the SPL cannot be substituted for items shown on the Drawings, or called for in the specifications, or specified in the Bidding Requirements, Contract Forms and Conditions of Contract, unless approved by the Engineer.

The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation in the Work is of the kind and quality that satisfies the specified functions and quality.

**111.04 Authority and Duties of Inspector:** Inspector will be authorized to inspect all work done and all materials furnished. Such inspection may extend to all or to any part of the work and to the preparation or manufacture of the materials to be used. An inspector will be assigned to the work and will report to the progress of the work and the manner in which it is being performed; also to report whenever it appears that the materials furnished and the work performed by the Contractor fails to fulfill the requirements of the Construction Documents and to call the attention of the Contractor and the Owner to any obligation to perform the work in accordance with the requirements of the Construction Documents.

The Inspector will not be authorized to revoke, alter, enlarge, or release any requirement of the Construction Documents, nor to approve or accept any portion of work, or to issue instructions contrary to the Construction Documents. He will in no case act as foreman or perform other supervisory duties for the Contractor nor interfere with the management of the work. The inspector shall, however, have the authority to temporarily suspend work if deficiencies are discovered. Such suspension shall be followed by written notification to the Engineer & Owner.

Any order, decision, requirement, suspension, revocation, denial or determination by an Inspector, may be appealed to the General Manager. Appeals shall be filed with the General Manager in writing within ten (10) calendar days of the date of the order, decision, requirement, suspension, revocation, denial or determination. The notice of



appeal must state the matter being appealed and the justification or basis for the appeal. Failure to timely file an appeal or comply with this provision waives any right to further review. The General Manager shall promptly schedule a hearing on the appeal, in which the applicant has burden of proof to show an error by the Inspector. At or within 3 days after the appeal hearing, the General Manger shall render a decision in writing. The decision of the General Manger is final, binding and not subject to further review.

**111.05 Final Inspection:** Within five working days after the Engineer has given the Owner written notice that the work has been substantially completed, the Inspector will review the work and schedule a final acceptance walk through.

**111.06 Acceptance by the City:** A meeting for final acceptance will be on the site and at a time mutually agreeable between the Engineer and the Owner. The Inspector will also invite:

- A. Contractors, as appropriate
- B. Consulting Engineer
- C. Water/Wastewater Utility Representative
- D. Street Department Representative
- E. Eagle Pass Water Works System Operations Representative
- F. If the project involved A.D.A requirements and T.D.L.R./Independent Contractor approved the plans the representative for T.D.L.R./Independent Contractor that reviewed the plans will be invited.
- G. Planning Department Representative

A final acceptance letter or a conditional acceptance letter will be provided by the Engineer/Owner based on the results of the walk through.

## **112 Developers**

**112.01 Owner-Engineer Relationship:** The Developer shall specify his representatives for the work who will be responsible for all communications with the Eagle Pass Water Works System. When the Construction Plans have been approved by the Engineer and passed to the Construction Inspector, the work must not deviate from the signed Construction Documents. Field adjustments not affecting project integrity, cost of construction, or time and that are consistent with intent of design may be approved by the Inspector. The office of the General Manager must approve changes to Construction Drawings.

**112.02 Developer's Duty and Superintendence:** The Developer shall insure that no work shall be done nor materials used without qualified supervision and inspection of work.

If the project is 5 acres or more in size, then the owner is required to have an EPA NPDES Permit issued by the EPA Region VI. A copy of the report and permit shall be on file with the Eagle Pass Water Works System. A copy of the permit shall be posted on the jobsite per EPA requirements.





If burning is allowed on the project, then a TCEQ burn permit and authorization from the Fire Marshal is required. The contractor must also comply with any Maverick County Burn Bans that are imposed due to weather conditions.

**112.03 Water & Wastewater Fees:** The City requires a fee be paid for water & wastewater utilities provided by EPWWS prior to plat recordation. Refer to the City of Eagle Pass, Texas, Code of Ordinance, Part II - Code of Ordinance, Chapter 23 – Subdivisions, Article IV – Subdivision Design Standards and Specifications, Section 23-66 Sewer & Section 23-67 Water Supply and Distribution for further explanation on the type of installation and associated fees.

Other water and wastewater fees associated with providing service by EPWWS can be found in the City of Eagle Pass, Texas, Code of Ordinance, Part II - Code of Ordinance, Chapter 27 – Water and Sewers, within their respective articles.

**112.04 Pre-construction Conference:** The Developer will distribute approved plans prior to convening a Pre-construction Conference to start any construction. As a minimum, the conference shall consist of: introduction of all parties with exchange of contact information; discussion of start dates and schedule of events; erosion and sedimentation controls, traffic control, and barricades; superintendence; final acceptance guidelines, and publishing and distribution of minutes. A minimum of two days notice of the conference will be given to:

- A. Owner's Representative / Engineer
- B. Design Engineer
- C. Contractors for roads, drains and utilities
- D. Fire Department
- E. Texas Department of Transportation (if applicable)
- F. Public Works Department
- G. Planning Department

**112.05 Substantial Completion:** Substantial completion shall be defined as the date when the work or specified part thereof, in the opinion of the Owner or Engineer, is sufficiently completed in accordance with the contract so that the project or specified part can be used for the purposes for which it was intended. All work shall be finished within 10 days of that date. Written notification by the Owner or Engineer will be provided as to document milestone.

**112.06 Guarantee Against Work:** Developer shall warrant the work for a period of eighteen (18) months from the date of the Letter of Final Acceptance of complete project. Said warranty shall bind Developer to correct any defects in materials, workmanship (including utility backfills), or design inadequacies, which may be discovered within said eighteen (18) month period. Developer shall correct or cause his Contractor to correct at his own expense, such defects within 30 days after receiving written notice of such defects from the Engineer. Should Developer or his Contractor fail or refuse to correct such defects within the said 30 day period or to provide acceptable assurances that such work will be completed within a reasonable time thereafter; the Eagle Pass Water Works System may correct any such defects at expense of Developer or his Contractor or his bond.



## **113 Engineers/Surveyors**

**113.01 Construction Drawings:** Construction drawings shall meet all requirements of the Eagle Pass Water Works System Standard Specifications, and must be approved by the office of the General Manager.

**113.02 Geotechnical Evaluation:** A geotechnical report including laboratory reports shall be submitted at the time of the construction drawings submittal to support the design submitted. This report shall include a geotechnical evaluation for any structures (i.e. lift stations, concrete foundations, etc.) and for areas of proposed construction.

**113.03 As-Built Drawings:** The Developer's Engineer must submit record drawings that have been signed, sealed, and dated by final acceptance of the project.

## **114 Laboratory**

**114.01 Testing of Materials:** Unless otherwise specified, Atterberg limits and soil moisture-density tests performed on the site to determine the quality of material to be incorporated into the project will be as directed by the Engineer. Frequency, time, locations, and procedures of tests will be coordinated and approved by the Inspector. This testing is to be accomplished by an independent laboratory chosen by the Owner. Payment for all testing for capital improvement projects will be the responsibility of the Owner. Restoration or patching required due to testing shall be done at no expense to the Eagle Pass Water Works System. For private development projects, all testing shall be the responsibility of the developer or developer's contractor and EPWWS shall not bear any responsibility. All work shall conform to guidelines and specifications in order to be accepted by the Owner.

If tests are to be performed on existing waterlines for any such reason, an independent laboratory chosen by the Owner will be used to perform tests. Standard testing procedures shall be followed by laboratory and findings shall be distributed to appropriate personnel for review, which shall include the Engineer.

## **115 General Contractors/Sub Contractors**

**115.01 Trench Safety System Plan Submittal:** Prior to, or at the Pre-Construction Conference, the Contractor shall submit to the Eagle Pass Water Works System a Trench Safety System Plan sealed by a registered Professional Engineer licensed in the State of Texas.

Authorization to proceed with construction will not be issued by the Eagle Pass Water Works System until the Contractor has submitted a Trench Safety System Plan to the Eagle Pass Water Works System.

The Trench Safety System Plan at a minimum shall conform to OSHA standards for sloping of sides, utilization of trench boxes, and/or utilization of shoring, sheeting and bracing methods.



The Contractor's Competent Person(s) shall be responsible for the maintenance of a copy of appropriate OSHA regulations onsite and the implementation of OSHA trenching safety regulations at the work site. Trenching shall be completed to the lines and grades indicated on the Drawings or as specified in various technical standard specification items requiring excavation and trenching and/or backfilling. The Contractor shall perform all trenching in a safe manner and shall maintain safety systems to prevent death or injury to personnel or damage to structures, utilities, or property in or near excavation.

If evidence of possible cave-ins or earthen slides is apparent or an installed trench safety system is damaged, the work in trench shall immediately cease, personnel shall be evacuated from the hazardous area, and the Owner shall be notified. Personnel shall not be allowed to re-enter the excavation until necessary repairs or replacements are completed and are inspected and approved by the Contractor's Competent Person(s). Repair and replacement of damaged safety system shall be at the Contractor's sole expense.

**115.02 Water:** The contractor shall make arrangements for obtaining equipment to log water usage for construction purposes. The contractor shall make all connections, furnish all necessary extensions, and remove same upon completion of the work. Any damage to Eagle Pass Water Works System property will be billed to the contractor.

EPWWS will provide the contractor a hydrant water meter for a fee to record the amount of water used for construction purposes. The contractor is responsible for paying for the amount of water used. Water use logs shall be maintained by the contractor to document amount of water used. Any outstanding bills shall be paid prior to final acceptance of the project.

**115.03 Sales Tax:** Contractors that contract with the Eagle Pass Water Works System and perform Capital Improvement Projects (CIP) for the Eagle Pass Water Works System will be issued a certificate that can be used to notify suppliers that no state or local sales taxes are due for this project.

## **120 General Contract Requirements**

### **121 General Requirements**

The Engineer-of-Record for the project needs to determine the general requirements for the project. Private projects do not require all of the sections outlined in Section 122.

### **122 Special Requirements**

**122.01 Bidding:** Owner projects with expenditures of \$50,000 or more must be awarded by the EPWWS Board of Trustees based on the sealed bid process. Expenditures under \$50,000 may be awarded based on written quotes and may be approved by the EPWWS Board and/or General Manager. All written contracts must be reviewed and approved by the city attorney.

**122.02 Advertising:** Any project subject to the sealed bidding process must be authorized for bidding by the EPWWS Board of Trustees and funds must be budgeted



with a line item number. Bid documents must be available in the office of the Owner prior to authorization. After authorization, the project must be advertised in the official newspaper of the city of Eagle Pass, a minimum of twice, with one week between notices.

**122.03 Bid Award:** Bids may not be opened until at least 14 days after the first notice appears (not counting the day of advertising). A pre-bid conference will be scheduled during the week prior to opening of the bids. All bids received will be kept in the office of the Owner and will be opened by the designated agent at the scheduled time and date.

**122.04 Engineering:** Any Public Works project must have plans, specifications and cost estimates prepared and signed by a Registered Professional Engineer (P.E.) and must be constructed under supervision of a P.E.

**122.05 Bonding:** Contracts for public works projects over \$50,000 must include a payment bond and a performance bond. Both of these bonds must be in the total amount of the contract and must be solely for the protection of the Owner. Contracts for construction of public works projects under \$50,000 may eliminate both of these bonds; however the contract will exclude any payments prior to completion of the work and final payment must include an affidavit stating that all bills for materials and labor have been paid by the prime contractor.

**122.06 Insurance:** Workers Compensation covering all employees per the statutory requirement is required on all contracts. The following insurance is required on all contracts over \$50,000:

- a. Employer's Liability \$1,000,000
- b. Comprehensive General Liability and  
Bodily Injury & Property Damage (per occurrence) \$1,000,000  
Aggregate \$1,000,000  
(Premises/Operations/Products/Completed Operations/Independent  
Contractors/Contractual Liability/Coverages may not be excluded).  
XCU must be supplied if any exposure.
- c. Business Automobile Liability covering owned vehicles, rented and non-owned  
vehicles and employee non-ownership Bodily Injury Property Damage (per  
occurrence) of \$1,000,000 with aggregate of \$1,000,000

**122.07 Americans with Disabilities Act:** All capital projects constructed by the Owner which are open to public access must be designed to be ADA compliant. All new construction or reconstruction projects where the estimated cost exceeds \$50,000 must be submitted to the Texas Department of Licensing and Regulation for approval prior to the start of construction by the engineer of record.

**122.08 Texas Antiquities Act:** Advance project review is required by the Texas Historical Commission if the Public Works construction project disturbs more than five acres of surface area or 5,000 cubic yards of earth, or if the project is inside a designated historical district or a recorded archeological site. If the THC determines that a survey is not required, no further action is necessary. If a survey is required it must be completed



before construction begins and must conform to their guidelines for archeological surveys.

**122.09 EPA National Pollutant Discharge Elimination (NPDES):** Projects which disturb over 5 acres must comply with NPDES requirements. These require that a plan be prepared by a Professional Engineer and be included in the bid documents. A Notice of Intent (NOI) as part of an EPA – NPDES general permit must be submitted to EPA by the contractor or developer, at least 48 hours prior to the start of construction. A Notice of Termination (NOT) must be prepared upon completion of the conditions specified in the SW3P and submitted to EPA.

**122.10 Storm Water Pollution Prevention Plan (SW3P):** Plans and specifications for all projects located in TxDOT right of way and all projects which disturb over 5 acres are required to include a plan to mitigate storm water pollution. Other capital projects may include this plan if deemed necessary to prevent surface water pollution. This SW3P will be part of the work which is performed by the contractor. As a minimum the SW3P must include:

- Site description
- Control measures to be performed by the contractor.
- Any permanent storm water management measures.
- Procedures for maintenance of erosion control measures.
- Description of inspection procedures.

**122.11 TCEQ Approvals:** Plans and specification must be filed with TCEQ – Water Quality Division for all wastewater collection system extensions, but no approval will be issued by TCEQ (See 30 TAC § 290.39(c) through (e)). All water distribution system extensions which meet TCEQs requirements must be submitted to the Plan Review Team of TCEQ and approved prior to construction (See 30 TAC § 217.6(b)). All improvements other than maintenance of existing facilities at the water or wastewater treatment plants must be submitted to and approved by TCEQ, prior to bidding. All plans which include work on public water or wastewater systems must conform to the TCEQ requirements for water and wastewater systems.

**122.12 Minority/DBE Participation:** Requirements for Minority/DBE participation will vary from contract to contract, and typically be dictated by funding agency requirements.

**122.13 Prevailing Wage Requirements:** The *Davis-Bacon Act*, as amended, requires that each contract over \$2,000 to which the United States is a party for the construction, alteration, or repair of public buildings or public works shall contain a clause setting forth the minimum wages to be paid to various classes of laborers and mechanics employed under the contract. Under the provisions of the Act, contractors or their subcontractors are to pay workers employed directly upon the site of the work no less than the locally prevailing wages and fringe benefits paid on projects of a similar character. In addition to the Davis-Bacon Act itself, Congress has added prevailing wage provisions to approximately 60 statutes which assist construction projects through grants, loans, loan guarantees, and insurance.



In general for Eagle Pass Water Works System projects this act does not apply; however, if grant monies from state agencies are utilized or if there is TxDOT participation in the form of federal pass-through monies, then the grant documents will include a requirement for the Owner to comply with these provisions. Where applicable, provisions are included in the specifications that require the contractor to pay the prevailing wages as determined by the Texas Department of Commerce for this area. In addition we are required to request a copy of this “wage determination” within ten days of the bid opening and to make this a part of the contract documents.

## **123 Instruction to Bidders**

**123.01 Examination of Contract Documents:** Before submitting a bid, the bidder shall examine carefully the proposal, plans, specifications, special provisions, and the form of contract to be entered into for the work contemplated. The submission of a bid shall constitute an acknowledgment that the bidder has thoroughly examined and is familiar with the contract documents. The failure or neglect of a bidder to receive or examine any of the contract documents shall in no way relieve him from any obligations with respect to his bid or to the contract. No claim for extra or additional compensation will be allowed based upon a lack of knowledge of any contract document and the owner will in no case be responsible for any loss or for unanticipated cost that may be suffered by the Contractor as a result of conditions pertaining to the work.

**123.02 Quantities Are Approximate:** The quantities named in the proposal or separately listed are approximate only, but these are to be used as a basis for the comparison of proposals and to determine the amount of the bonds. If, however, unit prices (where used) appear to the Owner to be unbalanced to such an extent that changes in actual quantities required under the contract might result in contract price adjustments which would increase payments to the Contractor excessively, then the Owner may take such a condition under consideration in making the award of the contract.

**123.03 Examination of Site and Conditions:** Before making a proposal, the bidder shall examine the site of the work and ascertain for himself all physical conditions in relation thereto. Failure to take this precaution shall not release him from his obligation as implied by the proposal he submits nor excuse him from performing the work in strict accordance with the requirements of the contract documents.

No statement made by any officer, agent, or employee of the Owner pertaining to the site of the work or the conditions under which the work must be performed will be binding on the Owner.

**123.04 Pre-Bid Conference:** A pre-bid conference between the Eagle Pass Water Works System, prospective bidder, suppliers, etc., will be held at EPWWS, to make certain the scope of work is fully understood and to answer any questions. No addendum will be issued at this meeting, but subsequent thereto, if necessary to clear up any questions, an addendum will be issued. After this meeting, the contractors will have the opportunity of viewing the work sites provided by the Eagle Pass Water Works System.





**123.05 Addenda and Interpretations of Documents:** No interpretations of the contract documents or other pre-bid documents will be made to any bidder orally. Every request for such interpretation shall be submitted in writing, addressed to the Engineer and in order to receive consideration shall be received at least five days prior to the date fixed for opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications, which, if issued, will be mailed or otherwise delivered to each prospective bidder. Failure of any bidder to receive any such addendum shall not relieve such bidder from any obligation under his bid as submitted. All addenda issued shall become a part of the contract documents.

**123.06 Qualification of Bidders:** The owner desires that this project be built by a contractor who is competent and adequately financed. The Owner may request the bidder to submit a written statement to show experience in construction work of this character as an indication of qualifications and business standing. If required, the bidder may make his statement in such form as may seem appropriate. Such statement must be notarized. Failure to comply with this request may cause rejection of the bid.

**123.07 Preparation of the Bid:** Bids must be submitted by filling in with ink (or typing) each and every blank provided for such purpose in the form; or if the bidder is required to provide a special form appropriate to the nature of his bid, then such form shall be complete in all respects as required by the contract documents if it is to merit consideration by the Owner. When indicated, all blank spaces shall be filled in with words and figures. Written amounts shall take precedence where there is a conflict between the written and the figure. If the proposal is made by a partnership, it should contain the name of each partner and should be signed in the firm name followed by the signature of a partner or that of a person duly authorized to act for and on behalf of such partnership. If made by a corporation, the bid form should be signed with the name of the corporation and the state in which incorporated followed by the written signature of the qualified officer and the designation of the office he holds in the corporation in whose behalf the bid is submitted shall be given. The bidder shall comply with all other specific requirements of the bid form.

**123.08 Alteration of Documents Prohibited:** Except as may be provided otherwise herein, bids which are incomplete, are conditioned in any way, contain unverified erasures or alterations, or include items which are not named in the bid form or which are unlawful may be rejected.

**123.09 Submission of Bid:** Each bid shall be completely sealed in a package addressed as required by the official advertisement and marked with the name of the bidder and the title of the project and must be delivered to EPWWS at or before the time named in the advertisement. If forwarded by mail, the sealed envelope containing the bid form shall be enclosed in another envelope addressed "BID ENCLOSED".

**123.10 Modification of a Bid:** A change in a bid already delivered will be permitted only if a request for the privilege of making such modification is made in writing signed by the bidder and the specific modification itself is stated prior to the scheduled closing time for the receipt of bids. To be effective, every modification must be made in writing over the signature of the bidder, and no other procedure will be acceptable.



**123.11 Listing of Subcontractors:** If the Contractor proposes to sublet any of the work, he shall list the name of the subcontractor(s) in the space provided in the bid form. Should the bid form not provide space for the listing of the names for proposed subcontractor(s), the Contractor shall provide such a list to accompany his bid. Failure to include this information in his proposal could constitute cause for rejection of any and all requests for subcontracting any portion of the work.

**123.12 Bid Security:** Each bid form must be accompanied by a bid bond duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner in the amount of Ten (10) percent of the bid, unless applicable law requires less. Such bid bonds will be returned promptly after execution of the contract or, if no award has been made within sixty days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he had not been notified of the acceptance bid.

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

The Attorney-in-fact who signs the bid bonds or contract bonds must file with each bond a certified and effectively dated copy of his power of attorney.

**123.13 Withdrawal of Bid:** A bid may be withdrawn at any time prior to the scheduled closing time for filing the bids. This may be done by the bidder in person or upon his written request. A telephone request for withdrawal of a bid will not be recognized. If withdrawal is made personally, a written acknowledgment thereof will be required. After the scheduled closing time for filing the bids, no bidder will be permitted to withdraw his bid unless no award of contract has been made prior to the expiration of sixty days immediately following the date when the bids are opened. Bids received after the scheduled closing time will be returned to the bidder unopened.

**123.14 Opening of Bids:** All bids received prior to the scheduled closing time and which are not withdrawn as above provided will be publicly opened and read aloud, even though there may be irregularities or informalities therein.

**123.15 Affidavit of Noncollusion:** The Owner reserves the right to require that any bidder before being awarded a contract shall execute a noncollusion affidavit in such form as will satisfy the Owner that the bid offered is genuine, is not a sham or collusive, and in no respect or degree is made in the interest or on behalf of any person, firm or corporation not named in the form containing such bid.

## **124 Award and Execution of Contract**

**124.01 Consideration of Bids:** For the purpose of award, after the proposals are opened and read, the summation of the products of the approximate quantities shown in the proposal and the unit prices bid will be considered the amount of the bid. The summations will then be compared and the results made available to the public. Until the award of the contract is made, the Eagle Pass Water Works System reserves the right to





reject any or all proposals and to waive such technicalities as may be considered to be in the best interest of the Owner.

In determining the amount of the bid as well as computing amount due for payment of each item under the contract, the Eagle Pass Water Works System reserves the right to round off all unit bids involving fractional parts of a cent to the nearest one-tenth cent.

**124.02 Award of the Contract:** Within sixty calendar days after the opening of the bids, the Owner will award the contract or reject all bids. Formal acceptance of the bids can be made only by the Board of the Eagle Pass Water Works System. It reserves the right to reject any or all bids, to solely determine the best and lowest bid, and to waive any informality.

**124.03 Execution of Contract, Bonds and Certificates of Insurance:** Within 15 days after written notification of award of the contract, the bidder shall execute and furnish to the Eagle Pass Water Works System: (1) contract, (2) performance bond and payment bond, with powers of attorney attached, each in the full amount of the contract price, executed by a surety company or surety companies authorized to execute surety bonds under and in accordance with the laws of the State of Texas, and (3) Certificate of Insurance showing coverages in accordance with contract requirements.

**124.04 Beginning of Work:** The Contractor shall not begin work until authorized by the Eagle Pass Water Works System in writing to do so. Authorization notification will be by Notice to Proceed.

**124.05 Permit Requirements:** It will be the responsibility of the contractor to obtain all necessary permits prior to commencing any work. Any construction work within a city public right-of-way shall require an application for and the issuance of a permit from the Public Works Department, pursuant to Article II of the City of Eagle Pass Code of Ordinance, Chapter 22, prior to commencing work.

**124.06 Working Day:** A working day is defined as a calendar day, not including Saturdays, Sundays, or legal holidays of the City of Eagle Pass, in which weather or other conditions not under the control of the Contractor will permit the performance of the principal unit of work underway for a continuous period of not less than 7 hours between 7 a.m. and 6 p.m. For every Saturday or legal holiday except the following holidays:

January 2nd, the last Monday in May, July 4<sup>th</sup>, the first Monday in September, the fourth Thursday in November and December 25<sup>th</sup>.

on which the Contractor chooses to work, one day will be charged against the contract working time when weather conditions will permit 7 hours of work as delineated above and the contractor shall pay inspection fees of \$35/hour to the Eagle Pass Water Works System. The principal unit of work shall be that unit which controls the completion time of the contract. Work on Sunday and on the six legal holidays listed above will not be permitted except in cases of extreme emergency or when the safety of the Contractor's forces and/or the public would be significantly improved, and then only with the written permission of the Owner. If Sunday work or work on the six legal holidays listed above is permitted, working time will be charged on the same basis as weekdays.



## 125 Scope of Work

**125.01 Claims and Disputes:** In the event that the Contractor requests additional compensation for work not clearly covered in the contract, the Contractor shall notify the Engineer in writing of his intention to make a claim for additional time or compensation before beginning such work. An assessment of damages is not required to be a part of this notice but is desirable. If such notice is not given or the Engineer is not provided an opportunity to keep an accurate account of the actual cost of the work in question, then the Contractor waives his right to file a claim for such work, unless the circumstances are such that the Contractor could not have reasonable knowledge of the additional cost prior to the performance of the work. If the contractor could not have reasonable knowledge of the need for additional time or cost, the notice of claim shall be delivered to the Owner on or before the 5<sup>th</sup> day after the discovery of the need for additional time or compensation. Failure to timely provide notice results in waiver of claim. Notice of claim by the Contractor and the documentation of the cost of the work by the Engineer shall not be construed as proof or substantiation of the validity of said claim.

**125.02 Final Clean Up:** Upon completion of the work and before acceptance and final payment is made, the Contractor shall clean, remove rubbish and temporary structures, restore in an acceptable manner all property which has been damaged during the prosecution of the work, and leave the site of the work in a neat and presentable condition throughout.

**125.03 Removal of Contractor's Equipment and Materials:** It is understood and agreed that the Contractor is to promptly remove from the project area and other property owned or controlled by the Owner all equipment and material that he places thereon that is not to become the Property of the Owner. It is further understood and agreed that any such equipment and material of all kinds that is not removed as herein provided within thirty (30) days after the date upon which all work to be done under the contract is completed and accepted by the owner or within such longer time as may be agreed upon in writing between the owner and the Contractor shall become the property of the Owner and may be used or otherwise disposed of by the Owner without obligation to the Contractor or to any party to whom he may transfer title.

## 126 Control of Work

**126.01 Conformity with Plans, Specifications and Special Provisions:** All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, profiles, cross sections, dimensions, details, gradations, physical and chemical characteristics of materials in accordance with tolerances shown on the plans or indicated in the specifications and special provisions.

In the event the Engineer finds that the work performed or the materials used are not within reasonably close conformity with the plans, specifications and special provisions, the affected material or product shall be removed and replaced or otherwise satisfactorily corrected by and at the expense of the Contractor.

Any deviations from the plans and approved work drawings will be made only with the approval of the Engineer.



**126.02 Coordination of Plans, Specifications and Special Provisions:** The specifications accompanying plans, special provisions and addendums are essential parts of the contract and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative and to describe and provide for a complete work. In cases of disagreement, figured dimensions shall govern over scaled dimensions, plan shall govern over standard and special specifications, and special provisions shall govern over both standard and special specifications and plans.

**126.03 Cooperation of Contractor:** The Contractor shall have one copy of the plans and specifications available on the project at all times. He shall give the work his constant attention to facilitate the progress thereof and shall cooperate with the Engineer and his representatives in every way possible. The Contractor's Superintendent shall be cooperative, responsible and competent, authorized to receive orders and to act for the Contractor. The Superintendent will be available at all times. In the event a competent superintendent is not available, the Engineer may suspend work until one is available.

**126.04 Deviation from the Plans and Specifications:** No deviation from the requirements of the plans and specifications will be permitted without the express, written approval of the Engineer. The Contractor shall prepare and/or assemble a detailed description of each proposed deviation from the plans and specifications. The description of each proposed deviation shall include, but not be limited to, drawings indicating horizontal and vertical details of all structural, mechanical and electrical elements of the proposed deviation, manufacturer's detailed performance and construction data for all equipment, detailed descriptive specifications of all piping and valves and all other data, and any information and plans as requested by the Engineer. The copies of the description of each proposed deviation shall be submitted to the Engineer for review.

All deviations from the plans and specifications shall conform to the original defined and implied intent of the plans and specifications.

The Contractor shall be responsible for and assume all costs of all elements of approved deviations including, but not limited to design, preparation of plans, procurement of materials and equipment, construction, installation and instigation of service. If the completed improvements of each deviation do not fulfill, provide, and meet the defined and implied intent of the plans and specifications, the Contractor shall provide labor, materials and equipment as required to modify the work to the satisfaction of the Engineer.

**126.05 Interpretation of the Contract Documents:** The apparent silence of the specifications and plans as to any detail or the apparent omission from them of a detailed description concerning any point shall be regarded as meaning that only the best general practice is to prevail and that only first-quality material and good workmanship are to be used.

The Contractor shall take no advantage of any errors or omissions in the specifications and plans or of any discrepancies in or between them and where such errors, omissions or discrepancies occur, the Contractor will be governed by the apparent intent of the specifications and plans and by orders of the Engineer. Work performed by the



Contractor as a result of an error or omission in the plans and specifications when such error or omission is not called to the attention of the Engineer shall be at the Contractor's risk.

**126.06 Shop Drawings, Product Data, Samples and Submittals:** After checking and verifying all field measurements, the Contractor shall approve in writing and submit with reasonable promptness and in such sequence as to cause no delay in the work or in the work of the Owner or any separate contractor, all shop drawings, product data and samples required to be reviewed or tested by the Engineer.

By approving and submitting shop drawings, product data, and samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto meet the requirements of the work and that he is satisfied they conform to the contract documents.

All required shop drawings, product data and samples shall be furnished to the Engineer for his review and any required testing before any of the work or related work is performed. Products or material ordered prior to the Engineer's review and completion of any testing will be at Contractor's own risk. Provide a full electronic version or three (3) hardcopies for review.

The Engineer will review all shop drawings, product data and samples and conduct such tests and will provide approval or denial in ten (10) working days after receipt.

Where contents of submitted literature from manufacturers include data not pertinent to the submittal, the Contractor shall clearly indicate which portion of the contents is being submitted for the Engineer's review.

The Contractor shall direct specific attention in writing on resubmitted shop drawings, product data, or samples to revisions other than those requested by Engineer on previous submittals.

The Contractor shall direct specific attention in writing to each deviation from the contract documents and state any trades, dimensions, functions, or other aspects of the work that will be affected by the proposed change. It is understood that any deviation will be made at no additional cost to the Owner and there will be no extension of the contract time for such deviation.

The Contractor is responsible for the design of any construction changes resulting from any such deviation, for dimensions which shall be confirmed and coordinated at the job site, for fabrication processes and techniques of construction for coordination of the work with that of all trades and for complete installation which will function as originally specified.

The Engineer will, upon completion of the review, return one copy of all shop drawings, product data, and one sample to the Contractor, and the Contractor will maintain them together with other submittals and the contract documents in good order and available to the Engineer and his representatives at the construction site.



The contract sum shall include the cost of furnishing all shop drawings, product data, and samples, and the Contractor will be allowed no extra compensation for such drawings, product data, or samples.

The review by the Engineer of any shop drawings, product data, samples, or other submittals is only for conformance with the general design concept of the project and does not extend to consideration of structural integrity, safety, detailed compliance with contract requirements or any other obligation of the Contractor. Any action shown is subject to the requirements of the plans and specifications. The Contractor is responsible for confirming and correlating all dimensions, fabricating and construction techniques, coordinating his work with that of all other trades, and the satisfactory performance of his entire work in strict accordance with the contract documents. The review is undertaken solely to satisfy the Engineer's obligations to the Owner and does not relieve the Contractor from his obligation to perform fully all contract requirements, nor shall such review give rise to any right of action or suit in favor of the Contractor or third persons against the Engineer or the Owner.

**126.07 Quality of Equipment and Materials:** In order to establish standards of quality, the Engineer may have referred in detailed specifications to certain products by name and catalog number. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers. The word "or approved equal" shall be considered following all such listings regardless of whether they so appear.

The Contractor shall furnish to the Engineer the complete list of proposed desired substitutions in sufficient time prior to their use to give the Engineer adequate time for his review, together with such engineering and catalog data as the Engineer may require. Failure on the part of the Contractor to supply data to the Engineer prior to ordering or using such alternate material or equipment will not relieve the Contractor of furnishing acceptable material or equipment as required by the Engineer.

The Contractor shall abide by the Engineer's judgment when proposed substitute materials or items of equipment are judged to be unacceptable and shall furnish the specified material or item of equipment in such cases. All proposals for substitutions shall be submitted in writing by the Contractor and not by individual trades or material suppliers. The Engineer will review proposed substitutions within a reasonable time after submission and no substitutions shall be used unless the substitution is accepted in writing.

Any review or acceptance of substitution does not relieve the Contractor from his obligation to perform fully all contract requirements, nor does it give rise to any right of action or suit by Contractor or third persons against owner or Engineer.

**126.08 Cooperation with other Contractors:** The Contractor shall conduct his operations so as to interfere as little as possible with those of other contractors or subcontractors on or near the work. It is expressly understood that the Owner has the right and may award other contracts in connection with the work so long as it does not unreasonably interfere with the work under this contract.



Where one contractor's operations are within the limits or adjoin the operations of another contractor, each shall be responsible to the other for any damage, injury, loss or expense which may be suffered on account of interference of operations, neglect, or failure to finish work at the proper time or of any other cause.

**126.09 Information Regarding Work:** The Contractor shall furnish the Engineer every reasonable facility necessary for obtaining such information as he may desire regarding the nature and quality of materials to be used and the progress and manner of the work.

The Engineer shall be allowed access at all times to the books and records of the Contractor and the Contractor shall furnish him all data necessary for the determination of the actual cost of all or any part of the work.

**126.10 Notice to Contractors:** Any written notice to the Contractor which may be required by law or by the provisions of the contract documents may be served on the Contractor or his representative, either personally or by mailing to the address given in the contract or by leaving it at such address.

**126.11 Notice by Contractors:** Wherever in the contract documents the Contractor is required to notify the Engineer for any reason, it shall be understood that such notification is to be made in writing, delivered to the Engineer or his representative in person, or mailed to the office of the Engineer at the address given in "Notice to Proceed."

**126.12 Surveys:** The Engineer shall furnish the Contractor with available benchmark and horizontal control data, principal lines, grades, and measurements necessary for the proper prosecution of the work unless otherwise specified in the Technical Specifications or Construction Plans. From benchmarks and horizontal control data furnished by Engineer, the Contractor shall stake out work, establish elevations, and assume responsibility for correctness of installation as to location and grade.

During the prosecution of the work, the Contractor shall make all necessary measurements to prevent misfitting and shall be responsible for the accurate construction of the work.

**126.13 Inspection:** The Engineer or his representatives shall be allowed access to all parts of the work at all times and shall be furnished every reasonable facility for ascertaining whether the work as performed is in accordance with the requirements and intent of the plans and specifications. The Contractor shall cut and replace with new materials at his own expense such samples as are customarily required for testing purposes. If the Engineer requests it, the Contractor shall at any time before acceptance of the work, remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing and the replacing of the covering or the making good of parts removed shall be at the Owner's expense. Owner will in any event retain all samples required for the inspection.





**126.14 Unauthorized and Defective Work:** Any defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist during construction or after final acceptance, shall be removed immediately and replaced by work and materials which shall conform to the contract documents or shall be remedied otherwise in an acceptable manner authorized by the Engineer. These provisions shall have full effect regardless of the fact that the defective work may have been done or the defective materials used with the full knowledge of the inspector. The fact that the owner may have previously overlooked such defective work shall not constitute an acceptance of any part of it. Work done contrary to or regardless of the instructions of the Engineer, work done beyond the requirements of the contract documents or any extra or additional work done without authority will be considered as unauthorized and will not be paid for by the Owner. Work so done may be ordered removed or replaced at the Contractor's expense.

**126.15 Non-Waiver:** No act or omission by Owner shall constitute waiver or estoppel of Owner's right to enforce any provision of this Contract.

**126.16 Remedies Cumulative:** No provision hereof is in lieu of any warranty implied by law. No provision hereof is in lieu or any remedy provided by law. All warranties and remedies are cumulative, and resort to one by Owner shall not be an election over others.

**126.17 Final Inspection:** Unless otherwise required, the Engineer shall make final inspection of the work included in the contract within a reasonable time after written notification by the Contractor that the work is completed. If the work is approved by the Engineer after inspection, he shall advise the Contractor in writing that the work is completed. If the work is not approved by the Engineer after inspection, he shall advise the Contractor in writing as to the particular defects to be remedied before final approval and recommendation for acceptance can be made to the Owner.

## **127 Control of Materials**

**127.01 Materials:** Only materials conforming to the contract documents shall be used in the work. Materials which for any reason become unsuitable for use shall be rejected and not used.

**127.02 Test of Materials:** All tests of materials shall be made in accordance with approved methods as described and designated in the technical specifications. When tests of materials are required, such test shall be made by a testing laboratory approved by the Engineer and at the expense of the Contractor. The Contractor shall provide such facilities as may be required for collecting and forwarding samples and shall hold materials represented by the samples until tests have been made and the materials found equal to the requirements of the specifications.

In the absence of any definite specification or reference to a specification in the technical provisions or in the special provisions for the particular project involved, it shall be understood that such materials and tests shall meet the specifications and requirements of the American Society for Testing Materials. Unless otherwise specified, all tests of



materials shall be made in accordance with the methods prescribed by the American Society for Testing materials.

Upon completion of a laboratory testing of materials as specified above, the results of the tests made therein shall be used as a basis for acceptance or rejection in accordance with the specifications for the particular material. Contractor will retain all materials tested.

**127.03 Storage of Materials:** Materials shall be stored in such manner as to insure the preservation of their quality and fitness for use. Suitable sheds, platforms, and covers shall be provided when necessary to protect materials and the materials shall be stored in such manner as to facilitate inspection.

**127.04 Defective Materials:** All materials not conforming to the requirements of the contract documents shall be considered defective. Upon failure on the part of the Contractor to remove, repair, or replace defective material when so ordered by the Engineer, the Owner shall have authority to remove, repair, or replace such defective material and to deduct all costs so incurred from any monies due or to become due the Contractor. Defective material not permitted for use shall be immediately removed from the site or disposed of as directed by the Engineer.

**127.05 Ordering Materials:** The Contractor is cautioned against placing orders for full quantities of materials until the work has advanced to a state permitting the determination of the exact quantities required. Estimates of quantities of materials furnished by the Engineer are understood to be approximate only and unless otherwise specified, the Owner will in no way be responsible for any materials in excess of actual requirements. The Owner will not be responsible for any increased costs or extra expense that the Contractor may have on account of materials or work not being ordered at some earlier date.

**127.06 Materials and Equipment Furnished by Owner:** Only materials and equipment specifically indicated in the contract documents shall be furnished by the owner. The fact that the Owner is to furnish materials or equipment is conclusive evidence of its acceptability for the purpose intended and the Contractor may continue to use it until otherwise directed. Unless otherwise noted or specifically stated, materials or equipment furnished by the Owner which are not of local origin are considered to be f.o.b. the nearest freight station. The Contractor shall be prepared to unload and properly protect all such materials and equipment from damage or loss. Contractor will examine the materials or equipment immediately after delivery or upon commencement of Contractor's performance, whichever is later, and advise Owner of any defects. Failure of the Contractor to so examine or advise Owner of any defects will relieve Owner of any responsibility for defects. The Contractor shall be responsible for material or equipment loss or damage after receipt at the point of delivery.

**127.07 Manufacturer Directions:** Manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer and must be approved by the Engineer as required by the technical provisions.





## 128 Prosecution and Progress

**128.01 Prosecution of Work:** From the time of commencement of the work to the time of completion, the work shall be prosecuted as vigorously and as continuously as possible and always in accordance with a schedule which will insure completion within the specified time limit. There shall be no voluntary shutdown or slowing of operations without prior approval of the Engineer.

If it appears to the Engineer that the rate of progress being made is not such as will insure the completion of the work within the specified time limit, it shall be within the authority of Owner upon notification by Engineer to require contractor to provide additional equipment and men to take such other steps as may be necessary to insure completion as specified.

**128.02 Subletting or Assignment of Contract:** The Contractor agrees not to assign, transfer, convey or otherwise dispose of the contract or his right, title, or interest, therein either in whole or in part, or his power to execute such contract to any other person, firm or corporation, or to subcontract any part of the work without the previous consent in writing of the Owner.

It is understood and agreed that if any part of the work to be done under the contract is subcontracted, the subcontracting shall be done in accordance with, and the Contractor shall be bound by, the following provisions.

All subcontracts shall be in writing and shall provide that all work to be performed thereunder shall be conducted and performed in accordance with the terms of the prime contract. Upon request, certified copies of any or all subcontracts shall be furnished to the Engineer.

In case the work being done or to be done under any subcontract is not conducted in a manner satisfactory to the Engineer, Contractor shall upon written notice to this effect cause such subcontractor to be terminated and the subcontractor and his employees to be removed from the work. Any loss or damage that may be suffered on account of such action shall be borne by the Contractor.

The Contractor agrees that he is as fully responsible to Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them as he is for acts and omissions of his own employees. Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the Owner.

Insofar as is practical, the Contractor shall make payment for subcontract work in the same units and on the same basis of measurement as apply under the prime contract. The Owner will not be responsible for loss resulting from Contractor's failure to do so. In making payments to subcontractor, Contractor shall protect himself against possibility of overpayment, and he shall assume such losses as may result from over payment.

The subcontracting of any or all of the work to be done will in no way relieve Contractor of any part of his responsibility under the contract. The Contractor shall have on the



work at all times a qualified and capable superintendent whose duty shall be to direct and coordinate the operations of the subcontractors to make certain orders of the Engineer are complied with. Failure of Contractor to control the work of the subcontractors to the satisfaction of the Engineer will result in the issuance of orders requiring the cancellation of the subcontractors and removal of the subcontractors from the work.

**128.03 Limitations of Operation:** Operations of the various units or portions of the work shall begin at the times and locations approved by the Engineer and shall be prosecuted between such limits as he may establish. No part of the work shall be undertaken without his approval, and no work shall be carried on contrary to his instructions.

In case of a dispute arising between two or more Contractors engaged on the same work as to the respective rights of each under the specifications, the Engineer shall determine the matters at issue and shall define the respective rights of the various interests involved in order to secure the completion of all parts of the work in general harmony with satisfactory results, and his decision shall be final and binding on all parties concerned.

**128.04 Use of Premises:** The Contractor shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the Engineer and shall not unreasonably encumber the premises with his materials.

The Contractor shall not load or permit any part of a structure which he is constructing under this contract to be loaded with a weight that will endanger its safety, and he shall not use any such structure for any purpose except as provided in the contract documents.

**128.05 Protection of Work and Property:** The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury or loss arising in connection with this contract. He shall adequately protect adjacent property as provided by law and these contract documents.

The Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the work, all necessary safeguards for the protection of workmen and the public and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways and falling materials; and he shall designate a responsible member of his organization whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported to the Engineer by the Contractor.

In an emergency affecting the safety of life or of the work or of adjoining property, the Contractor, without special instruction or authorization from the Engineer or Owner, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury and he shall so act without appeal if so instructed or authorized. Any compensation claimed by Contractor on account of emergency work shall be determined by negotiation or as a claim for extra compensation.



**128.06 Workmen and Equipment:** The Contractor shall employ only competent and efficient laborers, mechanics, or artisans, and whenever in the opinion of the Engineer any employee is or becomes unsatisfactory for the work assigned to the employee the Contractor shall upon request of the Engineer remove him from the work and not employ him again upon it.

The methods, equipment and appliances used and the quantity and quality of the personnel employed on the work shall be such as will produce a satisfactory quality of work and shall be adequate to complete the contract within the time limit specified.

**128.07 Time and Completion of Work:** At the Engineer's request, Contractor shall, before commencing any work, prepare and furnish an estimated progress schedule for the entire project.

**128.08 Termination of Contract by Owner:** If the Contractor should be adjudged bankrupt or if he should make a general assignment for the benefit of his creditors or if a receiver should be appointed on account of his insolvency or if he should persistently or repeatedly refuse or should fail to supply enough properly skilled workmen or proper materials for the efficient prosecution of the project or if he should fail to make prompt payment to subcontractors or for material or persistently disregard the laws, ordinances, or the instruction of the Engineer, or otherwise fail to comply with any provision of the contract, then the Owner, upon the certificate of the Engineer that, in his opinion, sufficient cause exists to justify such action, may without prejudice to any other right or remedy and after giving the Contractor and his surety seven (7) days written notice, terminate the Contractor and take possession of the premises, or any part thereof, and of all materials, tools, equipment, machinery, and appliances thereon and finish the work, or any part thereof, by whatever method it may deem expedient.

Neither by the taking over of all or any portion of the work nor by its completion in accordance with the terms of this provision shall the Owner forfeit its right to recover damages from Contractor or from Contractor's surety for failure to complete or for delay in such completion. Should the expense incurred by Owner in taking over and completing any or all of the work, including without limitation any additional administrative or engineer expense, be less than the sum that would have become payable under this agreement if the work had been completed by the Contractor, then Contractor shall be entitled to the difference with no interest, and should such expense exceed the said sum, then Contractor and Contractor's surety shall be liable to the Owner for the amount of such excess. Upon the taking over of the work by Owner as herein provided for, no further payment will be made to Contractor until the work is completed, and any monies due or that may become due contractor under this agreement may be withheld and applied by Owner to payments for labor, materials, supplies and equipment used in the prosecution of the work, and/or for the payment or rental charges on equipment used therein, or to the payment of any excess cost to Owner incurred in completing the work. The election by owner to take over any of the work shall not constitute Owner's sole remedy, but rather Owner reserves all other remedies at law or in equity upon default or breach of contract.

The Contractor and its surety shall likewise be liable for any expenses incurred by Owner in assisting Contractor to complete the contract.



**128.09 Right of the Owner to Do Work:** If Contractor should neglect to prosecute the work properly or fail to perform any provision of the contract, Owner after three (3) days written notice to Contractor may without prejudice to any other remedy it may have, make good such deficiencies and deduct the cost thereof from the payment then or thereafter due Contractor.

**128.10 Owner's Right to Terminate Contract:** The Owner reserves the right to terminate this contract for any such reason in its discretion considered to be in the public interest or if it is suspended by an order of any public agency. In the event of such termination, the amount to be paid to Contractor shall be determined by contract price in the case of any fully completed separate item or portion of the work for which there is a separate or unit price and, in respect to any other work, a percentage of the contract price equal to the percentage of the work completed as determined by Engineer.

**128.11 Venue and Attorney's Fee:** In the event there is any dispute between the parties arising out of this agreement, venue shall be in Maverick County, Texas.

**128.12 Temporary Suspension of Work:** The Engineer will have authority to suspend the work, wholly or in part, for such period as he may consider necessary, and the "Time Change" will be suspended during such period. Notice of such suspension with the reasons there will be given the Contractor in writing.

## **129 Measurement and Payment**

**129.01 Methods of Measurement and Computation:** All work completed under the contract shall be measured by Engineer according to United States standard measures.

The methods of measurement and computation to be used in the determination of the quantities of materials furnished and the quantities of work performed under the contract shall be the methods outlined in the contract documents or by those methods generally recognized as good engineering practice which in the opinion of Engineer give the greatest accuracy consistent with practicable application.

**129.02 Scope of Payment:** The Contractor shall accept the compensation as provided in full payment for furnishing all materials, labor, tools and equipment and for performing all work under the contract, and for all loss, damage, or liability arising from any unforeseen difficulties which may be encountered during the prosecution of the work until its final acceptance by Owner.

**129.03 Payment Retainage:** Ten Percent (10%) retainage will be withheld from each payment request. All retainage will be paid at completion and acceptance of the project.

**129.04 Payment for Materials on Omitted Items:** Acceptable materials ordered by Contractor or delivered on the work prior to the date of cancellation or suspension of the work by order of Owner may be purchased from the Contractor by Owner at actual cost and thereupon become the property of the Owner.



**129.05 Progress Payments:** At a regular period each month, Engineer shall make an estimate of the amount of work completed and of the value of such completed work based on a request submitted by the Contractor. He shall also make an estimate of the amount and value of acceptable material to be incorporated in the completed work which has been delivered and properly stored at or near the site or at an acceptable location to the Engineer. With these estimates as a base, a progress payment shall be made to Contractor.

The Engineer may withhold, or on account of subsequently discovered evidence, nullify the whole or part of any payment certificate to such extent as may be deemed necessary to protect Owner from loss on account of:

- a. Defective work not remedied.
- b. Claims filed or reasonable evidence indicating probable filing of claims.
- c. Failure of Contractor to make payments properly to subcontractors or for materials or labor.
- d. A reasonable doubt in the opinion of the Engineer that the contract can be completed for the balance then underpaid.
- e. Damage to another Contractor.
- f. Reasonable indication that the work will not be completed within contract time.
- g. Unsatisfactory prosecution of the work by Contractor.
- h. Failure of Contractor to comply with any other order of Engineer made in accordance with the contract documents.

Progress payments shall not be construed as an acceptance or approval of any part of the work covered thereby, and shall in no manner relieve Contractor of responsibility for defective workmanship or material.

The estimates upon which progress payments are based are not represented to be accurate estimates, and all quantities shown therein are subject to correction in the final estimate. If Contractor uses such estimates as a basis for making payments to subcontractors, he does so at his own risk and he shall bear all loss that may result.

The making of progress payments under the contract either before or after the date set for completion of the work shall not operate to invalidate any of the provisions of the contract or to release the surety.

At the time payment is made for any materials which have been stored at or near the site, the ownership of such materials shall be vested in Owner, and they shall remain in storage until used on the work. Such materials shall not be used on other work. The risk of damage or loss of materials due to disappearances, theft, casualty, or other, shall be upon the Contractor.

**129.06 Final Estimate:** As soon as the complete project has passed inspection by the Engineer, he will so notify Owner and Contractor in writing. The Engineer will then prepare the final estimate and recommend acceptance. Upon acceptance of the completed project and the final estimate by Owner, Contractor will be paid an amount such as will make the total payments equal to the final total contract price less than



retained percentage. This payment will be made at the same time in the month and in the same manner as provided for monthly estimates.

The Contractor will be entitled to payment of the retainage thirty (30) days after acceptance of the work. The Owner may retain such sums as necessary for all incomplete or defective work or unsettled claims of owner or third parties against Contractor. As a condition of payment, Owner may require sufficient evidence that all indebtedness of Contractor connected with the work has been paid and may require releases on waivers or liens in a form satisfactory to Owner from all parties performing the work.

**129.08 Guarantee and Correction of Work After Final Payment:** Neither the final certificate nor payment nor any provision in the contract documents shall relieve the Contractor of responsibility for faulty materials or workmanship.

**129.09 Payments:** Payments under the contract shall be paid by check by Owner unless otherwise provided by the contract documents.

**129.10 Certificate of Compliance:** No final payment of the retained percentage shall be made until Contractor files with Owner following acceptance of the work a Certification of Compliance in form substantially as follows:

I (we) hereby certify that all work has been performed and materials supplied in accordance with the plans, specifications and contract documents for the above work that:

- a. There have been no unauthorized substitutions of subcontractors, and no subcontracts been entered into without the names of the subcontractors having been submitted to the Engineer prior to the start of such subcontracted work.
- b. No subcontract was assigned or transferred or performed by any subcontractor other than the original subcontractor without prior notice having been submitted to Engineer together with the names of all subcontractors.
- c. All claims for material and labor and other service performed in connection with these specifications have been paid.

## **130 Technical Specifications**

### **131 General Information**

**131.01 References:** The Technical Specifications are interpreted to require that Contractor shall provide all items, articles, materials, operation or methods listed, mentioned, or scheduled either on Plans or specified herein, or both, including all labor, materials, equipment, and incidentals necessary and required for their completion.

All references to standard Technical Specifications or manufacturer's installation directions shall mean the latest edition thereof.





Reference to technical society, organization, or body is made in Technical Specifications in accordance with following abbreviations:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute (Formerly ASA)
API	American Petroleum institute
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Waterworks Association
FA	Federal Specifications
ICC	International Code Council
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PTI	Post-Tensioning Institute
SSPC	Steel Structures Painting Council
TCEQ	Texas Commission on Environmental Quality
UL	Underwriters' Laboratories

Some Technical Specification items cover construction requirements and materials in comprehensive manner, and only pertinent portions of these items apply.

**131.02 Operation and Maintenance Manuals:** Operation and maintenance manuals are to be provided where required by Specification Item.

Contractor to be responsible for obtaining installation, operation, and maintenance manuals from manufacturers and suppliers for equipment furnished under the contract. Submit three copies of each complete manual to the Engineer within 90 days after approval of shop drawings, product data, and samples, and not later than the date of shipment of each item of equipment to the project site or storage location.

Operations and maintenance manuals specified hereinafter are in addition to any operation, maintenance, or installation instructions required by the Contractor to install, test, and start up equipment.

Each manual shall be bound in a folder and labeled to identify the contents and project to which it applies.

The manual to contain the following:



1. An 8 ½ -inch x 11-inch typewritten sheet listing the manufacturer's identification, including order number, model and serial number and location of parts and service centers.
2. A separate 8 ½ -inch x 11-inch typewritten list of recommended stock of parts, including part number and quantity.
3. Complete replacement parts list.
4. Performance data and rating tables.
5. Specific instructions for installation, operation, adjustment, and maintenance.

**131.03 Guarantees:** Guarantee work, including equipment installed, to be free from defects due to faulty workmanship or materials for period of eighteen (18) months from date of issue of Certificate of Acceptance. Upon notice from Owner, repair defects in all construction which develop during specified period at no cost to Owner. Neither final acceptance nor final payment nor any provision in Contract Documents relieves Contractor of above guarantee. Notice of observed defects will be given with reasonable promptness. Failure to repair or replace defect upon notice entitles Owner to repair or replace, same and recover reasonable cost thereof from Contractor and/or his Surety.

**131.04 Interruption of Utility Services:** Operate no valve or other control on existing systems. Exercise care in performing work so as not to interrupt service. Locate and uncover existing utilities ahead of heavy excavation equipment. At house connections, either lift trenching machine over lines or cut and reconnect with minimum interruption of services, as approved.

**131.05 Protective Traffic Measures:** Where construction creates hazard to traffic or public safety, furnish, and maintain suitable barricades, warning signs, and lights. Remove same when no longer necessary.

1. Remove, as soon as practicable, accumulated rubbish and open each block for public use. Use of any portion of street shall not constitute acceptance of any portion of work. Backfill and shape trenches across street intersections or driveways for safe traffic at night, or where permitted, span open trenches with steel plates or bridges to permit traffic flow. When driveways are cut, immediate placement of plates for ingress or egress of vehicles may be directed if undue hardship to property owner would otherwise result.
2. Except where approved otherwise, do not hinder or inconvenience travel on streets or intersecting alleys for more than two blocks at any one time. Whenever street is closed, place properly worded sign announcing fact to public, with proper barricades at nearest street corners, on both sides of obstruction. Leave no street or driveway blocked at night.
3. When street is to be closed, notify Fire Department and Police Department in advance.
4. Do not block ditches, inlets, fire hydrants, etc., and, where necessary, provide temporary drainage.





5. Comply & obtain the permit that is discussed in Chapter 22 of the Code of Ordinances for the City of Eagle Pass.

## **140 Legal Relations and Responsibility to the Public**

### **141 Responsibilities**

**141.01 General:** Contractor shall, at his own expense, comply with all applicable federal, state, and local laws, regulations, and standards including without limitation those governing labor, safety, health, and sanitation.

**141.02 Permits and Licenses:** The Contractor shall produce all permits and licenses and give all notices necessary and incident to the due and lawful prosecution of the work. The Eagle Pass Water Works System may waive all permit and connection fees.

**141.03 Safety and Convenience:** The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Any review by the Engineer of the Contractor's performance does not, and is not intended to, include review of the adequacy of the Contractor's safety measures in, on or near the construction site.

The Contractor shall at all times so conduct his work as to insure the least possible obstruction to traffic. The convenience of the general public and the protection of persons and property are of prime importance and shall be provided for by the Contractor in an adequate and satisfactory manner.

The Contractor shall conduct the work so as to cause a minimum of inconvenience to traffic at intersections and connecting streets and to persons operating commercial enterprises or residing along the route of work. Entrances to residences, garages, service stations, business places and driveways of all kinds shall not be blocked for more than a few hours, if at all. Satisfactory means of ingress and egress for persons residing or transacting business along the route of the work shall be maintained all times. The Contractor shall not work before 7:00 a.m. or after 6:00 p.m. without written permission of the Engineer.

Adequate sanitary conveniences for the use of persons employed on the work properly secluded from public observation shall be constructed and maintained by the Contractor in such a manner and at such points as shall be approved by the Engineer. These conveniences shall be maintained at all times without nuisance and their use shall be enforced. Upon completion of the work, they shall be removed from the premises, leaving all clean and free of nuisance.

**141.04 Barricades, Warning Signs and Flagmen:** The Contractor shall at his expense and without further or other order provide, erect, and maintain at all times during the progress or temporary suspension of the work suitable barricades, fences, signs or other adequate warnings or protection, and shall provide, keep and maintain such danger lights, signals, and flagmen as may be necessary to insure the safety of the public as well as those engaged in connection with the work. All barricades and obstructions shall be



protected at night by signal lights which shall be suitably distributed across the roadway and which shall be kept burning from sunset to sunrise. The Contractor shall provide all barricades and the placement of all barricades shall meet the requirements as provided within Part VI, Texas Manual on Uniform Traffic Control Device for Streets and Highways.

Failure of the Engineer to notify the Contractor to maintain barriers, lights, signals or flagmen shall not relieve the Contractor from this responsibility. The Contractor will be required, at the request of the Engineer, to produce a Traffic Control plan and submit this to the Engineer for approval.

All traffic control devices and procedures used by the Contractor in controlling, directing, and safeguarding traffic shall conform to the requirements of the "Texas Manual on Uniform Traffic Control Devices".

The Contractor's responsibility for safeguarding of traffic as specified above shall cease when the work included in the contract is completed and accepted by the Owner.

**141.05 Fences:** By the construction of temporary fences or by other adequate means, the Contractor shall restrain stock from leaving the lands wherein they are confined, or from trespassing which would be made possible, or which might result from, the removal or destruction of existing fences or the carrying out of any part of the work under the contract. The Contractor shall be responsible for all loss, injury or damage that may result from his failure to restrain stock as above provided. The expense for erecting and maintaining temporary fences and for otherwise providing for the restraint of stock shall be borne by the Contractor.

**141.06 Safeguarding of Excavations:** The Contractor shall provide such safeguards and protections around and in the vicinity of excavations as may be necessary to prevent and avoid the occurrence of damage, loss, injury and death to property and persons because of such excavations. Liability for such damage, loss, injury, or death shall rest with the Contractor.

**141.07 Use of Explosives:** No explosives shall be used for any purpose on work unless authorized by City officials or representative.

If the use of explosives is granted, the Contractor must comply with all Federal, State and local laws, and the owner and Engineer will in no way be responsible for damages to property or injury to persons resulting from the use, storage of explosive or explosions.

**141.08 Trespass:** The Contractor will be solely responsible for any trespass upon adjacent property or injury thereto resulting from or in connection with his operations. He will be liable for any claims that may be made on account of trespass or the deposit of debris of any kind upon private property.

**141.09 Protection of Property and Persons:** In the performance of the work to be done under the contract, the Contractor shall use every reasonable and practical means to avoid damage to property, injury to persons and loss, expense, inconvenience, and delay to property owner, users of streets or highways and others. He shall provide protective



devices and flagmen wherever and whenever needed in affording this protection and in the performance of the work, and shall use no means or methods which will unnecessarily endanger either persons or property.

At points where the Contractor's operations are adjacent to properties of railway, telegraph, telecommunication, water, gas or other pipeline or utility companies, or are adjacent to other property, work shall not be commenced until all arrangements necessary for the protection of the interests of the owner as well as any interest that a third party may have therein, have been made.

All utility companies shall be advised by the Contractor of the work proposed under this Contract and of the necessary adjustments to their respective installations. The Contractor shall communicate with all utility companies at least three (3) days in advance before commencing any work in areas where utilities are located.

The Contractor shall be on the alert for any additional utilities which he may encounter in the course of the operations. If additional utilities are discovered, the Contractor shall immediately take steps to protect the utility and notify the Engineer and the utility owner.

In case of damage to any utilities by the Contractor, either above or below the ground, the Contractor shall restore such utilities to a condition equal to that existing before the damage was done. Any and all costs incurred for such restoration shall be borne entirely by the Contractor.

The Contractor shall take into consideration the adjustments of installations by public utilities in areas within the limits of the contract in preparing his proposal. No additional compensation will be allowed for work interruptions, changes in handling, excavation, drainage and paving, changes in types of equipment used, etc. caused by others performing work within the limits of the contract.

**141.10 Restoration of Damaged Property:** All damage and injury to property that may be caused by or that may result from the carrying out of the work to be done under the subcontractors, or his employees, shall promptly be made good by the Contractor either by the repairing, rebuilding, or replacing of the property damaged or in some other manner satisfactory to the Owner of such property. In case of failure on the part of the Contractor to promptly and satisfactorily make good damage or injury, the Owner may without notice to the Contractor proceed to repair, rebuild or replace such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under the contract.

In applying the provisions above stated, the repairing, rebuilding or replacing of damaged property shall be understood to include the providing of any temporary facilities that may be needed to maintain normal service until the required repairing, rebuilding or replacing is accomplished.

**141.11 Contractor's Responsibility for Work:** Until final acceptance of the contract, the Contractor will be responsible for any injury or damage to the work or any part thereof or to materials, equipment, or supplies due to any cause whatsoever, and he shall make good at his own expense all such injuries or damages.



**141.12 No Personal Liability of Engineer:** The exercise of all responsibility, power and authority by Engineer or his representative is undertaken solely to satisfy Engineer's obligation to Owner. It shall not give rise to any claim against nor impose liability to Engineer or his representatives in favor of Contractor or third persons for any reason whatsoever and Contractor agrees that any remedy he has arising in connection with Engineer's performance hereunder, whether neglect or otherwise, is against Owner and not Engineer.

**141.13 No Waiver of Legal Rights:** The Owner shall not be precluded by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work and payment therefore from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate or certificate is untrue or incorrectly made, or that the work or materials do not conform in fact to the contract. The Owner shall not be precluded, notwithstanding any such measurement, estimate or certificate, and payment in accordance therewith, from recovering from the Contractor and his sureties such damages as the Owner may sustain by reason of the Contractor's failure to comply with the terms of the contract or of any power herein reserved or any right to damages herein provided.



## **200 Water Specifications**

### **210 Design Criteria for Water Distribution**

#### **211 General Information**

These design criteria are minimum requirements to be used in the design of water distribution systems within the jurisdiction of the City of Eagle Pass Water Works System, herein after referred to as EPWWS. The jurisdiction of the EPWWS is defined as the area bound by the Certificate of Convenience and Necessity (CCN). In all cases, the Texas Commission on Environment Quality's (TCEQ) design criteria for water distributions systems shall be enforced as the minimum design criteria for use in the City of Eagle Pass. Fire flows shall meet the required flows and corresponding residual pressures as specified by the local governing Fire Code. The following design criteria will be supplemented by the TCEQ design criteria. Water distribution work shall conform to the current edition of the International Plumbing Code (IPC) where indicated or necessary as adopted by the City of Eagle Pass. Engineered plans must be submitted to the Owner/Engineer for review, comment, and approval prior to construction.

##### **211.01 General Design Criteria**

- A. Hazen-Williams Friction Coefficient,  $C = 120$
  - B. Average day demand, single family residence, = 165 gal/capita/day
  - C. Peak day demand = 500 gal/capita/day
  - D. Peak hour demand = 750 gal/capita/day
- \*\*Commercial, industrial, multi-family demand vary greatly due to the type of facility, number of fixture units and occupancy numbers therefore calculations shall be done to provide an average day demand per facility type. Typical rates for water uses can be used for estimation but demand shall be based on the factors above. TCEQ regulations shall be consulted for guidance on calculation average day demand for residential, commercial, industrial, multi-family, etc.

##### **211.02 Peak Hour Demand**

- A. Maximum velocity in distribution system = 5 fps
- B. Minimum pressure at any point of entire network must be not less than 35 psi.

##### **211.03 Emergency Demand (Fire Flow)**

- A. Maximum velocity in distribution system = 10 fps
- B. Fire flow – Residential
  - 1 & 2 family dwellings where distance between homes is more than 31 feet apart = 750 gpm
  - Where distance between homes is 11-30 feet = 1000 gpm
  - Where distance between homes is 10 or less feet = 1500 gpm
  - Minimum industrial/commercial = 1,000 gpm
- C. Minimum residual pressure during fire flow shall not be less than 20 psi for both Residential and Commercial/Industrial.

#### **212 Design Criteria – Mains**

**212.01 Size:** Size of mains shall conform to the Eagle Pass Water Master Plan. Minimum size of mains shall be 8" unless otherwise approved by the Owner/Engineer.



Mains size shall be larger than 8" if the necessary to accommodate the flow needed for fire protection, peak hour demand or high-density land usage exceeds the capacity of the minimum main size.

**212.02 Layout:** Water distributions system layout should be designed with consideration for general system gridding, future transmission mains, and other developments nearby. All lines over 300 feet in length shall be looped; non-looped mains must be approved by the Owner/Engineer. In the case of a non-looped main, a 2" blowoff valve or fire hydrant shall be placed at the end of main. See Appendix *Detail 1.A – 2" & 4" Permanent Blow-off Assemblies and Detail 1.B – 4" In-Line Permanent Blow-off Assembly Details* for additional information. Water mains that cross rivers and creeks shall either be affixed to the underside of a bridge as approved by the Owner/Engineer or in most cases be constructed by bore with steel encasement or as approved by the Owner/Engineer.

**212.03 Cover:** Water mains shall have a minimum of 36" cover, minimum 48" of cover in paved areas and 60" cover maximum between the top of the pipe and the finished grade. Water transmission lines shall have a minimum 72" minimum cover from finished grade to top of pipe.

**212.04 Location:** Water mains should be located in easement or within right-of-way where maintenance can be accomplished with the least interference with traffic, structures, and other utilities. For residential streets mains are to be generally located as shown in *Detail 2 – Typical Utility Placement Section* in the Appendix section of this document. The minimum easement width for water lines that are not in the Right of Way is twenty feet (20'). The separation between water and wastewater mains shall comply with Section 500 and TCEQ regulation 30 TAC §290.44.e .

**212.05 Pipe:** Main piping materials shall be C-900, DR-18 for pipe 12" diameter or less; for 14" diameter pipe or greater shall be C-905, DR-18. Ductile Iron shall be used on all Fire hydrant services.

**212.06 Backflow Prevention Devices:** No water connection from any public drinking water supply system shall be made to any establishment where an actual or potential contamination or system hazard exists without an air gap separation between the drinking water supply and the source of potential contamination. The containment air gap is sometimes impractical and, instead, reliance must be placed on individual "internal" air gaps or mechanical backflow prevention devices. Under the conditions, additional protection shall be required at the meter in the form of a backflow prevention device (in accordance with AWWA Standards C510 and C511, and AWWA Manual M14) on those establishments handling substances deleterious or hazardous to the public health. Overhead bulk water dispensing stations must be provided with an air gap between the filling outlet hose and the receiving tank to protect against back siphonage and cross-contamination.

**212.07 Valves:** Shall be properly spaced so that no more than one residential block or 30 customers will be without water during main repairs. For lines smaller than 10", typical spacing should be one block in high-density areas and two blocks in residential areas. All large mains, 10" or greater, should be valved off from smaller diameter mains.





There will be a 3-valve system located at all fire hydrants (one of the lead and one on each side of the main where the lead is connected). There shall be 3 valves located at each tee in the main (one for each direction of the tee) and there shall be 4 valves located at each cross in the main (one for each direction of the cross).

**212.08 Air Valves:** Automatic combination air/vacuum and air release valves will be placed at all high points and at vertical points on pipeline where abrupt change occurs.

**212.09 Fire Hydrants:** Shall be installed at the intersection of two streets and between intersections where necessary; at distances not in excess of 300 feet between hydrants in commercial districts and 500 feet in residential. Fire hydrants shall not be installed at the end of cul-de-sacs, but rather at the beginning of the curvature of the cul-de-sac. Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer line, cleanout, or manhole regardless of construction. Fire hydrants shall not be located within sidewalks or within those areas in the development designated for use as a public sidewalk. All pipe must be acceptable without penalty to the Texas Fire Insurance Commission for use in water works supply and distribution.

## **213 Design Criteria – Services**

**213.01 Location:** Water services shall be placed at the lot corner as shown in Detail 3 – Typical Water Service Placement in the Appendix of this document. The Engineer shall ensure that the electric, gas, telephone and cable TV are located on the opposite lot corner from the water service.

**213.02 Service Piping:** Size should be one inch (1”) Type K Copper for all single services and two inch (2”) Type K Copper with sweated or compression fittings (i.e. bending a 2” Copper pipe shall not be allowed) with two-one inch services to serve two residential lots.

Polyethylene tubing should be one inch (1”) SDR-9 (150 psi), CTS, for all single services and two inch (2”) SDR-9 (150 psi), CTS, with “y” branch with two – one inch (1”) polyethylene tubes to serve two residential lots. See Appendix Detail 4 – Single Water Service Detail and Detail 5 – Dual Water Service Details for additional information and construction details.

Commercial lots shall be sized according to land use requirements. All new residential lots with a potable water meter and an irrigation meter shall be served by a single two inch (2”) tap with two-one inch services. The irrigation meter shall have backflow prevention. In cases where irrigation meters are not proposed, but the Owner/Engineer anticipates that irrigation meters will be installed at a later date, the minimum size of the service will be increased to two inches (2”).

**213.03 Cover:** Water Services shall have 36” of cover between the top of the service.

**213.04 Meters:** Water meters for each occupied residential, commercial & industrial lots shall be installed at locations near the corner of the properties, away from all other utility services. Vacant properties shall have a service line installed with a water meter



box and capped for future connection. Each lot shall have an individual meter and services shall not cross lot lines. Each dwelling unit must have an individual meter.

All apartment buildings, condominiums, and other multiple use facilities (e.g. shopping centers, office complexes, etc.), must be plumbed in such a manner as to allow for submetering of the individual dwelling or rental units and individual water meters must be installed.

Manufactured home rental communities and hotels / motels shall contain a single meter to serve entire property and no individual meters shall be installed for each space. Water meters must be from Section 270 Standard Product List.

## **214 Construction Plans**

**214.01 General:** Construction Plans shall include the following:

- A. Plan and profile of the proposed main.
- B. Location and stationing on all water services.
- C. Location and stationing on all fire hydrants.
- D. Location and stationing of all blowoff, air release, and gate valves.
- E. Standard Details
- F. Horizontal scale that allows plans to be legible (or as directed by the Owner/Engineer).

<u>Horizontal</u>	<u>Vertical</u>
1" = 20'	1" = 2 ft
1" = 40'	1" = 4 ft
1" = 50'	1" = 5 ft

Note: 1"=50' maximum horizontal scale

## **220 Materials for Construction**

### **221 General**

The Contractor shall furnish and install all pipes, miscellaneous pipe-fittings, valves, valve boxes and testing in strict accordance with these specifications. All service fittings shall be suitable for use at hydrostatic working pressures up to 175 psi minimum. Testing of new water distribution system shall comply with Section 600 of the Standard Specifications.

### **222 Pipe**

All water mains shall have metallic location tape placed in the last 2 feet of fill of the trench (i.e. 2 feet deep from the final grade). A detector tape shall be laid, in the same trench, above and parallel to the water main. The tape shall state in a minimum of 3-inch tall letters "Caution: Water Pipe Line Buried Below" continuously along the tape. See the details at the end of this section for more information.





#### **222.01 Polyvinyl Chloride Water Pipe:**

- A. General: All polyvinyl chloride (PVC) water pipe shall be of the rigid type and must bear the National Sanitation Foundation seal of approval for potable water pipe. Pipe shall be C-900, DR-18 for 12" diameter or less and C-905, DR-18 for 14" diameter or larger; pipe shall be acceptable with approval from the Owner/Engineer.

Pipe shall have push-on rubber gasket joints of the bell and spigot type with thickened integral bells with rubber gasket joints. Each joint of pipe shall consist of single continuous extrusion; bells or other components attached by solvent welding are not acceptable. The wall thickness of each pipe bell and joint coupling must be greater than the standard pipe barrel thickness. Clearance must be provided in every gasket joint for both lateral pipe deflection and for linear expansion and contraction.

- B. Applicable Specifications: Except as modified or supplemented herein, PVC pipe shall meet the following standards.
1. AWWA C-900, DR 18 for PVC Pressure Pipe, 6, 8 and 12 inch nominal sizes, having Cast Iron Pipe size outside diameters.
  2. AWWA C-905, DR-18 for PVC Pressure Pipe 14 inch nominal sizes or larger, having Cast Iron Pipe size outside diameters
  3. Fittings used with PVC Pressure pipe shall be AWWA C-110 or AWWA C-111 mechanical joint and restraint devices (e.g. Mega Lugs).
  4. All pipe must be approved by Underwriter's Laboratories for use in buried water supply and fire protection systems.
- C. Material Requirements: All pipe and fittings shall be made from clean, virgin, NSF approved, Class 12454B PVC. Clean reworked materials generated from the manufacturer's own production may be used within the current limits of the referenced AWWA C-900 & C-905.
- D. Marking: Permanent marking on each joint of pipe shall include the following at intervals of not more than 5 feet:
1. Nominal pipe size and OD base (e.g., 4 CIPS).
  2. Type of plastic material (e.g., PVC 12454B).
  3. Dimension Ratio and the pressure rating in psi for water at 73° (e.g., DR 18, 150 psi).
  4. AWWA designation with which the pipe complies (e.g., AWWA C-900 or C-905).
  5. Manufacturer's name or code and the National Sanitation Foundation (NSF) mark.

#### **222.02 Ductile Iron Pipe:**

Fire line leads and fire hydrant leads shall be ductile iron. Domestic water services shall not be supplied from fire service leads, unless the domestic and fire connections are on separately valved branches with an approved backflow prevention device in the fire service branch. All fire mains shall be constructed of ductile iron pipe Pressure Class 350 for pipe 12-inch size and smaller.



Iron pipe shall be ductile iron pipe meeting all requirements of standards as follows:

- A. For push-on and mechanical joint pipe: AWWA C-151
- B. For flanged pipe: AWWA C-115. Barrels shall have a nominal thickness required by Table 1 of AWWA C-115. Flanges shall be ductile iron (gray iron is not acceptable); they shall be as shown in ANSI/AWWA C115/A21.15 and shall conform to dimensions shown in Table 2 and Figure 1 of AWWA C115. These flanges are the same in all respects as flanges shown in ANSI/AWWA C110/A21.10 for fittings and are standard for all flanges used with pipe, valve, and equipment units in the EPWWS water distribution systems. Flanges shall be fabricated and attached to the pipe barrels by U.S. fabricators using flanges and pipe barrels of U.S. manufacture. If fabrication is to be by other than the pipe barrel manufacturer, a complete product submittal and approval by the Owner/Engineer will be required. Additionally, such fabricator shall furnish certification that each fabricated joint has been satisfactorily tested hydrostatically at a minimum pressure of 300 psi.
- C. Linings and Coating: Interior surfaces of all iron water pipe shall be cement-mortar lined and seal coated as required by AWWA C104, unless otherwise indicated in the plans. Pipe exteriors shall be coated as required by the applicable pipe specification. The type and brand of interior lining shall be clearly marked on the outside of the pipe and fittings. Except as authorized by the Engineer, only one type and brand of pipe lining shall be used on a given project.

Except as described above for flanged pipe and where not otherwise indicated, ductile iron pipe shall be minimum Class 250 as defined by ANSI/AWWA C150/A21.50; all ductile iron pipe and flanges shall meet the following minimum physical requirements:

Grade 60-42-10:

Minimum tensile strength: 60,000 psi.

Minimum yield strength: 42,000 psi.

Minimum elongation: 10 percent.

The flanges for AWWA C115 pipe may be also be made from:

Grade 70-50-050:

Minimum tensile strength: 70,000 psi.

Minimum yield strength: 50,000 psi.

Minimum elongation: 5 percent.

- D. Markings: Each pipe joint and fitting shall be marked as required by the applicable AWWA specification. This includes in all cases: manufacturer's identification, Country where cast, year of casting, and "DUCTILE" or "DI."



**223 Ductile Iron Fittings**

Fittings shall be flanged or mechanical joint and shall meet all requirements of standards as follows:

All mechanical joints shall be fitted with mechanical joint restraint devices (e.g. Mega-Lugs).

Sizes 4 inch through 24 inch: AWWA C-110 or AWWA C-153.

Sizes larger than 24 inch: AWWA C-110.

Interior surfaces of all iron water pipe fittings shall be lined with cement-mortar and seal coated as required by AWWA C104, unless otherwise indicated in the plans. Gaskets for mechanical joints shall conform to ANSI/AWWA A21.11/C-111. Tee-head bolts, nuts and washers for mechanical joints shall be high strength, low alloy, corrosion resistant steel stock equal to "COR-TEN A" having UNC Class 2 rolled threads or alloyed ductile iron conforming to ASTM A 536; either shall be fabricated in accordance with ANSI/AWWA A21.11/C-111.

Hex head bolts and nuts shall satisfy the chemical and mechanical requirements of ASTM A449 SAW Grade 5 cadmium plated, and shall be fabricated in accordance with ASTM B 18.2 with UNC Class 2 rolled threads.

All threaded fasteners shall be marked with a readily visible symbol cast, forged or stamped on each nut and bolt, which will identify the fastener material and grade. The producer and the supplier shall provide adequate literature to facilitate such identification; painted markings are not acceptable.

All hardware shall be tar coated as per AWWA c-110 & shall include tar coating of nuts & bolts.

**224 Polyethylene Film Wrap**

All iron pipe, fittings and accessories shall be wrapped with standard 8 mil (minimum) low density polyethylene film or 4-mil (minimum) cross laminated high-density polyethylene conforming to AWWA C-105, with all edges overlapped and taped securely with poly tape to provide a continuous wrap to prevent contact between the piping and the surrounding backfill. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective wrap before backfilling.

**225 Tracer Wire & Box**

Tracer wire shall be 12 gauge wire with PVC insulation, nylon jacket and be surface printed. Shall be of material as required in ASTM B-3 and shall terminate at tracer wire boxes spaced with fire hydrant intervals at valves. Tracer wire shall be taped to pipe at 5 ft. on center. Tracer wire boxes shall be of cast iron materials, H-20 rated, in areas subject to vehicular traffic. Tracer wire boxes shall be constructed with a 2' x 2', 6"



thick concrete collar with 6"x6" woven wire mesh or #4 bars around the top of the box. See Appendix *Detail 6 – Tracer Wire Access Box Detail* for more information.

**226 General Valves:**

- A. Description: This item shall govern the valves furnished and installed as indicated on the Drawings.
- B. Materials: The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation in the Work is of the kind and quality that satisfies the specified functions and quality.
- C. Samples, Inspection and Testing Requirements: All tests and inspections called for by the applicable standards shall be performed by the manufacturer. Upon request, results of these tests shall be made available to the purchaser.
- D. All valves shall be wrapped with 8-mil polyethylene film with all edges and laps securely taped to provide a continuous wrap.
- E. Other Requirements: Each submittal shall be accompanied by:
  - 1. Complete data covering:
    - a. The operator, including type and size, model number, etc.,
    - b. The manufacturer's name and address of his nearest service facility,
    - c. The number of turns to fully open or close the valve.
  - 2. Detailed instructions for calibrating the limit stops for open and closed positions, and
  - 3. Any other information that may be necessary to operate and maintain the operator.
  - 4. Complete dimensional data and installation instructions for the valve assembly as it is to be installed, including the operator.
  - 5. Complete replacement parts lists and drawings, identifying every part for both the valve and operator.

**227 Specific Valves:**

- A. Iron-Body Gate Valves: Unless otherwise indicated, Iron Body Gate Valves, 2" to 12", including Tapping Valves, shall conform to AWWA C509, "Resilient Seated Gate Valves for Water Systems". Iron Body Gate Valves larger than 24", including Tapping Valves, shall meeting the requirements of AWWA C500. Gate valves shall be, resilient seat type, 300 psi test pressure, 200 psi working pressure, mechanical joint.

All Gate Valves larger than 12" shall be equipped with a 2" bypass that is built into the housing of the main valve (the bypass valve shall have a valve box that extends to the surface in the same manner as the main valve box). See Appendix *Detail 7 – Non-Geared Gate Valves Detail* for more information.



1. Stem Seals: All valves shall have approved O-ring type stem seals. At least two O-rings shall be in contact with the valve stem where it penetrates the valve body.
2. Operation: All valves shall have non-rising stems with a 2" square operating nut in the distribution system, or with a spoke type handwheel at pump stations when approved by the Engineer, turning clockwise to close.
3. Valve Ends: Valve ends flanged or mechanical joint, as indicated or approved.
4. Tapping valves shall have inlet flanges conforming to MSS SP-60, with bolt holes drilled per ANSI B16.1 Class 125. Seat rings and body casting shall be over-sized as required to accommodate full size cutters; the outlet end shall be constructed and drilled to allow the drilling machine adapter to be attached directly to the valve.
5. Gear Case: All geared valves shall have enclosed gear cases of the extended type, attached to the valve bonnet in a manner that makes it possible to replace the stem seal without disassembly and without disturbing the gears, bearing or gear lubricant. Gear cases shall be designed and fabricated with an opening to atmosphere so that water leakage past the stem seal does not enter the gear case.

Butterfly Valves: Unless otherwise indicated, all butterfly valves shall conform to the current "AWWA" Standard C-504, "Rubber-Seated Butterfly Valves", Class 150B, except as modified or supplemented herein. Butterfly valves shall be used on 14" to 36" diameter pipelines. See Appendix Detail 8.A – Buried Butterfly Valve Detail and Detail 8.B – Butterfly Valve Assembly for more information.

1. Functional Requirements
  - a. Valves shall be the short body design and shall have flanged connections on both ends unless otherwise called for.
  - b. Valves shall be of such design that the valve discs will not vibrate or flutter when operated in a throttled position. Valve discs shall be secured to the shafts by means of keys or pins so arranged that the valve discs can be readily removed without damage thereto. All keys and pins used in securing valve discs to shafts shall be stainless steel or monel. Valve discs shall be stainless steel or ductile iron, ASTM A 536, Grade 65-45-12 (448-310-12); seating edge shall be stainless steel or other corrosion resistant material.
  - c. Valve shafts shall be constructed of wrought stainless steel or monel. The ends of the shaft shall be permanently marked to indicate the position of the disc on the shaft.
  - d. All buried valves shall have approved manufacturer's O-ring type. There shall be at least two O-rings in contact with the valve shaft where it penetrates the valve body.
  - e. Rubber seats located on the valve disc shall be mechanically secured with stainless steel retainer rings and fasteners.
  - f. Unless otherwise indicated, valves shall be provided with manual operators with vertical stems and 2 inches square operating nut turning clockwise to close and equipped with a valve disc position indicator. All



keys or pins shall be stainless steel or monel. Buried valves shall have the valve stems extended or adjusted to locate the top of the operating nut no more than 24 inches below finish grade.

## 2. Performance Requirements

Unless otherwise indicated, valve operators shall be sized to seat, unseat, open and close the valve with 150 psi shutoff pressure differential across the disk and allow a flow velocity of 16 feet per second past the disc in either direction.

### 228 Air-Vacuum Release Valves:

Valves shall be combination air release, air/vacuum units having small and large orifice units contained and operating within a single body or assembled unit. Combination air-vacuum release valves shall be manufactured by Apco or approved equal.

The small orifice system shall automatically release small volumes of air while the pipe is operating under normal conditions. The large air-vacuum orifice system shall automatically exhaust large volumes of air while the pipe is being filled and shall permit immediate re-entry of air while being drained. See Appendix [Detail 9 – Air-Vacuum Release Valve Detail](#) for more information.

Valves shall be rated for at least 150 psi service pressure.

#### Material Requirements:

- A. Valve exterior bodies and covers shall be cast iron.
- B. Internal bushings, hinge pins, float guide and retaining screws, pins, etc., shall be stainless steel or bronze.
- C. Orifice seats shall be Buna-N rubber.
- D. Floats shall be stainless steel, rated at 1000 psi.
- E. Unless otherwise indicated, these valves shall be as included in the Standard Products List.

### 229 Valve Boxes:

All valves shall be equipped with adjustable valve boxes or vaults (where applicable). Each valve box installed shall be of cast iron material and designated with H20 load capacity or greater and be of the extension type. This requirement does apply to valves placed outside of the traffic area. All valve boxes (whether in pavement or not) shall have a 2 ft. x 2 ft. square of concrete 6 in. thick placed around the valve box at grade. Where the valve is in pavement it shall be rotated so that the sides of the square are at a 45° angle with the curb.

### 230 Fire Hydrants:

All fire hydrants shall be Mueller Super Centurion or approved equal, three way hydrants and shall be installed with a six inch stub out line with a six inch valve. All valves for fire hydrant leads shall be located at the main by an anchor tee. All fire hydrants shall incorporate a 3-valve system (one of the lead and one on either side of the main at the lead). All fire hydrants shall have a four foot by four foot slab of six inch thick reinforced (wire mesh) concrete (4'x4'x6") placed just below the bury line





(approximately 6 inches below the break-away nuts) to force the fire hydrant to “break-away” properly when struck by a vehicle (see details at the end of this section). See Appendix *Detail 10 – Standard Fire Hydrant Detail* for more information.

A. Applicable Specifications:

AWWA C-502 current: “AWWA Standard for Dry-Barrel Fire Hydrants.”

NFPA 1963: “National (American) Standard Fire Hose Coupling Screw Thread” and EPWWS 4 ½ inch (133 mm) Fire Hose Connection Standard (Available upon request from Standards Committee Secretary at 322-2806).

ANSI A-21.11 current: “American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.”

B. Functional Requirements:

Design Working Pressure shall be 250 psi and a test pressure of 400 psi.

Inlet shall be side connection hub end for mechanical joint (ANSI A-21.11-current). Shoe shall be rigidly designed to prevent breakage.

Lower Barrel shall be rigid to assure above ground break at traffic feature. Bury length of hydrant shall be three (3) feet minimum, five (5) feet maximum. Flange type connections between hydrant show, barrel sections and bonnet shall have a minimum of 6 corrosion resistant bolts.

Hydrant Main Valve shall be 5 ¼ inch I.D. Valve stem design shall meet requirements of AWWA C502, with Operating Nut turning clockwise to close. Operating Nut shall be pentagonal, 1 ½ inch point to flat at base, and 1 7/16 inches at top and 1 inch minimum height. Seat ring shall be bronze (bronze to bronze threading), and shall be removable with light weight stem wrench. Valve mechanisms shall be flushed with each operation of valve; there shall be a minimum of two (2) drain ports.

Traffic Feature shall have replaceable break-away ferrous metal stem-coupling held to stem by readily removable type 302 or 304 stainless steel fastenings. Break-away flange or frangible lugs shall be designed to assure above-ground break. Break-away or frangible bolts will not be acceptable.

Outlet Nozzles shall be located approximately 18 inches above ground. Each hydrant shall have two (2) 2 ½ inch nozzles 180 degrees apart with National (American) Standard Fire Hose Coupling Screw Thread NFPA 1963 and one (1) 4 ½ inch pumper nozzle. Nozzles shall be threaded or cam-locked, O-ring sealed, and shall have type 302 or 304 stainless steel locking devices. Nozzle caps and cap gaskets shall be furnished on the hydrant. The cap nut shall have the same configuration as the operating nut.



Hydrants shall be Dry-Top Construction, factory lubricated oil or grease with the lubricant plug readily accessible. The system shall be described for Owner approval.

Hydrant shall have double O-ring seals in a bronze stem sheath housing to assure separation of lubricant from water and shall have a weather cap or seal, or both, as approved by the Owner, to provide complete weather protection.

- C. Material Requirements: All below ground bolts shall be corrosion resistant. The hydrant valve shall be Neoprene, 90 durometer minimum. The seat ring, drain ring, operating nut and nozzles shall be bronze, AWWA C-502 current, containing not over 16 percent zinc. Break-away stem coupling shall be of ferrous material; its retaining pins, bolts, nuts, etc. of type 302 or 304 stainless steel.

Coatings shall be durable and applied to clean surfaces. The coating shall be applied according to coating manufacturer's specifications. Other exposed ferrous metal shall receive asphalt-based varnish, or approved equal, applied according to the coating manufacturer's specifications.

**231 Fire Line:**

Fire supply lines shall be connected to water distribution system via a cut-in tee and appropriate fire flow meter assembly. The fire flow meter assembly shall be contained within an underground concrete vault and be located in public right-of-way, near property line where minimizes impact to surrounding site features.

Fire meter size shall be dependent on fire flow demand for structure being protected and documentation for sizing meter shall be supply to EPWWS for review and approval.

Customer shall supply the backflow preventer assembly conforming to TCEQ regulations and shall be located near property line.

See Appendix *Detail 11 – Fire Flow Meter Installation Detail* for additional Information.

**232 Mechanical Restraint**

Provide mechanical joint restraint if indicated on plans and as required. All fittings shall be restrained based on type of fitting and required restrained lengths. Restrained lengths shall be designed based upon specific conditions such as type of trench, backfill and other factors associated with installation of pipeline. See Appendix *Detail 12 – Mechanical Joint Restraints* for additional information.

**233 Service Lines:**

**A. Copper Tubing**

All copper service tubing shall be annealed seamless Type K water tube meeting ASTM B88 and rated at 200 psi working pressure. The tubing shall be homogenous throughout and free from cracks, holes, crimping, foreign inclusions or other defects. It shall be uniform in density and other physical properties.



Nominal Tube Size [inches]	Outside Diameter [inches]		Wall Thickness [inches]	
	Average	Tolerance	Average	Tolerance
1	1.125	$\pm 0.0035$	0.065	$\pm 0.0045$
2	2.125	$\pm 0.005$	0.083	$\pm 0.007$

#### B. Polyethylene Tubing

All polyethylene service tubing shall be rated at 200 psi working pressure and conform to Copper Tube Size (CTS) sizes (nominal diameter compatible). The tubing shall be homogenous throughout and free from cracks, holes, crimping, foreign inclusions or other defects. It shall be uniform in density and other physical properties

### 234 Water Service Connection Fittings:

- A. Brass Goods: All brass valves, couplings, bends, connections, nipples and miscellaneous brass pipe fittings and accessories used in meter connections, service lines, air release piping assemblies, and wherever needed in the water distribution system, shall conform to the EPWWS Standards and AWWA C-800, except as here in modified or supplemented.

Unless otherwise noted, the goods described herein shall be fabricated of standard Red Brass (Waterworks Brass) meeting ASTM B62 or B584, alloy 83600, consisting of 85 percent copper and of tin and zinc (lead free).

Exposed threads shall be covered with plastic caps or sheeting to protect the threads.

Brass goods of each type and class shall be compatible with other fittings in common usage for similar purposes. Where not otherwise indicated, all such materials shall meet the following requirements:

For ¾" and 1" sizes only, corporation valve inlet threads, and the internal threads of saddles shall be the AWWA CC taper thread conforming to AWWA C800. External threads of corporation valve inlet must be compatible with internal threads of the service saddle.

For 2" and larger services, inlet threads of corporation valves shall be AWWA (IP) thread (male); outlets of service saddles shall be tapped with AWWA IP thread (female); the service shall be equipped with a gate valve at the main. Two inch (2") Type K Copper shall be installed with sweated or compression fittings (i.e. bending the pipe shall not be allowed). Two inch (2") polyethylene tubing shall be installed with proper CTS size fittings to fit CTS corporation stop and angle meter valve.

Connections of all new tubing, and of tubing repairs wherever possible, shall be by compression connections for ¾" to 2" copper or quick joining style fittings (i.e. Ford Grip-Tite Connector or approved equal) for ¾" to 2" poly tubing. Shall be designed to provide a seal and to retain the tubing, without slippage, at a working water pressure of 200 psig minimum.



Brass pipe shall conform to the weights and dimensions for Extra Strong pipe given in Table A.2 of AWWA C800.

- B. Tapping saddles shall be of all stainless steel construction, with a full wrap around gasket. It shall have a pressure test port mounted on the side of the stem with NPT threads and a stainless steel plug.
- C. All services shall be connected to the main with a saddle (i.e. direct taps are not permitted).
- D. Curb stop (or Angle Meter Valve) shall be installed on all services within the meter box, consistent with CTS sizes & polyethylene or copper tubing with proper connection fittings. Angle meter valve shall be of ball-type only, all brass conforming to AWWA standard C-800, meeting 200 psi working pressure for 1 in. or less service line and 200 psi working pressure for 2 in. or larger service lines.
- E. See Appendix *Detail 13 – Service Tap Installation Detail* for additional information.

#### **235 Water Meter & Boxes**

- A. Water meters for services 1” or less shall be of Master Meter or approved equal. For services 2” or larger, water meter shall be Master Meter – DBC Compound or approved equal. If radio ready type water meter to be used, meter shall be of Master Meter AMR or approved equal. Specific water meter models & type shall be approved by the Owner or his representative.
- B. Water meter boxes shall be of plastic material with plastic cover and rebar encasement. Review and approval shall be made by EPWWS representative.
- C. Water meter shall be sized accordingly to water demand for properties being served. The number of water fixtures per service connection is to be used to calculate the size of water meter needed. Refer to manufacturer’s criteria and flow ranges for each type of meter.



## 240 Standard Products List

### 240.01 Piping, Tubing, & Fittings

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Ductile Iron	U.S. Pipe, Tyler Pipe, Griffin Pipe, American Ductile Iron Pipe or approved equal	6" and up
PVC SDR 26	J-M Eagle Pipe, North American Pipe, American Diamond Products or approved equal	6" and up
Copper Tubing		
DI Fittings	Tyler Union, Sigma Corp. or approved equal	

### 240.02 Water Valves

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Butterfly Valves	Val-Matic or approved equal	14" or larger
Gate Valves	Mueller, East Jordan Iron Works, American Flow Control or approved equal	2" through 12"
Curb Stop	Ford Meter Box or approved equal	
Corporation Stop	Ford Meter Box or approved equal	



### 240.03 Air Valves

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Combination Valves	APCO or approved equal	2" and 3"

### 240.04 Appurtenances

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Fire Hydrant	East Jordan Iron Works, Mueller, American Flow Control or approved equal	
Mechanical joint Restraint	Ford Meter Box, EBAA Iron, Smith Blair or approved equal	
Water Meters	Master Meter or approved equal	
Valve & Meter Boxes	Ford Meter Box, Tyler Union, Sigma Corp, DFW. or approved equal	
Tracer Wire Boxes	Valco or approved equal	





## 300 Wastewater Specifications

### 310 Design Criteria for Wastewater Collection

#### 311 General Information

These design criteria are minimum requirements to be used in the design of wastewater collection systems within the jurisdiction of the City of Eagle Pass Water Works System, herein after referred to as EPWWS. The jurisdiction of the EPWWS is defined as the area bound by the Certificate of Convenience and Necessity (CCN). In all cases, the Texas Commission on Environmental Quality (TCEQ) design criteria for sewerage systems shall be enforced as the minimum design criteria for use in the EPWWS. The following design criteria shall be supplemented by the TCEQ design criteria. Wastewater collection work shall conform to the current edition of the International Plumbing Code (IPC) where indicated or necessary as adopted by the City of Eagle Pass. Engineered plans must be submitted to the Owner / Engineer for review, comment, and approval prior to construction.

#### 312 Design Criteria, Mains

##### 312.01 Gravity Mains

A. Size: the minimum main size shall be eight (8) inches, except that six inch (6") will be permitted only at the direction of the Owner / Engineer (e.g. in low flow situations, or in standard length cul-de-sacs or lines less than 200 feet in length which will not be extended in the future). A detector tape shall be laid, in the same trench, above and parallel to the sewer main. The tape shall state in a minimum of 3-inch tall letters "Caution: Sewer Pipe Line Buried Below" continuously along the tape.

B. Sanitary Sewer mains in new subdivisions shall be placed to produce a minimum velocity of 2 feet per second (based on the calculated flows) and in no case be flatter or steeper than the grades as set forth below and must meet the current TCEQ 30 TAC § 290.53(I)(2)(A) (shown below for reference)

Nominal Pipe Size [inches]	Minimum Slope [%]	Maximum Slope [%]
6	0.50	12.35
8	0.33	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.30
24	0.08	1.93



The grades shown in the above are based on Manning's formula with an assumed "n factor" or 0.013 and constitute minimum acceptable slopes. The minimum acceptable "n" for design and construction shall be 0.013. The "n" used takes into consideration the slime, grit and grease layers that will affect hydraulics or hinder flow as the pipe ages.

C. The maximum design velocity should not be greater than ten (10) fps at peak flow. However, a velocity in excess of ten (10) fps may be approved with proper consideration of pipe material, abrasive characteristics of the wastewater, turbulence, and thrust blocks at changes in direction.

D. Where the pipe grade exceeds 12.5%, concrete dissipaters shall be used at intervals not exceeding 50 feet.

E. All sanitary sewer mains shall be designed for a 50-year life.

F. Wastewater piping and appurtenances shall conform to Section 320 of these specifications.

G. Minimum depth of cover shall be 5.0 feet measured from the top of pipe while the maximum cover shall be 14 feet, variances from this shall be as approved by the Owner / Engineer. Backfill must be compacted in 4-6" lifts with a hand operated tamper, 6-8" lifts with a remote compactor or sheepsfoot roller mounted to a backhoe, max 12" lift with a sheepsfoot roller mounted to a minimum 5 ton excavator; compaction to 95% Standard Proctor (ASTM D-698) for cover of 10 feet or less, 95% Modified Proctor (ASTM D-1557) for more than 10 feet of cover. Density tests shall be taken in the presence of an Owner's inspector horizontally every 100 linear feet and vertically at the following depths (depending on depth of sewer main): 2 ft, 5 ft, 7.5 ft, 10 ft, and 12.5 ft.

H. Installation shall be in accordance with Section 600 of these specifications. Contractor shall provide submittals on pipe and fittings prior to ordering materials.

I. The average day flow for single family residences shall be taken to be 100 gal/capita-day and averaging 4 persons per dwelling unit. For commercial and industrial facilities, average day flows vary depending occupancy and other such factors such as number of fixtures therefore calculations shall be done in order to obtain specific average day flows for the type facility being considered. Peaking factors range from 2 – 6 depending on the population served. The following formula shall be used to determine the peaking factor, M,

$$M = 1 + 14 / (4 + P^{0.5}), \text{ where}$$

M = the ratio of peak-to-average and average-to-minimum rates of flow;  
and



P = the population served, thousands

J. Sewers shall be laid in straight alignment with uniform grade between manholes unless slight deviations from straight alignment and uniform grade are justified to the satisfaction of the Owner / Engineer.

K. Gravity sewers with horizontal curvature shall be sloped at least 3% greater than the minimum allowable slope for the same diameter pipe. For example, an 8" diameter gravity pipe (with horizontal curvature) minimum slope shall be  $0.40\% \times 1.03 = 0.412\%$ . The maximum allowable manhole spacing for sewers with horizontal curvature shall be 300 feet. All reaches of sewer, which include horizontal curvature, shall be tested with a rigid mandrel and shall be hydrostatically tested using a maximum allowed exfiltration of 10 gallons per inch diameter per mile of pipe.

L. Construction methods which utilize flexure of the pipe joint are prohibited. The engineer shall provide the calculations for horizontal pipe curvature in the final engineering design report and detail the proposed curvature on the plans. The maximum allowable joint deflection shall be the lesser of the following three alternatives:

(A) equal to  $1^\circ$ ;

(B) 80% of the manufacturer's recommended maximum deflection; or,

(C) 80% of the appropriate ASTM, AWWA, ANSI or nationally-established standard for joint deflection.

M. Separation Distances: Separation distances shall comply with Section 500 of the EPWWS Standard Specifications. Wastewater lines must conform to the TCEQ 30TAC §217.53.d. regulations for spacing as a minimum.

### **312.02 Force Mains**

A. General: Pipe material and fittings shall be PVC meeting ASTM D2241 SDR-26 specifications with a minimum pressure rating of 160 psi or C-900 PVC DR-14. Pipe shall be designed and installed according to TCEQ rules and regulations. A detector tape shall be laid, in the same trench, above and parallel to the forced main. The tape shall state in a minimum of 3-inch tall letters "Pressurized Wastewater" continuously along the tape.

B. Minimum depth of cover shall be 4 feet while maximum shall be 5 feet.



- C. Testing: Systems will be tested in accordance with Section 600 of these specifications.

### **313 Design Criteria, Manholes**

#### **313.01 Manholes**

Shall be placed and located to facilitate their use for inspection and maintenance of the sewer main. They will be placed at:

- A. Intersections of mains
- B. Horizontal alignment changes
- C. Vertical grade changes
- D. Change of pipe size
- E. Six inch and above service laterals (because of large volume, etc.)
- F. At the end of all sewer mains except where a Wastewater Access Device is used.
- G. Maximum spacing shall be 500 feet for mains from 6" to 15" diameters. For mains over 15 inches (up to 30"), maximum spacing shall be 800 feet. Maximum spacing for sewer mains with horizontal curves shall be 300 feet regardless of the size of pipe.
- G. When sewer mains have horizontal curvature (generally where they follow curvature of a street); manholes shall be located at the P.C. and P.T. of the curve and the minimum radius of curvature shall be 250 feet.
- H. Venting. Where gasketed manhole covers are required for more than three manholes in sequence, an alternate means of venting shall be provided at less than 1,500 foot intervals. Vents shall be designed to minimize inflow. Vents shall be 1 foot above the B.F.E. for the 100-year flood elevation.

#### **313.02 Manhole Inverts**

The bottom of the manhole shall be provided with a "U" shaped channel that is a smooth continuation of the inlet and outlet pipes. For manholes connected to pipes less than 15 inches in diameter, the channel depth shall be at least half the largest pipe diameter. For manholes connected to pipes 15 to 24 inches in diameter, the channel depth shall be at least three fourths the largest pipe diameter. For manholes connected to pipes greater than 24 inches in diameter, the channel depth shall be at least equal to the largest pipe diameter. In manholes with pipes of different sizes, the tops of the pipes shall be placed at the same elevation and flow channels in the invert sloped on an even slope from pipe to pipe. The bench provided above the channel shall be sloped at a minimum of 0.5 inch per foot. Where sewer lines enter the manhole up to 24 inches above the manhole invert, the invert shall be filleted to prevent solids deposition. A drop pipe shall be provided for a sewer entering a manhole more than 24 inches above the invert. The minimum change in elevation from invert in and invert out is 0.1' measured at the flow line.



### **313.03 Bolt Down Manhole Ring & Cover**

Bolt down rings and covers shall be cast iron as manufactured by East Jordan Iron Works, model # V-1420 or approved equal.

### **313.04 Manhole Watertight Inserts**

Watertight manhole insert shall contain the following components: valve bodies, valve plugs, valve springs and gasket.

### **314 Design Criteria, Sewer Services**

RESIDENTIAL - As a minimum, 4" SCH-40 sewer service complete with a two-way cleanout placed at the property line will be required for each platted lot. Each service will be required to have at least 30" of cover between the curb and the service. Services shall be located with a minimum of 9-foot separation between the water and the sewer services.

Dual services may be used with approval of the Owner / Engineer. As a minimum, 6" SCH-40 sewer service complete with a two-way cleanout placed at the property line must be used for dual service installations. Engineered plans must be submitted for review, comment, and approval.

COMMERCIAL - All commercial service lines shall be sized by the design engineer based on standard engineering practices. All service line sizes will be subject to review and approval of the Owner / Engineer. As a minimum, 6" SCH-40 sewer service complete with a two-way cleanout must be used for commercial services.

See Appendix *Detail 14 – Lateral Detail* for additional information.

### **315 Design Criteria, Lift Stations**

Lift Stations shall be designed in accordance with Section 330 and Section 340 of the EPWWS Standard Specifications. Lift stations shall not be used where a gravity main can be installed to provide the necessary service. The use of a lift station must be approved by the Owner / Engineer.

### **316 Construction Plans**

A. Construction plans shall be drawn to one of the following scales:

<u>Horizontal</u>	<u>Vertical</u>
1" = 20'	1" = 2 ft
1" = 40'	1" = 4 ft
1" = 50'	1" = 5 ft

Note: 1"=50' maximum horizontal scale



B. Elevations shall be provided at all manhole rims and flowlines. The pipe gradient between manholes shall be clearly shown on the plans. The ground profile shall be shown.

C. Benchmarks shall be shown on the plans at distances no greater than 1000 feet.

D. The location and stationing of all services shall be shown on the construction plans.

E. Sequence of construction (for sewer line and for all other construction in conformance with Section 101).

NOTE: A professional engineer may submit a request to modify design criteria, upon presentation of sufficient data to justify the variation, based upon unique and known circumstances.

## **320 Materials For Construction**

### **321 General Information**

Contractor shall furnish all necessary labor, equipment, materials, and performing all work required to install sanitary sewer pipe and appurtenances of the class, size, and dimensions specified at the locations and to the lines and grades shown on the plans, all in strict compliance with these specifications.

### **322 Materials**

**322.01 PVC Pipe and Fittings:** Pipe material, fittings, and services shall be PVC meeting ASTM D3034 for 4" to 15" diameter & ASTM F-679 for 18" to 27" diameter, SDR35 & SDR-26 pressure pipe specifications. Pipe shall be designed and installed according to EPWWS Standard Specifications and the Rules and Regulations for Sewage Collection Systems as adopted by the TCEQ.

Joints shall be locked in rubber sealing ring (steel ring, band or other rigid material) to provide water tight, flexible seal, and shall meet the requirements of ASTM D3212.

All gaskets shall be of a lock-in type gasket meeting the requirements of ASTM F-477.

Permanent marking on the pipe shall include the following at intervals of not more than 5 feet:

Manufacturer's name and/or trademark.

Nominal pipe size.

PVC cell classification per ASTM D 1784.

Fittings shall be clearly marked as follows:

Manufacturer's name or trademark,





Nominal size,

The material designation

All sewer mains shall have metallic location tape placed in the last 2 feet of fill of the trench (i.e. 2 feet deep from the final grade). See details.

### **322.02 Manholes:**

A. General: Manholes shall be minimum 48" diameter fiberglass material, larger diameter manholes will be necessary as indicated in the details section of this specification book. Manholes shall be of fiberglass reinforced polyester material manufactured from commercial grade polyester resin or other suitable polyester or vinyl ester resins, with fiberglass reinforcements. Reinforcing materials shall be commercial Grade "E" type glass having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin. The complete manholes shall have a minimum dynamic load rating of 16,000 ft-lbs, AASHTO H-20 rated. See Appendix *Detail 15 – Fiberglass Manhole* for additional information

Brick manholes will not be allowed, nor shall brick be used to adjust manhole covers to grade. All manholes (whether in pavement or not) shall have a 4-ft x 4-ft x 6-inch thick slab of concrete placed around the ring and cover and reinforced with #6, 6" x 6" wire mesh. Where the manhole is in pavement it shall be rotated so that the sides of the square are at a 45° angle with the curb as shown in the details section. Manholes shall be tested using the Vacuum Test as specified in Section 600 of these specifications. See Appendix *Detail 16 – Manhole Ring Encasement* for additional information.

B. Grade Rings: Grade rings shall be HDPE Recycled Plastic Manhole Adjusting Rings. Manholes shall be designed and constructed with a maximum allowable grade adjustment (using grade rings) of no more than 8-inches. Existing manholes receiving rehabilitation may have a maximum allowable grade adjustment of no more than 20-inches including existing grade rings. Concrete grade rings will not be permitted and must be replaced with HDPE grade rings on existing manholes receiving rehabilitation.

D. Ring and Cover: The ring and cover shall be ductile iron, East Jordan Iron Works V-142 or an approved equal with a minimum nominal opening of 30 inches. Covers shall contain 1-1" hole or opening for ventilation and lifting bars with slots adequate for pick insertion and cast into the covers shall be provided for lifting purposes. A minimum of three (3) bolt holes in the covers shall be evenly spaced and provided with minimum 1 ½ inch



diameter counter sinks for the bolt heads. See Appendix Detail 17 – Manhole Ring & Cover for additional information.

Manholes which lie within the 100 year floodplain shall have the covers be sealed and gasketed to protect against inflow. Where gasketed manhole covers are required for more than three manholes in sequence, an alternate means of venting shall be provided at less than 1,500 foot intervals. Vents should be designed to minimize inflow and be place a minimum of 1' above the Base Flood Elevation. Impervious material should be utilized for manhole construction in these areas in order to minimize infiltration.

- E. Watertight Inserts: The watertight manhole insert shall be manufactured and finished to fit upon the manhole frame rim upon which the manhole cover rests. Insert shall be manufactured of high density polyethylene meeting the requirement of ASTM D 1248 Class A, Category 5 or equal. Gasket shall be manufactured of closed cell radiation crosslinked polyethylene foam meeting the requirements of ASMT D-395, D-1564, D-624 and D-1667.

### 330 Lift Stations

#### 331 Description

**331.01 General:** The contractor shall furnish all labor, materials, and equipment required to provide the duplex pumping system specified herein. The control system shall be as specified by the Owner / Engineer.

Every possible solution shall be explored to minimize the use and implementation of lift stations for sanitary sewer collection systems. The Owner shall be made aware of probable locations of lift stations during the early stages of a project in order to review and give approval for implementing lift stations in a project.

**331.02 Extent of Work:** System shall consist of two (2) submersible pumps, wet well and valve vault with flood proof access hatches and coal tar epoxy interior coating, wet well level control switches, submersible pump cable, discharge plumbing with hydraulically seated discharge flange, pump mounting plates with bottom rail supports, upper rail supports, lifting chain, all pressure piping and valves within the lift station site, manual transfer switch and enclosure, pump control unit, control transformer and enclosure, electrical service pole, stainless steel Unistrut mounting assembly with concrete base, mobile generator receptacle, all electrical wiring, conduits, fasteners, and all NEMA 4X weather proof enclosures shown on plans and provided in specifications necessary to produce a properly functioning lift station site.



### **332 Component Construction**

**332.01 Submersible Pumps:** The pump shall be Hydromatic, Flygt, KSB, or as approved by the Owner / Engineer. The pumps shall be capable of handling raw wastewater. The discharge connection elbow shall be permanently installed in the wetwell along with the discharge piping. The pumps shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service along with guide rails. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump. A sliding guide bracket shall be an integral part of the pump unit. All hardware associated with the pump guide, pipe supports, lifting chain, and hardware shall be 304 stainless steel. The entire weight of the pump unit shall be guided by no less than two guide bars and pressed tightly against the discharge connection elbow with metal to metal contact.

Sealing of the discharge interface by means of a diaphragm, O-ring, or other device will not be acceptable. No portion of the pump shall bear directly on the floor of the sump.

Hydraulic Components:

- A. The pump casing shall be of gray iron with a gray iron or ductile iron slide rail guide shoe attached to the discharge flange as an integral assembly. Casing shall be easily removable from the motor for full inspection of impeller.
- B. The pump openings and passages shall be of adequate size to pass 3" diameter spheres and any trash or stringy material which may pass through a wastewater collection system. The back of the impeller shall incorporate straight auxiliary vanes to hydraulically reduce pressure on the primary seal, and force debris away from the impeller clearance. No wearing rings or adjustments of the backside clearance will be required.
- C. The impeller shall be of semi-axial flow design, incorporating one or two sweeping vanes with wide flow channels. It shall be gray iron 30 or ductile iron Class 80-56-06 with designed counter mass for dynamic balancing to eliminate vibration. Balancing shall not deform or weaken the impeller.
- D. The suction clearance between the impeller and pump casing shall be in the axial direction only. This clearance must be fully adjustable to maintain peak operating efficiency of the pump.

### **332.02 Pump Motor Description:**

- A. The submersible pump motor shall operate in accordance with the electrical power indicated on the drawings. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled water tight enclosure. The motor shall conform to NEMA design class B, and incorporate Class F insulation materials to withstand a continuous operating temperature of 155 degrees C (311 deg F). The pump and motor shall be capable



of handling liquids with a maximum temperature of 40 deg C (104 deg F). Oil filled motors are not acceptable.

B. Motor shall be capable of sustaining a minimum of 10 starts per hour. The motor shall operate while only partially submerged and not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation.

C. Motor housing shall be cast iron. The stator shall consist of copper windings with copper connectors applied to high-grade electrical steel laminations. The stator shall be held securely in place by a heat-shrink fit into the motor housing. Any other means of securing the stator which would require penetration of the motor housing shall not be considered acceptable.

D. Rotor shall be solid cast and dynamically balanced for vibration-free operation. Rotor end bars and short circuit rings shall be of aluminum. The pump shaft shall be stainless steel. The shaft shall be machined with shoulders or snap ring grooves for positive placement of bearings. The upper and lower bearing shall be of heavy duty design, capable of supporting the shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated at the time of installation.

**332.03 Sump Level Controls:** Ultrasonic level sensors shall be supplied to control sump level and alarm signals. Submittals shall be provided for approval from EPWWS personnel. Float switches can be used as a backup mechanism and shall be sealed in a solid polypropylene float for corrosion and shock resistance. The support cable shall be stainless steel. A weight shall be attached to the cable above the float to hold switch in place. A quantity of four (4) floats shall be provided.

**332.04 Check Valve and Pipe:** The discharge piping shall include exterior lever air cushioned check valves and wheel actuated gate valves located in a concrete valve pit on each discharge main.

**332.05 Fiberglass (FRP) Wetwell:** Fiberglass Reinforced Polyester (FRP) wetwells shall be a one-piece monolithic designed unit constructed of glass-fiber reinforced, supplier certified, unsaturated commercial grade polyester resin containing chemically enhanced silica to improve corrosion resistance, strength and overall performance. FRP wetwells shall be manufactured in strict accordance with ASTM D-3753 "Standard Specification for Glass-Fiber Reinforced Polyester Manholes and Wetwells", as manufactured by Containment Solutions, Inc., Conroe, Texas, "Flowtite" Fiberglass wetwells, or Engineer Pre-approved equal.

The bottom of the wet well shall have a minimum slope of 10% to the pump intakes and shall have a smooth finish. The wet well shall be sized to provide adequate storage volumes and must be designed to provide an anti-floatation foundation system.

Engineered plans must be submitted to the Owner / Engineer for review and approval.



**332.06 Wetwell Access Hatch:** The wetwell access hatch shall consist of two Halliday Series FIR or approved equal access doors, each containing 36" X 60" openings, each centered directly over each pump and guiderail. The floodtight access doors shall be certified to be watertight when under 2' of water. Alternates to the Halliday access hatch shall be submitted to the Owner / Engineer for review.

**332.07 Guide Rail:** The guide rail assembly shall be permanently attached to the sump basin. The entire rail system shall be constructed of 304 stainless steel. The guide rail assembly shall consist of a bottom plate which shall be bolted to the bottom of the basin, a minimum of two guide rails per pump to insure correct placement of the pumps and provide easy installation and removal of pumps, and rail braces as required.

The lifting cable shall consist of a stainless steel braided wire cable attached to the pump lifting bail of sufficient length to connect directly to the hoist for single lift operation. An eyelet shall be provided at the upper end of this cable for attaching to the wet well access frame.

**332.08 Discharge Piping Assembly:** The discharge piping assembly shall include be as shown on the construction plans. All interior piping within the wetwell shall be ductile iron or 304 stainless steel. Any interior couplings shall be 304 stainless steel. Piping within the valve vault shall be ductile iron. Check valves shall be external lever air cushioned swing check valves. Gate valves shall have flanged joints complete with wheel actuator.

**332.09 Vent:** The lift station vent shall be placed in order to vent the wet well and additionally protect the lift station from the 100 year flood event. The vent shall be installed a minimum of 1' above the Base Flood Elevation. Vent material shall be PVC schedule 40 pipe w/stainless steel screen.

**332.10 Valve Vault:** Valve vault shall be precast or cast in place reinforced concrete, outer dimensions 10' X 6', a minimum of 5' in depth, with a bottom backfilled with a minimum of 12" of washed 1.5" rock to allow the bottom to drain. The valve vault shall contain a Halliday Series WS27248 access hatch or approved equal to allow operators to easily access the valve vault for maintenance.

**332.11 Electric:** The control system shall include circuit breakers, motor starters, transformers, hand-off-automatic switches, automatic pump alternator, wetwell level sensing devices, cycle timers, SCADA communication and control equipment, and accessories required to provide a complete and functional system.

All wiring within the wetwell and outside the control cabinet shall be run in PVC conduit



except for wiring to motors which shall be in accordance to manufacturer recommendations. All wiring shall be in accordance with current National Electric Code and applicable local code revisions. It shall be the responsibility of the contractor to furnish and install correctly sized service wires and obtain service for installation. No splice shall be permitted in any wiring. It shall also be the responsibility of the contractor to furnish and install all required exterior disconnects, switching mechanisms, alarm or control conduit and wiring.

**332.12 Pump Control Center:** A complete pump control center shall be mounted adjacent to the wet well on a Unistrut support anchored into a concrete pad, as shown on the construction plans. The panel, all its components, and the wiring shall be in accordance with the latest NEC Code. The panel shall be NEMA 4X construction with doors hinged to swing horizontally and utilize acceptable stainless steel clasp devices. For operator safety, one panel shall house the breakers, contactors, and current transformer while a separate panel shall house the pump control unit and phase monitors. All circuit breaker operators, selector switches and gauges shall be accessible from the front panel without opening the doors. Internal panel wiring shall be color coded and any wiring leaving the panel shall pass through properly numbered or coded terminal strips. Every switch, control relay, circuit breaker and other components, either inside or out shall be visibly and permanently identified.

The pump station control panel shall be as specified in the construction drawings. The contractor shall be responsible for providing compartmentalization of control transformer and control panel to prevent unauthorized access.

The service meter for lift station will be fastened to a service pole provided by contractor. Contractor will be responsible for placing electrical service line underground from the starters to the junction box located at the lift station wetwell. The work required will include the trenching, PVC conduit, and the construction of the junction box and control panel mounting structure.

### **333 Operation of System**

On sump level rise, lower switch shall first be energized, then upper switch shall next energize and start lead pump. With lead pump operating, sump level shall lower to low switch turn off setting and pump shall stop. Alternating relay shall index on stopping of pump so that lag pump will start first on next operation and become lead pump. If sump level continues to rise when lead pump is operating, override switch shall energize and start lag pump. Both lead and lag pump shall operate together until low level switch turns off both pumps. If level continues to rise when both pumps are operating, alarm switch shall energize and signal the alarm. If one pump should fail for any reason, the second pump shall operate on the override control and if the level rises above the override control, the alarm shall signal. All level switches shall be adjustable for level setting from the surface.





**334 Execution**

The Contractor shall leave the entire packaged lift station installed under this contract in proper working order. Upon completion of the installation, an acceptance test run shall be run in the presence of the Owner / Engineer for his representative for a period of six (6) hours to ascertain that the system is operating correctly as required for the overall operation of the facility.

**335 Accountability**

**338.01 Warranty:** Manufacturer shall warrant in writing the entire structure to be free from defects in materials and workmanship for a period of eighteen (18) months starting from the date of written project acceptance. The manufacturer shall submit in writing, a letter guaranteeing compliance to pump performance data submitted. The approved packaged lift station manufacturer shall provide references of similar lift station installations in Texas if requested by the Owner / Engineer.

**336 Payment**

All materials, labor, electrical wiring, control panel, pumps, pressure piping, valves, and all incidentals necessary to install, connect, test and provide a functioning lift station shall be paid for at the lump sum bid for "Wastewater Lift Station".

**340 Effluent Reuse – Type II Reclaimed Water**

All effluent reuse mains shall have metallic location tape placed in the last 2 feet of fill of the trench (i.e. 2 feet deep from the final grade). See details.

**341 General**

**341.01 Description:** This item shall consist of furnishing all necessary labor, equipment, and materials and performing all work required to install reclaimed water pressure mains and appurtenances of the class, size, and dimensions specified at the locations and to the lines and grades shown on the plans, all in strict compliance with these specifications.

**342 Design Criteria**

**342.01 Hose bibs and Faucets:** All hose bibs and faucets shall be painted purple and designed to prevent connection to a standard water hose. Hose bibs shall be located in locked, below grade vaults which shall be clearly labeled as being of non-potable quality. As an alternate to the use of locked, below grade vaults with standard hose bibs services, hose bibs may be placed in a non-lockable service box which can only be operated by a special tool so long as the hose bib is clearly labeled as non-potable water and complies with one of the following requirements:

- A. Signs having a minimum size of eight inches by eight inches, as shown in Figure 1, shall be posted at all storage areas and on all hose bibs and faucets reading, in both English and Spanish, "Reclaimed Water, Do Not Drink" or similar warning.



B. The area shall be secured to prevent access by the public.

**342.02 Separation Requirements:** Separation distances shall comply with Section 500 of the EPWWS Standard Specifications. Reclaimed water lines must conform to the TCEQ requirement for spacing as a minimum.

**342.03 Pressure Mains:** Reclaimed water lines which transport reclaimed water under pressure shall be sized according to acceptable engineering practices for the needs of the reclaimed water users. The designer shall consider methods to prevent or maintain lines to mitigate the effect of the deposition of solids in such lines. Pipe specified for reclaimed water force mains shall be of a type having an expected life at least as long as that of the lift station and shall be suitable for the reclaimed water being pumped and operating pressure to which it will be subjected. All pipes and fittings shall have a minimum working pressure rating of 150 pounds per square inch.

**342.03 Gravity Mains:** Gravity flow reclaimed water lines shall meet the requirements of Section 312 of these specifications. The designer shall consider methods maintain line fluid velocity to migrate the effects of the depositions of silt in the gravity conveyance.

**342.04 Marking of Pipe:** All exposed piping and piping within a building shall be either purple pipe or painted purple. All buried piping shall be manufactured in purple color. All exposed piping shall be stenciled in white with a warning reading "NON-POTABLE WATER".

**342.05 Isolation Valves:** In-line isolation valves for reuse pipes shall open clockwise to distinguish them from potable water isolation valves. Valve casings for underground isolation valves shall have cast into the cast iron lid "reuse" or "NPW".

**342.06 Storage:** All effluent ground level and elevated storage tanks shall be designed, installed, and constructed in accordance with current AWWA standards with reference to materials to be used and construction practices to be followed, except for health-based standards strictly related to potable water storage and contact practices, where less restrictive standards may be applied. All storage facilities shall be stenciled in white with a warning reading "NON-POTABLE WATER".



## 350 Standard Products List

### 350.01 Piping

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Ductile Iron	U.S. Pipe, Tyler Pipe, Griffin Pipe, American Ductile Iron Pipe or approved equal	3" and up
**The above shall apply to lift station piping suction and discharge always flanged.		
PVC SDR 35 Sewer	J-M Eagle Pipe, North American Pipe, Diamond Plastics or approved equal	4" and up
The above shall apply to gravity sewer in uninterfered trench (not crossing water mains, through creeks etc.)		
SDR-26 Sewer Pressure Pipe	J-M Eagle Pipe, North American Pipe, Diamond Plastics or approved equal	4" and up
C-900 PVC DR-14 Only		
The above shall apply to lift station force mains, interfered trenches, special circumstance gravity lines as deemed necessary by Owner / Engineer.		

### 350.02 Manholes

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Fiberglass Heavy Wall Manholes (minimum wall thickness 0.480 inches)	Flowtite, LF Manufacturing or approved equivalent	48" +
H-20 Minimum rating		



### 350.03 Ring & Cover

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Ductile Iron Ring and Cover	East Jordan Iron Works V-1420 or approved equal	30"
H-20 Rating		

### 350.04 Lift Station Covers

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
Aluminum Wet well Covers and hatches	Halliday W1S, W2S, S1S, S2S, W1R, W2R, S1R, S2R, H1W, 2W, H1R, H2R or approved equal	As Per Specifications depending on pump size and wet well configuration
Cleanout boot for drop manholes	East Jordan Iron Works model #1565, Cast Iron	As per manufacturer's specs

### 350.05 Miscellaneous

<b><u>TYPE</u></b>	<b>Manufacturer</b>	<b>Size</b>
<p>Note: Any and all fasteners, nuts, bolts, washers, chains, wire rope, clasps, rails, hasps, brackets, or hangers at or around wastewater wetwells shall be a minimum construction material of 304 stainless steel and 316 or greater stainless steel if deemed necessary by the Owner / Engineer.</p>		
<p>Note: Any device, piping assembly, bracketry, hatch or any other item secured to concrete on or around a wastewater plant or lift station shall be approved by the Owner / Engineer or designated EPWWS Inspector before installation.</p>		



## **400 Installation of Pipe and Appurtenances**

### **410 General Requirements**

#### **411 Description**

These design criteria are minimum requirements to be used in the design of piping and appurtenances within the jurisdiction of the City of Eagle Pass Water Works System, herein after referred to as EPWWS. The jurisdiction of the EPWWS is defined as the area bound by the by the Certificate of Convenience and Necessity (CCN). This section describes excavation and trenching work for pipe and appurtenances to be installed under these specifications and shall include the necessary site preparation, excavation and trenching, the handling, storage, shoring and protection of the work, preparation of the subgrades, pumping and dewatering as necessary or required, protection of adjacent property, backfilling, pipe embedment, and other incidentals necessary to complete the work.

Excavation work shall be performed in a safe and proper manner with suitable precautions being taken against hazards of every kind. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation, and shall be in compliance with the latest OSHA regulations for Trench Safety.

Prior to commencing this Work, all erosion control and tree protection measures required shall be in place and all utilities located and protected

#### **412 Classification of Excavated Material**

**412.01 Common Excavation:** Materials that can be removed by standard construction methods and/or equipment.

**412.02 Rock Excavation:** All masses of material which cannot be removed by standard construction methods and/or equipment thereby requiring special equipment, or blasting for excavation, shall be considered rock excavation.

#### **413 Grades, Lines, and Levels**

Grades, lines, and levels shall conform to the approved construction plans approved by the EPWWS. The surveyor will set all necessary stakes required by the specifications and/or the construction plans. Any damage to the above by the Contractor shall be re-established at the Contractor's expense.

The location of the lines and grades indicated may be changed only by direction of the Engineer and it is understood that the Contractor will be paid on the basis of his unit



Contract prices bid for such Work actually performed and shall make no claim for damages or loss of anticipated profits due to the change of location or grade.

The Contractor shall furnish, at his expense, all necessary electronic devices or batter boards for controlling the Work. Electronic devices shall have adequate precession to produce a finished pipe on grade. Batter boards shall be of adequate size material and shall be supported substantially. Control stakes must be protected from possible damage or change of location. The Contractor shall furnish good target for electronic devices, sound twilled lines for use in achieving lines and grades and the necessary plummets, levels and graduated poles.

Should the Contractor's procedures not produce a finished pipe placed to grade and alignment, the pipe shall be removed and relayed and the Contractors procedures modified to the satisfaction of the EPWWS Inspector. No additional compensation shall be paid for the removal and relaying of pipe required above.

## **420 Materials**

### **421 General**

This item shall consist of furnishing and installing all pipe and/or materials for constructing pipe mains, sewers, laterals, stubs, inlet leads, service connections and culverts, including all applicable Work such as excavating, bedding, jointing, backfilling materials, tests, concrete trench cap, concrete cap and encasement, etc. The pipe shall be of the sizes, types, class and dimensions indicated or as designated by the Engineer and shall include all joints or connections to new or existing mains, pipes, sewers, manholes, inlets, structures, etc., as may be required to complete the Work in accordance with specifications and published standard practices of the trade associations for the material specified and to the lines and grades indicated.

This item shall include any pumping, bailing, drainage and Trench Safety Systems for trench walls, when indicated or applicable. Unless otherwise provided, this item shall consist of the removal and disposition of trees, stumps and other obstructions, old structures or portions thereof such as house foundations, old sewers, masonry or concrete walls, the plugging of the ends of abandoned piped utilities cut and left in place and the restoration of existing utilities damaged in the process of excavation, cutting and restoration of pavement and base courses, the furnishing and placing of select bedding, backfilling and cement or lime stabilized backfill, the hauling and disposition of surplus materials, bridging of trenches (metal plates) and other provisions for maintenance of traffic or access as indicated.



## 422 Backfill Materials

**422.01 General:** The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation into the Work is of the kind and quality that satisfies the specified functions and quality. Material classified by ASTM D 2487 as GW, GP, GC, GM, SW, SP, SM, SC, CL, CH, and is free of rocks larger than three (3") inches and having a plasticity index equal to or less than twenty (20) shall be classified as Satisfactory Native Material.

Unsatisfactory materials shall be materials that do not comply with the requirements for satisfactory material. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than three (3") inches, plasticity index equal to or greater than twenty-one (21), and materials classified in ASTM D2487 as PT, OH, OL, ML, and MH.

Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

**422.02 Bedding Material:** Bedding shall be well graded Class I or II material as described below:

### A. Class IB

Manufactured angular, densely graded stone/sand, granular material, 1/4 to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells.

Note: Soils are as defined in ASTM D2487, except for Class I material which is defined in ASTM D2321. These materials are stone/sand mixtures with gradations selected to minimize migration of adjacent soils.

### B. Class II

- |    |  |
|----|--|
| GW | Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.  |
| GP | Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No 4 sieve. More than 95% retained on No. 200 sieve. Clean. |
| SW | Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.             |
| SP | Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.           |





Note: In accordance with ASTM D2487, less than 5% pass No. 200 sieve.

#### **422.03 Trench Backfill Material:**

##### **A. Satisfactory Native Material**

This material shall consist of suitable material excavated from the trench. It shall conform to paragraph 422.01 of this section. The moisture content at the time of compaction shall be within 2 percent of optimum as determined by TXDOT Test Method Tex-113-E.

##### **B. Cement Stabilized Backfill**

When indicated or directed by the Engineer, all backfill shall be with cement-stabilized backfill rather than the usual materials. Unless otherwise indicated, cement stabilized backfill material shall consist of a mixture of cement and aggregates and shall be thoroughly dry mixed with no water added to the mixture except as may be directed by the Engineer.

#### **430 Trench Excavation**

##### **431 General**

**431.01 Trench Opening:** The Contractor shall open no more trench in advance of pipe laying than is necessary to expedite the work. The maximum length of open trench permitted on any line under construction shall not exceed the amount of pipe that can be placed in the same day of excavation.

**431.02 Trench Safety:** Underground piped utilities shall be constructed in an open cut in accordance with Federal regulations "Trench Safety Systems" and with a trench width and depth described below.

**431.03 Trench Fill:** When pipe is to be constructed in fill above the natural ground, Contractor shall construct embankment to plan grade and meet compaction requirements, and then the trench can be excavated.

##### **432 Excavated Materials**

**432.01 General:** Excavated material from trenching may be used as the satisfactory native material for backfilling the trench, provided the material meets Section 422 specifications.

No excavated material shall be deposited on the site of the work or other improved areas, or upon private property unless approved by the Owner/Engineer, and such material shall be handled in such a manner as not to obstruct drainage or other parts of the project.



Where necessary for compliance with this provision, the material shall be hauled or removed by an approved method.

**432.02 Surplus Excavated Materials:** Any surplus excavated materials shall be hauled and disposed of as directed by the Engineer. If the Engineer notifies the Contractor that there is no use for this material on the project it shall become the property of the Contractor to be disposed of without injury to the Owner's or any adjoining property at the Contractor's expense.

### 433 Trench Width

**433.01 Water & Wastewater Lines:** Trenches for pipes shall be of sufficient width to provide ample working space for handling and jointing the pipe in the trenches. In no case shall the width of the trench inside sheeting and brace lines be less than sixteen (16") inches greater than the normal pipe diameter as follows:

<u>Pipe Diameter</u>	<u>Min Trench Width</u>	<u>Max Trench Width</u>
6"	18"	30"
8"	20"	32"
10"	22"	34"
12"	24"	36"
18"	30"	42"
24"	36"	48"

**433.02 Excessive Trench Width:** If the trench width within the pipe zone exceeds this maximum, the entire pipe zone shall be refilled with approved backfill material, thoroughly compacted to a minimum of 95 percent of maximum density as determined by TxDOT Test Method Tex-114-E and then re-excavated to the proper grade and dimensions. Excavation along curves and bends shall be so oriented that the trench and pipe are approximately centered on the centerline of the curve, using short lengths of pipe and/or bend fittings if necessary.

Where, for any reason, width of the lower portion of the trench as excavated at any point exceeds the maximum permitted, either pipe of adequate strength, special pipe embedment, or arch concrete encasement, as required by loading conditions and as determined by the Engineer, shall be furnished and installed by and at the expense of the Contractor.

**433.03 Excavation Below Pipe Subgrade:** Except when so ordered by the Engineer, pipe trenches shall not be excavated below pipe subgrade elevations, in which event the bottom of the trench shall be bedded with sandy or acceptable material.



**433.04 Bell Holes:** Bell holes shall provide adequate clearance for the tools and methods used in installing the pipe. No part of any bell or coupling shall be in contact with the trench bottom or trench walls when the pipe is jointed.

#### **434 Trench Depth and Depth of Cover**

**434.01 General:** All pipe and in-line appurtenances shall be laid to the grades indicated. The depth of cover shall be measured from the established finish grade, natural ground surface, subgrade for staged construction, street or other permanent surface to the top or uppermost projection of the pipe.

**434.02 Water Piping:** Where not otherwise indicated, all water piping shall be laid to the following minimum depths:

A. Water piping installed in undisturbed ground in easements of undeveloped areas, which are not within existing or planned streets, roads or other traffic areas shall be laid with at least 36 inches of cover.

B. Water piping installed in existing streets, roads row or other traffic areas shall be laid with at least 48 inches of cover below finish grade.

**434.03 Wastewater Piping:** Where not otherwise indicated, all wastewater piping shall be laid with at least 60 inches of cover.

#### **435 Trenching Detail**

See Appendix Detail 18 – Unfinished Surface Trenching Detail for additional information.

#### **440 Pipe Embedment**

##### **441 General Requirements**

Bedding material shall be used to fill up to a point at least six (6) inches above the pipe. Satisfactory native material may be used to backfill the remaining depth of the trench.

##### **442 Compaction & Moisture Requirements**

Both the bedding material and the satisfactory native materials shall be compacted to at least 95% of the standard proctor density as determined by ASTM D698 and within 2% of optimum moisture content.

Each layer of backfill material, if dry, shall be wetted uniformly to the moisture content required to obtain the specified density and shall be compacted to that density by approved mechanical means. The use of wheel compactors may be allowed in lieu of hand operated mechanical compactors with authorization from the Inspector. When wheel compactors are used, backfill lifts may be increased to twelve (12") inches



provided proper moisture content of the backfill material is maintained and the specified minimum density is achieved. All testing required to validate that adequate compaction is being achieved by the use of the wheel compactor shall be at the expense of the Contractor.

Water tamping by flooding the trench prior to placing the remainder of the trench backfill may not be used in lieu of hand tamping. Water jetting may be used except in pavement cuts.

The Owner may perform or have performed any material tests needed as indicated by the situations described below. The Contractor will be charged for all testing regardless of whether or not the test passes or fails. The Contractor will also be charged for all retesting necessitated by failures. Situations requiring testing are as follows:

- A. In determining whether or not minimum density is being achieved.
- B. Visual inspection by the Inspector shows poor quality, workmanship or materials.
- C. Inspector was not notified of backfill operation.
- D. In all trenches placed in a proposed or existing roadway.
- E. Any other unusual circumstance that cause the Inspector to doubt the quality of the workmanship or materials.

## **450 Construction Methods**

### **451 General**

The Contractor shall conduct his Work such that a reasonable minimum of disturbance to existing utilities will result. Particular care shall be exercised to avoid the cutting or breakage of all existing utilities. If at any time the Contractor damages the utilities in place through his operations, the Contractor shall immediately notify the owner of the utility to make the necessary repairs.

The Contractor shall inform utility owners sufficiently in advance of the Contractor's operations to enable such utility owners to reroute, provide temporary detours or to make other adjustments to utility lines in order that the Contractor may proceed with his Work with a minimum of delay and expense. The Contractor shall cooperate with all utility owners concerned in effecting any utility adjustments necessary and shall not hold the Owner liable for any expense due to delay or additional Work because of conflicts arising from existing utilities.

The Contractor shall do all trenching in accordance with the provisions and the directions of the Engineer as to the amount of trench left unfilled at any time. All excavation and backfilling shall be accomplished as indicated and in compliance with State Statutes.



Where excavation for a pipeline is required in an existing city street, control of traffic shall be as indicated in accordance with the Texas Manual on Uniform Traffic Control Devices. A copy of the traffic control plan must be submitted to the City Public Works and Planning Department for review and approval.

Wherever existing utility branch connections, sewers, drains, conduits, ducts, pipes or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed by the Contractor through cooperation with the owner of the utility, structure or obstruction involved. In those instances where their relocation or reconstruction is impractical, a deviation from line and grade will be ordered by the Engineer and the change shall be made in the manner directed.

Adequate temporary support, protection and maintenance of all underground and surface utility structures, drains, sewers and other obstructions encountered in the progress of the Work shall be furnished by the Contractor, at his expense and as approved by the Engineer.

Where traffic must cross open trenches, the Contractor shall provide suitable steel plates of the thickness directed by the Engineer. Adequate provisions shall be made for the flow of sewers, drains and watercourses encountered during construction and any structures which may have been disturbed shall be satisfactorily restored upon completion of Work.

When rainfall or runoff is occurring or is forecast by the U.S. Weather Service, the Contractor shall not perform or attempt any excavation or other earth moving Work in or near the flood plain of any stream or watercourse or on slopes subject to erosion or runoff, unless given specific approval by the Engineer.

#### **452 Water / Sewer Line Separation**

**452.01 Water and Sewer Crossings:** Installation shall comply with Section 500 of the Standard Specifications.

**452.02 Utility and Storm Sewer Crossings:** When the Contractor installs a pipe that crosses a drainage structure or storm sewer and the top of the pipe is within 18 inches of the bottom of the structure, the pipe shall be encased in concrete for a distance of at least 1 foot on either side of the ditch line of the utility structure or the storm sewer.

#### **453 Pipe Anchorage, Support, and Protection**

Pressure pipeline tees, plugs, caps, and bends shall be securely anchored by approved metal harness.

**453.01 Metal Thrust Restraint:** Fabricated thrust restraint systems such as those described below may be approved for use instead of concrete blocking. To obtain



approval, the project Drawings must include sufficient drawings, notes, schedules, etc., to assure that the proposed restraints as installed will be adequate to prevent undesirable movement of the piping components. Such restraint systems may only be used where and as specifically detailed and scheduled on approved Project Drawings.

A. Restrained Joints: Piping or fitting systems utilizing integral mechanically restrained joints may be approved. All components of such systems shall be standard manufactured products fabricated from cast ductile iron, hot-dip galvanized steel, brass or other corrosion resistant materials and the entire assembly shall be protected with a continuous film wrap.

Location, configuration, and description of such products shall be specifically detailed on the Drawings. (Add-on attachments such as retainer glands, all-thread rods, etc., are not acceptable.)

B. Concrete Encasement, Cradles, Caps, and Seals: When trench foundation is excessively wet or unstable or installation of water or wastewater pipe will result in less than 30 inches of cover, Contractor shall notify Engineer. Engineer may require Contractor to install a concrete seal, cradle, cap, encasement, or other appropriate action.

C. Trench Caps, Concrete Rip-Rap and Shaped Retards: Where called for by the Contract or as directed by the Engineer, concrete trench caps, concrete rip-rap and/or shaped retards shall be placed as detailed by the Drawings as protection against erosion.

#### **454 Connections to Existing Systems**

Requests for connections to the existing wastewater and water systems shall be made to the Owner and inspection by Owner's representative shall be conducted to approve connection work. Only thereafter shall acceptance of work be made if all work is satisfactory to Owner's guidelines and specifications.

**454.01 Wastewater Connections:** All branch connections of new main lines shall be made by use of manholes. Service stubs shall be installed as indicated in the details, utilizing a 45 degree bend with a wye or a sanitary tee (long sweep). Minimum grade shall be 1 percent downward to main and minimum cover shall be 30 inches at the curb. A two-way clean-out shall be installed at the property line with a one foot stub-out. Glued-caps shall be installed on the stub-outs before backfilling.

Where not otherwise indicated, (wastewater) service connections shall be installed so that the outlet is at an angle of not more than 45 degrees above horizontal at the main line.



Unless otherwise specified by the Engineer, all sewer main connections made to existing mains shall be made at manholes with the soffit of the inlet pipe installed at the same elevation as the soffit of the existing pipe.

Connections to existing manholes shall conform to TCEQ requirements and shall only be made by boring through the manhole wall.

**454.02 Water System Connections:** The Contractor shall, at his expense, make all necessary connections of new piping or accessories to the existing water system. To minimize any inconvenience from outages, the Contractor shall tap all mains using an approved tapping sleeve (full circle stainless steel wrap-around) and tapping valve.

In instances which require shutoffs on existing water mains, the Owner will make the shut-off. The Contractor shall be required to notify the Engineer's field representative on the job and EPWWS at least 72 hours prior to the desired time for any shutoff. EPWWS will notify any affected utility customers at least 24 hours prior to the shutoff; EPWWS may request that the Contractor be responsible for notification of affected customers. The Water Utility will make the shutoff after ensuring that all appropriate measures have been taken to protect the water system, customers, and employees.

Water for the work shall be metered and furnished by the Contractor, including water for flushing of lines. However, the cost of metered water shall be absorbed by the Owner on Capital Improvement Projects. Should it be determined that the Contractor excessively wastes water, then billing charges shall be forwarded to the Contractor.

The Contractor shall make all pressure taps called for by the Contract Documents or required to complete the Work. A pressure tap shall consist of connecting new piping to the existing water system by drilling into the existing pipe while it is carrying water under normal pressure without taking the existing piping out of service.

Unless otherwise provided by the Contract, the Contractor shall, at his expense, perform all necessary excavation, furnish and install the tapping sleeve, valve and accessories, provide the tapping machine, drill the tap and shall block, anchor and backfill the piping, valve, and all accessories, place the new piping in service, and perform all site cleanup.

An EPWWS Inspector must be present when the Contractor makes the tap.

Service connection taps into PVC or AC pipe or into CI or DI pipe 12 inches or smaller shall be made using tapping saddles as recommended by the pipe manufacturer and as approved by the Engineer.

All water service connections shall be installed so that the outlet is at an angle of not more than 45 degrees above horizontal at the main line.

No size on size taps will be allowed. For size on size connections, a cut-in tee will be required.





Precautions should be taken to ensure that the tapping saddle or sleeve is placed on the pipe straight to prevent any binding or deformation of the PVC pipe. Tapping shall be performed with a sharp shell type cutter so designed that it will smoothly penetrate heavy walled PVC and AC pipe and will retain and extract the coupon from the pipe.

#### **455 Concrete Encasement and Encasement Pipe**

**455.01 General:** This item shall govern the furnishing of materials and the methods of constructing a Portland cement concrete encasement or encasement pipe.

**455.02 Submittals:** The submittal requirements of this specification item include:

- A. Type of pipe, construction methods and sequence,
- B. Aggregate types, gradations and physical characteristics for the Portland cement concrete mix,
- C. Proposed proportioning of materials for the mortar mix.

**455.03 Materials:** The Portland cement concrete shall conform to Class B Concrete. The cement stabilized sand shall have a minimum of 10% (2.5 bags min.) cement per cubic yard and shall contain brown coloring for identification when used to encase wastewater lines.

**455.04 Construction Methods:** When indicated on the Drawings or acceptable to Engineer, concrete encasement shall be placed to protect the pipe. Pipe or bedding shall not be placed where:

- A. the top of the pipe would have less than 30 inches of cover,
- B. the ground water invades the trench, or
- C. the trench bottom is of unstable material.

If either of these conditions is encountered, the Engineer or designated representative shall be notified and may direct the Contractor to:

- A. encase the pipe with concrete,
- B. change pipe material, or
- C. use a higher strength class of pipe.

Concrete encasement shall extend from 6 inches below to 6 inches above the outer projections of the pipe over the entire width of the trench in accordance with the EPWWS Standard Details. See Appendix *Detail 19 – Concrete Encasement Detail* for more information.



**456     Blasting**

Blasting or other use of explosives for excavation will not be permitted on the site of the work without specific written approval by the Owner/Engineer and the City Fire Marshall.

**457     Removal of Water**

The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the pipe to be installed therein is completed to the extent that no damage from hydrostatic pressure, flotation, or other causes will result.

Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

The Contractor will be held responsible for the condition of any pipe which may be used for drainage purposes, and all such pipe shall be kept clean and free from sediment.

**458     Backfilling**

**458.01 General:** Special emphasis is placed upon the need to obtain uniform density throughout the backfill material. The maximum lift of backfill shall be determined by the compaction equipment selected and in no case shall it exceed 6 inches. Density testing shall be conducted to Standard Proctor (ASTM D-698) or Modified Proctor (ASTM D-1557) and must be taken at a minimum of every 500 linear feet under paved streets, at a minimum of every 1,000 linear feet under non-paved areas and additional testing at the discretion of the inspection personnel if backfill compaction does not appear to meet specifications within the intervals indicated above for every lift. Section 640 of this document contains additional information on backfill testing.

No heavy equipment, which might damage pipe, will be allowed over the pipe until sufficient cover has been placed and compacted. All internal pipe bracing installed or recommended by the manufacturer shall be kept in place until the pipe bedding and trench backfill have been completed over the braced pipe section.

**458.02 Backfill in Street Right of Way:** Prior to commencing any work within the street right-of-way, contractor shall obtain a right-of-way use permit from the Public Works Department. The depth of layers, prior to compaction, shall depend upon the type of sprinkling and compacting equipment used and the test results thereby obtained, but shall not be more than 6 inches. Prior to and in conjunction with the compaction operation, each layer shall be brought to the moisture content necessary to obtain the required density and shall be kept level to insure uniform compaction over the entire layer. Testing for density shall be in accordance with Test Method Tex-114-E and Test Method Tex-115-E.



Each layer of backfill must provide the density as required herein. Satisfactory Native Material shall be sprinkled as required and compacted to the extent necessary to provide not less than 95 percent of the density as determined in accordance with Test Method Tex-114-E.

After each layer of backfill is complete, tests may be required by the Engineer. At a minimum, density testing shall be conducted at every 500 linear feet under paved streets and at the discretion of inspection personnel to request additional testing within the intervals mentioned previously. If the material fails to meet the density indicated, the course shall be reworked as necessary to obtain the indicated compaction and the compaction method shall be altered on subsequent Work to obtain indicated density.

At any time, the Engineer may order proof rolling to test the uniformity of compaction of the backfill layers. All irregularities, depressions, weak, or soft spots that develop shall be corrected immediately by the Contractor.

Should the backfill, due to any reason, lose the required stability, density or finish before the pavement structure is placed; it shall be recompacted and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling, or sealing. Excessive loss of moisture shall be construed to exist when the subgrade soil moisture content is more than 4 percent below the optimum of compaction ratio density. Backfill shall be placed from the top of the bedding material to the existing grade, base course, subgrade, or as indicated. The remainder of the street backfill shall be Flexible Base, Concrete or Hot Mix Asphalt Concrete as indicated or to replace the same kind of surface removed to construct the pipe.

**458.03 Backfill in State Highway Right of Way or City Street:** All Work within the right of way shall meet the requirements of above as a minimum and shall meet the requirements of the permit issued by the City / County when their requirements are more stringent. Prior to the start of construction, the Contractor shall be responsible for contacting the appropriate TxDOT office, City Public Works, Planning Department or County office and for coordinating his activities with the operating procedures in effect for utility cut permits and pavement repair under their jurisdiction. Approval for all completed Work in the State, City or County right of way shall be obtained from the appropriate Official prior to final payment by the Owner.

**459.04 Backfill in Easements:** Where not otherwise indicated, the Contractor may select whatever methods and procedures may be necessary to restore entire Work area to a safe, useful and geologically stable condition with a minimum density of 95 percent or a density superior to that prior to construction.

All soil areas disturbed by construction shall be covered with topsoil and seeded. All turf within city right-of-way shall obtain seventy (70) percent coverage before final acceptance and erosion control structures are removed. All turf, drainways, and drainage



structures shall be constructed or replaced to their original condition or better. No debris shall remain in the drainways or drainage structures.

#### **459 Pavement Repair**

##### **458.01 Gravel Base Course:**

A. Flexible base course shall be compacted in maximum 9 inch lifts to at least 95% of the modified proctor maximum dry density per ASTM D1557 within plus or minus two percent of optimum moisture content. A compaction test should be done per 5,000 square feet of base course placed per lift.

B. Construction methods to conform with applicable Section of the Texas DOT Standards Specifications.

C. Top of gravel base course to be below finish grade a distance equal to the depth of the permanent trench of curb-to-curb pavement to be placed on gravel base course.

D. Additional gravel course to be placed where temporary pavement thickness is less than the permanent pavement thickness and later removed with the temporary pavement and dressed and compacted as necessary for the permanent pavement.

##### **458.02 Temporary Trench Pavement:**

A. Temporary asphalt stabilized base over all trenches as direct by the Engineer shall meet TxDOT Item 330 – Limestone Rock Asphalt Pavement.

B. Prior to placing asphalt stabilized base, backfill compacted as required to eliminate settling of backfill. No asphalt stabilized base placed over poorly compacted backfill or gravel base.

C. Asphalt stabilized base compacted, brought to proper elevation and dressed so that it matches existing grade. Maintain surface of trench area until final pavement is placed.

D. Temporary asphalt stabilized base course to be a minimum 9.5 inches to 10 inches maximum: 8 inch thick layer equivalent to flexible base course layer and 1.5 inches or 2 inches equivalent to asphalt pavement layer (varies by location).

Temporary asphalt stabilized base to be of compacted limestone rock, asphalt course, Specific Gravity – APP: 2.35, Bulk: 2.19, SSD: 2.26, Absorption %: 3.1, LA Wear (ASTM C131): 32, Sulfate Soundness, % Loss: 21.

E. See Appendix *Detail 20 – Temporary Surface Trenching Detail* for additional information.

##### **458.03 Preparation for Pemanent Trench Pavement:**



A. In preparation for permanent trench pavement for City roadways, Contractor to remove minimum 1.5 inches or equivalent thickness of existing pavement (varies based on existing asphalt thickness & location) of temporary asphalt stabilized base to match existing elevation of surrounding flexible base course.

B. Edges of existing pavement to be saw cut 24 inches beyond trench excavation wall or damaged area to provide a clean bonding edge.

C. Remove and dispose of excavated material before proceeding with remainder of work.

**458.04 Pemanent Pavement:**

A. Materials and construction methods to conform to TxDOT Standard Specification Item 334 – Hot Mix-Cold Laid Asphaltic Concrete Pavement or Item 340 – Hot Mix Asphaltic Concrete Pavement.

B. Place on previously prepared gravel base course dressed and compacted as per TxDOT specifications.

C. Provide smooth transition to existing pavement.

D. See Appendix *Detail 21 – Final Surface Trenching Detail* for additional information.

**460 Specialized Construction Methods**

**461 Construction Methods**

**461.01 Setting Valves, Drains and Air Releases:** Unless otherwise indicated, main line valves, drain valves and piping, air and vacuum release assemblies, and other miscellaneous accessories shall be set and jointed in the manner described for cleaning, laying, and jointing pipe.

Unless otherwise indicated, valves shall be set at the locations shown on the Drawings and such that their location does not conflict with other appurtenances such as curb ramps. Valves shall be installed so that the tops of operating stems will be at the proper elevation required for the piping at the location indicated above. Valve boxes and valve stem casings shall be firmly supported and maintained, centered and aligned plumb over the valve or operating stem, with the top of the box or casing installed flush with the finished ground or pavement in existing streets, and installed with the top of the box or casing approximately 6 inches (150 mm) below the standard street subgrade in streets which are excavated for paving construction or where such excavation is scheduled or elsewhere as directed by the Engineer or designated representative.



**461.02 Setting Fire Hydrants:** Fire hydrants shall be located in a manner to provide accessibility and in such a manner that the possibility of damage from vehicles or conflict with pedestrian travel will be minimized. Unless otherwise directed, the setting of any hydrant shall conform to the following:

Hydrants between curb and sidewalk on public streets shall be installed as shown on details, with outermost point of large nozzle cap 6" to 18" behind back of curb. Where walk abuts curb, and in other public areas or in commercial areas, dimension from gutter face of curb to outermost part of any nozzle cap shall be not less than 5 feet, nor more than 7 feet, except that no part of a hydrant or its nozzle caps shall be within 6 inches of any sidewalk or pedestrian ramp. Any fire hydrant placed near a street corner shall not be placed within the radius. Fire hydrants shall not be installed within nine feet vertically or horizontally of any sanitary sewer line regardless of construction. Hydrants placed on uncurbed State of Texas right-of-way shall be located within 18" of the R.O.W. line.

All hydrants shall stand plumb; those near curbs shall have the 4 inch nozzle facing the curb and perpendicular to it. The hydrant bury mark shall be located at ground or other finish grade; nozzles of all new hydrants shall be approximately 18 inches above grade. Each hydrant shall be connected to the main by 6 inch ductile iron pipe; a 6 inch gate valve shall be installed at the main on an anchor tee for individual shutoff of each new hydrant.

Below each hydrant, a drainage pit shall be excavated according to the details and filled with compacted coarse gravel or broken stone mixed with coarse sand under and around the bowl of the hydrant, except where thrust blocking is situated and to a level 6 inches above the hydrant drain opening. No hydrant drainage pit shall be connected to a sanitary sewer. Drain gravel shall be covered with filter fabric to prevent blockage of voids in the gravel by migration of backfill material. The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with concrete thrust blocking (taking care not to obstruct the hydrant drain holes). Hydrants shall be thoroughly cleaned of dirt or foreign matter before setting.

Fire hydrants on mains under construction shall be securely wrapped with a poly wrap bag or envelope taped into place. When the mains are accepted and placed in service the bag shall be removed.

**461.03 Protective Covering:** Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other steel component shall be coal tar coated and shall be wrapped with standard low density polyethylene film or a cross laminated high-density polyethylene meeting ANSI/AWWA Specification C-105-current, with all edges and laps taped securely to provide a continuous and watertight wrap. Repair all punctures of



the polyethylene, including those caused in the placement of bedding aggregates, with poly tape to restore the continuous protective wrap before backfilling.

**461.04 Valve Box, Casing and Cover:** Stems of all buried valves shall be protected by valve box assemblies. Valve box castings shall conform to ASTM A 48, Class 30B. Testing shall be verified by the manufacturer at the time of shipment. Each casting shall have cast upon it a distinct mark identifying the manufacturer and the country of origin.

#### **470 Boring of Pipe**

##### **471 Description**

This item shall govern furnishing and installing of encasement pipe by methods of boring as indicated on the Drawings and in conformity with the specifications. This item shall also include, but not be limited to other constructions activities such as traffic control measures, excavation, removal of all materials encountered in jacking or boring pipe operations, disposal of all material not required in the work, grouting, bulkhead installation, backfilling, and re-vegetation.

##### **472 Submittals**

The submittal requirements for this item shall include:

- A. Shop drawings identifying proposed jacking or boring method complete in assembled position
- B. Trench Safety Plan including pits, trenches and sheeting or bracing if necessary,
- C. Design for jacking or boring head,
- D. Installation of jacking or boring supports or back stop,
- E. Arrangement and position of jacks and pipe guides, and
- F. Sealing plan,
- G. City / State requirements regarding traffic control & site safety plan

##### **473 Materials**

**473.01 Pipe:** Carrier pipe and encasement pipe shall be the size, type, thickness, and class indicated on the Drawings, unless otherwise specified.

**473.02 End Seal:** End seals shall be sized to securely attach to the exterior of casing and carrier pipe to prevent water, dirt, and debris from entering the annular space between the installed pipe. The end seal shall be pull-on, wrap-around, or heat shrinkable. No concrete, grout, or bricks will be acceptable.





**473.03 Casing Spacers:** Casing spacers shall be constructed of high density polyethylene and shall be sized to securely fasten onto the carrier pipe barrel O.D. They shall be furnished with a minimum runner height to prevent the pipe from resting or sliding on its joint during and after installation.

#### **474 Construction Methods**

**474.01 General:** The Contractor is responsible for:

- A. Adequacy of jacking and boring operations,
- B. Installation of support systems as indicated on the Drawings,
- C. Provision of encasement and carrier pipe, and
- D. Execution of work involving the jacking operation, the wet or dry method of boring and the installation of encasement pipe simultaneously.

The Contractor shall have sole responsibility for the safety of the jacking and boring operations and for persons engaged in the work. The Contractor is directed to the Construction Industry Occupational Safety and Health Administration (OSHA) Standards (29 FR 1926/1920) as published in U.S. Department of Labor publication OSHA 2207, latest revision, with particular attention to Subpart S. The Contractor shall conform to the requirements in accordance with "Trench Safety System" and shall provide an appropriate Trench Safety Plan.

When the grade of the pipe at the boring end is below the ground surface, suitable pits or trenches shall be excavated to provide sufficient room to conduct the jacking or boring operations and for placement of end joints of the pipe. In order to provide a safe and stable work area, the excavated area shall be securely sheeted and braced to prevent earth caving in accordance with the Trench Safety Plan.

The location of the work pit and associated traffic control measures required for the boring operations shall conform to the requirements of the TXDOT Manual on Uniform Traffic Control Devices.

Where installation of pipe is required under highways, streets, or other facilities by jacking or boring methods, construction shall be undertaken in such a manner that it will not interfere with operation of any railroad, street, highway, utility, or other facility and shall not weaken or damage any embankment or structure. All appropriate permits shall be acquired prior to the initiation of the work. At a minimum, bore pit locations must be ten feet from the edge of pavement.

During construction operations, and until the work pits are backfilled and fill material compacted, traffic barricades and warning lights to safeguard traffic and pedestrians shall be furnished and maintained by the Contractor. The Contractor shall submit the



proposed pit location and traffic control plan for review by the City or designated representative. The Review by the Engineer or designated representative, however, will not relieve the Contractor from his responsibility to obtain specified results in a safe, workmanlike manner.

The pipe shall be bored from the low or downstream end, if possible. Minor lateral or vertical variation in the final position of pipe from line and grade established by the Engineer will be permitted at the discretion of the Engineer provided that such variation is regular and occurs only in one direction and that the final grade of the flow line conforms to the specified direction.

When conforming to details indicated on the drawings, but the bottom of the work pit is unstable or excessively wet or the installation of water and wastewater pipe will result in less than 36 inches of cover, the Contractor shall notify the Engineer. The Engineer may require the Contractor to install a concrete seal, cradle, cap or encasement or other appropriate action.

Positioning of spacers should ensure that the carrier pipe is adequately supported throughout its length. Spacers at each end shall not be further than 6" from the end of the casing regardless of the size of casing and carrier pipe or type of spacer used. Casing spacers shall be doubled on each end of the encasement and shall be installed within one foot on each side of the bell or flange. The maximum spacing for casing spacers is 5 ft.

After placement of the carrier pipe is complete, the ends of the encasement pipe shall be sealed with a flexible type end seal as outlined in section 473.02. As soon as possible after the end seals are placed, the work pits or trenches, which are excavated to facilitate these operations, shall be backfilled. The backfill in the street ROW shall be compacted to not less than 95 percent of the maximum density conforming to TXDOT Test Method Tex-114-E, "Laboratory Compaction Characteristics & Moisture-Density Relationship of Subgrade & Embankment Soil". Field density measurements will be made in accordance with TXDOT Test Method Tex-115-E, "Field Method for Determination of In-Place Density of Soils and Base Materials".

The boring shall proceed from a work pit provided for the boring equipment and workmen. Excavation for the work pits and the installation of shoring shall be as outlined in the Trench Safety Plan. The location of the pit shall be approved by the Engineer or designated representative. The boring shall be done mechanically using either a pilot hole or the augur method.

In the pilot hole method an approximate 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.



When the augur method is used, a steel encasement pipe of the appropriate diameter equipped with a cutter head to mechanically perform the excavation shall be used. Augurs shall be of sufficient diameter to convey the excavated material to the work pit.

Excavated material will be removed from the working pit and disposed of properly. The use of water or other fluids in connection with the boring operation will be permitted only to the extent to lubricate cuttings. Water jetting will not be permitted.

In unstable soil formations, a gel-forming colloidal drilling fluid that consists of at least 10 percent of high grade carefully processed bentonite may be used to consolidate the drill cuttings, seal the walls of the hole and furnish lubrication to facilitate removal of the cuttings from the bore.

See Appendix *Detail 22 – Typical Jack & Bore Detail* for additional details.

#### **475 Cleanup and Restoration**

It shall be the Contractor's responsibility to keep the construction site neat, clean and orderly at all times. Cleanup shall be vigorous and continuous to minimize traffic hazards or obstructions along the streets and to driveways. Trenching, backfill, pavement repair (as necessary), and cleanup shall be coordinated as directed. The Engineer will regulate the amount of open ditch and may halt additional trenching if cleanup is not adequate to allow for orderly traffic flow and access.

Materials at the site shall be stored in a neat and orderly manner so as not to obstruct pedestrian or vehicular traffic. All damaged material shall be removed from the construction site immediately and disposed of in a proper manner. All surplus excavated materials become the property of the Contractor for disposal at his expense. After trenching, the Contractor shall immediately remove all excavated materials unsuitable for or in excess of, backfill requirements. Immediately following the pipe laying Work as it progresses, the Contractor shall backfill, grade, and compact all excavations as provided elsewhere and shall immediately clean up and remove all unused soil, waste, and debris and restore all surfaces and improvements to a condition equal or superior to that before construction began and to an appearance which complements the surroundings. The Contractor shall grade and dress the top 6 inches of earth surfaces with soil or other material similar and equal to the surrounding, fill and smooth any visible tracks or ruts, replace and re-establish all damaged or disturbed turf or other vegetation and otherwise make every effort to encourage the return of the entire surface and all improvements to a pleasant appearance and useful condition appropriate and complementary to the surroundings and equal or similar to that before construction began.



## 500 Separation Distances

### 510 General Requirements

Separation distances criteria are the minimum requirements to be used within the jurisdiction of the City of Eagle Pass Water Works System, herein after referred to as EPWWS. The jurisdiction of the EPWWS is defined as the area bound by the Certificate of Convenience and Necessity (CCN). The minimum design requirements are those required by TCEQ in their regulations. The most current version of these regulations are provided below for reference.

### 520 New Wastewater Lines

The requirements below are taken from 30 TAC § 217.53(d), effective August 28, 2008.

- (1) Collection system pipes must be installed in trenches separate from public water supply trenches.
- (2) Collection system pipes must be no closer than nine feet in any direction to a public water supply line.
- (3) If a nine-foot separation distance cannot be achieved, the following guidelines will apply.
  - (A) If a collection system parallels a public water supply pipe the following requirements apply.
    - (i) A collection system pipe must be constructed of cast iron, ductile iron, or PVC meeting ASTM specifications with at least a 150 pounds per square inch (psi) pressure rating for both the pipe and joints.
    - (ii) A vertical separation must be at least two feet between the outside diameters of the pipes.
    - (iii) A horizontal separation must be at least four feet between outside diameters of the pipes.
    - (iv) A collection system pipe must be below a public water supply pipe.
  - (B) If a collection system pipe crosses a public water supply pipe, the following requirements apply:
    - (i) If a collection system is constructed of cast iron, ductile iron, or PVC with a minimum pressure rating of 150 psi, the following requirements apply:
      - (I) A minimum separation distance is six inches between outside diameters of the pipes.
      - (II) A collection system pipe must be below a public water supply pipe.
      - (III) Collection system pipe joints must be located as far as possible from an intersection with a public water supply line.
    - (ii) If a collection system pipe crosses under a public water supply pipe and the collection system pipe is constructed of acrylonitrile butadiene styrene (ABS) truss pipe, similar semi-rigid plastic composite pipe, clay pipe, or concrete pipe with gasketed joints, the following requirements apply:
      - (I) A minimum separation distance is two feet.
      - (II) If a collection system pipe is within nine feet of a public water supply pipe, the initial backfill around the collection system pipe must be:



- (-a-) sand stabilized with two or more 80 pound bags of cement per cubic yard of sand for any section of collection system pipe within nine feet of a public water supply pipe.
    - (-b-) installed from one quarter of the diameter of the collection system pipe below the centerline of the collection system pipe to one pipe diameter (but not less than 12 inches) above the top of the collection system pipe.
  - (iii) If a collection system crosses over a public water supply pipe, one of the following procedures must be followed:
    - (I) Each portion of a collection system pipe within nine feet of a public water supply pipe must be constructed of cast iron, ductile iron, or PVC pipe with at least a 150 psi pressure rating using appropriate adapters.
    - (II) A collection system pipe must be encased in a joint of at least 150 psi pressure class pipe that is:
      - (-a-) centered on the crossing;
      - (-b-) sealed at both ends with cement grout or manufactured seal;
      - (-c-) at least 18 feet long;
      - (-d-) at least two nominal sizes larger than the wastewater collection pipe; and
      - (-e-) supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.
  - (4) Public water supply pipe and collection system manhole separation.
    - (A) Unless collection system manholes and the connecting collection system pipe are watertight, as supported by leakage tests showing no leakage, they must be installed a minimum of nine feet of horizontal clearance from an existing or proposed public water supply pipe.
    - (B) If a nine-foot separation distance cannot be achieved, the requirements in paragraph (3) of this subsection apply.

### 530 New Water Lines

The requirements below are taken from 30 TAC § 290.44(e), effective December 10, 2009. See Appendix *Detail 23 – Waterline Crossing Sanitary Sewer & Other Utilities* for additional information.

The following rules apply to installations of waterlines, wastewater mains or laterals, and other conveyances/appurtenances identified as potential sources of contamination. Furthermore, all ratings specified shall be defined by ASTM or AWWA standards unless stated otherwise. New mains, service lines, or laterals are those that are installed where no main, service line, or lateral previously existed, or where existing mains, service lines, or laterals are replaced with pipes of different size or material.

- (1) When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.



- (2) Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in separate trenches.
- (3) No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.
- (4) Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.
  - (A) New waterline installation - parallel lines.
    - (i) Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.
    - (ii) Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or lateral shall be replaced with at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.
    - (iii) Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.
  - (B) New waterline installation - crossing lines.
    - (i) Where a new potable waterline crosses an existing, non-pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral is disturbed or shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.
    - (ii) Where a new potable waterline crosses an existing, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are





equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

- (iii) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
- (iv) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform to one of the following options.
- (I) Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.
- (II) All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.
- (III) When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals in subclause (II) of this clause or constructed of ductile iron or steel pipe with





mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. Both the waterline and wastewater main or lateral must pass a pressure and leakage test as specified in AWWA C600 standards.

- (v) Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pressure rating of at least 150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
  - (vi) Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.
- (5) Waterline and wastewater main or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.
  - (6) Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.
  - (7) Location of potable or raw water supply or suction lines. Suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.
  - (8) Proximity of septic tank drain fields. Waterlines shall not be installed closer than ten feet to septic tank drain fields.



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## 600 Acceptance Testing

### 610 General Requirements

Acceptance testing criteria are the minimum requirements to be used within the jurisdiction of the City of Eagle Pass Water Works System, herein after referred to as EPWWS. The jurisdiction of the EPWWS is defined as the area bound by the by the Certificate of Convenience and Necessity (CCN). This includes any private system which will connect or which may connect to City utilities.

**610.01 Calibration:** Calibration of all gauges pressure or vacuum gauges shall have a sticker affixed upon the gauge certifying it has been calibrated within the preceding six months before the equipment is allowed to be used for acceptance testing.

**610.02 Pipe Access for Testing:** The Contractor will not be permitted to load the new piping by opening a valve connected to an existing system. The Contractor may use an existing service or install a new service in the existing main. The connection shall be installed with a mechanical backflow prevention device and shall be metered.

### 620 Water Main Testing

#### 621 Acceptance Testing of Water Main

**621.01 Hydrostatic Testing:** After the pipe has been installed and backfilled and all service laterals, fire hydrants and other appurtenances installed and connected, a pressure test, followed by a leakage test, shall be conducted by the Contractor and witnessed by an EPWWS Inspector. The use of a reduced pressure zone (RPZ) backflow prevention device shall be used when loading the water main. The Contractor will furnish all the equipment required for the tests. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points. See Appendix Detail 24 – 2” Temporary Blow-Off Detail for additional information.

All water services and fire hydrant leads, with the main 6-inch gate valve open, the hydrant valve seats closed and nozzle caps open, shall be included in the test.

A. Pressure Test: New mains shall be hydrostatically field tested before acceptance by being placed under 1.5 times system pressure for a period of not less than 24 hours. It is the intent of these specifications that all joints be watertight and that all joints which are found to leak either by observation or during any test shall be made watertight by the Contractor. Repairs shall be made by the Contractor to correct any leaking or defective materials.

B. Pressure Pipe Leakage Test: A leakage test will follow the pressure test and be conducted on lengths not to exceed 1000 feet or each valved



section. The leakage test shall be at 200 psi for at least 2 hours and not to exceed 6 hours.

C. Allowable Leakage: Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time. Allowable leakage shall be defined as any leakage under the following formula:

$$L = SD(P)^{1/2} / 133,200$$

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test, in psig

If repairs are required, the hydrostatic field test shall be repeated until the pipe installation conforms to the specified requirements and is acceptable by the General Manager.

D. Location and Correction of Leakage: If such testing discloses leakage in excess of this specified allowable, the Contractor, at his expense, shall locate and correct all defects in the pipe line until the leakage is within the indicated allowance.

All visible leakage in pipe shall also be corrected by Contractor at his own expense.

E. Operation of valves: No valve in the Owner's water distribution system shall be operated by the Contractor without prior authorization by the Owner. The Contractor shall notify the Owner when a valve is to be operated and shall operate the valve only in the presence of the Owner's representative.

**621.02 Disinfection of Potable Water Lines:** The Contractor shall protect all piping materials from contamination during storage, handling, and installation. Prior to disinfection, the pipeline interior shall be clean, dry, and unobstructed. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work.

Water for the work shall be metered and furnished by the Contractor, including water for flushing of lines. However, fees for water usage will be waived on Capital Improvement



Projects. Should it be determined that the Contractor excessively wastes water, then billing charges shall be forwarded to the Contractor.

The Contractor, at his expense, will supply the test gauges and the Sodium Hypochlorite conforming to ANSI/AWWA B300, which contains approximately 5 percent to fifteen percent available chlorine. Calcium Hypochlorite conforming to ANSI/AWWA B300, which contains approximately 65 percent available chlorine by weight, shall be used for disinfection of pipelines.

During construction, calcium hypochlorite mix shall be pumped into the new pipe for disinfection. Water mains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Refer to the current edition of TCEQ 30 TAC §290.44.f.3 and AWWA C651 for disinfection and sanitary precautions for water mains.

A. Procedure and Dosage: Connection to the existing system will be allowed with a valve arranged to prevent the strong disinfecting dosage from flowing back into the existing water supply piping. The valve shall be kept closed. No other connection shall be made until the disinfection of the new line is complete and the water samples have met the established criteria. The valve shall remain closed at all times. The new pipeline shall not be filled by opening the valve to the existing system. The new pipeline shall be filled completely by using an existing service or by installing a new service. Regardless of the method used, a backflow prevention device shall be installed. Every part of the line shall contain a minimum concentration of 50 ppm available chlorine.

The disinfecting solution shall be retained in the piping for at least 24 hours and all valves, hydrants, services, stubs, etc. shall be operated so as to disinfect all their parts. After this retention period, the water shall contain no less than 25 parts per million chlorine throughout the treated section of the pipeline.

The heavily chlorinated water shall then be carefully flushed from the potable water line until the chlorine concentration is no higher than the residual generally prevailing in the existing distribution system or approximately one part per million. Proper planning and appropriate preparations in handling, diluting, if necessary, and disposing of this strong chlorine solution is necessary to insure that there is no injury or damage to the public, the water system or the environment. No chlorinated water shall be flushed into public streets or drainage ways. This includes dechlorination of the water until the residual of the water to be disposed of meets current residual requirements for potable water



(4.0 mg/L chlorine maximum). Additionally an authorized representative of the Owner must witness the flushing.

Approval for discharge of the diluted chlorine water or heavily chlorinated water into the wastewater system must be obtained from the EPWWS. The line flushing operations shall be regulated by the Contractor so as not to overload the wastewater system or cause damage to the odor feed systems at the lift stations.

B. Bacteriological Testing: After final flushing of the strong disinfecting solution, water samples from the line will be tested for bacteriological quality and must be found free of coliform organisms before the pipeline may be placed in service. One test sample will be drawn from the end of the main and additional samples will be collected at intervals of not more than 1000 feet along the pipeline. All stubs shall be tested before connections are made to existing systems.

The Contractor, at its expense, shall install sufficient sampling taps at proper locations along the pipeline. Each sampling tap shall consist of a standard corporation cock installed in the line and extended with a copper tubing gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

Samples for bacteriological analysis will only be collected from suitable sampling taps in sterile bottles treated with sodium thiosulfate. Samples shall not be drawn from hoses, fire hydrants or unregulated sources. The Owner, at its expense, will furnish the sterile sample bottles and collect the test samples. Testing fees will be paid by the Contractor at the time of sampling.

If the initial disinfection fails to produce acceptable sample test results, the disinfection procedure shall be repeated. Before the piping may be placed in service, satisfactory test results must be obtained.

An acceptable test sample is one in which: (1) the chlorine level is similar to the level of the existing distribution system; (2) the total coliform count is zero. An invalid sample is one, which has excessive free chlorine, silt, or non-coliform growth. If invalid sample results are obtained for any pipe, the Contractor may, with the concurrence of the Inspector, flush the lines and then collect a second series of test samples for testing by EPWWS. After this flushing sequence is completed, any pipe with one or more failed samples must be disinfected again in accordance with the approved disinfection procedure followed by appropriate sampling and testing of the water.



## 630 Wastewater Testing

### 631 Acceptance Testing of Wastewater Manholes

Manholes shall be tested separately and independently of the wastewater lines.

**631.01 Vacuum Method:** A pre-vacuum test shall be performed by the Contractor after assembly and prior to backfilling. A vacuum test will be performed after backfill and base installation.

All lift holes and exterior joints shall be plugged with a non-shrink grout prior to backfilling. No grout shall be placed in horizontal joints prior to testing.

Testing after backfill and compaction are complete will be the basis for acceptance of the manhole.

#### A. Equipment:

1. Plug Design: Pneumatic plugs shall be used. All plugs shall be designed to resist internal testing pressures without the aid of external bracing or blocking.
2. Singular Control Panel: To facilitate test verification by the Inspector, all air used shall pass through a single, above ground control panel.
3. Equipment Controls: The above ground air control equipment shall include a shut-off valve, pressure regulating valve, pressure relief valve, input pressure gauge and a continuous monitoring pressure gauge having a pressure range from 0 to at least 10 psi. The continuous monitoring gauge shall be no less than 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of  $\pm 0.04$  psi.
4. Separate Hoses: Two separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low-pressure air, and (2) a separate hose connection for constant monitoring of air pressure built up in the line. This requirement greatly diminishes any chance for over pressuring the line. A separate hose shall also be required to inflate the pneumatic plugs from the above ground control panel.

#### B. Procedures:

1. Manhole section interiors shall be carefully inspected; units found to have through-wall lift holes, or any penetration of the interior surface by inserts provided to facilitate handling, will not be accepted. Coating





shall be applied after the testing unless coating is applied is applied at the factory. All lift holes and exterior joints shall be plugged with an acceptable non-shrink grout. No grout shall be placed in horizontal joints prior to testing.

2. After cleaning the interior surfaces of the manhole, the Contractor shall place and inflate pneumatic plugs in all of the connecting pipes to isolate the manhole; sealing pressure within the plugs shall be as recommended by the plug manufacturer. Plugs and the ends of pipes connected by flexible boots shall be blocked to prevent their movement during the vacuum test.

3. The vacuum test head shall be placed on the top of the cone section or, inside of the top of the manhole cone section, and the compression seal band inflated to the pressure recommended by its manufacturer. The vacuum pump shall be connected to the outlet port with the valve open. When a vacuum of 10 inches of mercury has been attained, the valve shall be closed and the time noted. Tampering with the test equipment will not be allowed. Vacuum gauges shall not show evidence of sticking, and gauge that shows evidence of sticking shall be replaced with a calibrated gauge prior to any additional testing.

4. The manhole shall have passed the test if the vacuum does not drop below 9 inches of mercury within 2 minutes. The actual vacuum shall be recorded at the end of the test time minutes during which the valve was closed.

5. When the standard vacuum test cannot be performed because of design or material, testing shall be performed as directed by the General Manager.

**631.02 Smoke Testing:** All rings and covers shall be smoke tested by the Owner's personnel upon completion of project and prior to final acceptance. Any defects shall be repaired.

**631.03 Failure to Pass the Test -- Records of Tests:** If the manhole fails to pass the initial test method as described in 631.01 Vacuum Method, the Contractor shall locate the leak, if necessary by disassembly of the manhole, checking gaskets and replacing if necessary, re-lubrication and re-assembly, or Contractor may install an acceptable exterior joint sealing product on all joints and then retested. If any manhole fails the vacuum twice, the Contractor shall consider replacing that manhole. If the Contractor chooses to attempt to repair that manhole, the manhole must be retested until it passes.



In no case shall cold applied preformed plastic gaskets be used for repair. Records of all manhole repairs/testing shall be made available to the General Manager prior to acceptance. Any damaged or visually defective products or any products out of acceptable tolerance shall be removed from the site.

At a minimum, test records on all manholes that fail, shall include the following and shall be part of the project records turned in with the acceptance package.

Name of the manhole manufacturer  
Date tested/date re-tested  
Passed/failed and state what was done to correct the problem  
Test Method Used  
Location/station of manhole  
Precast/cast-in- place bottom  
Type of Coating  
Any repairs made to the joints.

**631.04 Inspection:** The Owner's inspector shall make a visual inspection of each manhole after it has passed the testing requirements and is considered to be in its final condition. The inspection shall determine the completeness of the manhole; any defects shall be corrected to the General Manager's satisfaction.

The Owner Engineer Representative may, at any time, require a calibration check of the instrumentation used. The Vacuum gauge shall have a calibration sticker within the last six (6) months.

## **632 Testing for Wastewater Pipe**

### **632.01 Low Pressure Air Test of Plastic Gravity Flow Wastewater Lines:**

- A. General: Wastewater lines shall be air tested between manholes. Backfilling to grade shall be completed before the test and all laterals and stubs shall be capped or plugged by the Contractor so as not to allow air losses, which could cause an erroneous, test result. Manholes shall be plugged so they are isolated from the pipe and cannot be included in the test.

All plugs used to close the sewer for the air test shall be capable of resisting the internal pressures and must be securely braced. Place all air testing equipment above ground and allow no one to enter a manhole or trench where a plugged sewer is under pressure. Release all pressure before the plugs are removed. The testing equipment used must include a pressure relief device designed to relieve pressure in the sewer under test at 10 psi or less and must allow continuous monitoring of the test pressures in order to avoid excessive pressure. Use care to



avoid the flooding of the air inlet by infiltrated ground water (Inject the air at the upper plug if possible). Use only qualified personnel to conduct the test.

- B. Ground Water: During construction any ground water shall be noted on the approved construction drawings. If ground water is noted during construction, test holes shall be dug to the pipe zone at intervals of not more than 100 feet and the average height of ground water above the pipe (if any) shall be determined before starting the test.
- C. Test Procedure: The General Manager may, at any time, require a calibration check of the instrumentation used. Use a pressure gauge having minimum divisions of 0.10 psi. All air used shall pass through a single control panel. Clean the sewer to be tested and remove all debris where indicated. Wet the sewer prior to testing. The average back pressure of any groundwater shall be determined (0.433 psi) for each foot of average water depth (if any) above the sewer.

Add air slowly to the section of sewer being tested until the internal air pressure is raised to 4.0 psig greater than the average back pressure of any ground water that may submerge the pipe. After the internal test pressure is reached, allow at least 2 minutes for the air temperature to stabilize, adding only the amount of air required to maintain pressure. After the temperature stabilization period, disconnect the air supply. Determine and record the time in seconds that is required for the internal air pressure to drop from 3.5 psig to 2.5 psig greater than the average back pressure of any ground water that may submerge the pipe. Compare the time recorded with the specification time for the size and length of pipe as given in the following table:

Table for Low Pressure Air Testing of Plastic Pipe:

Pipe Diameter (Inches)	Minimum Time (Seconds)	Length of Pipe for Minimum Time (Feet)	Time for Longer Length of Pipe (Seconds/foot)
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1020	133	7.693
21	1190	114	10.471
24	1360	100	13.676



The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the test period, then the test shall continue for the entire test duration as outlined above or until failure.

Any drop in pressure, from 3.5 psig to 2.5 psig (adjusted for groundwater level), in a time less than that required by the above table shall be cause for rejection.

Low-pressure air tests must conform to the procedure described in ASTM C-924 or other equivalent procedures.

**632.02 Pressured Sewer/Forced Mains Test:** The use of a reduced pressure zone (RPZ) backflow prevention device shall be used when loading the force main from the Owner's potable water mains (see Sewer Details). Leakage in the pressure sewer hydrostatic test shall be defined as the quantity of water that must be supplied into the pipe or any valved section thereof, to maintain pressure within 5 pounds per square inch of the specified test pressure after the air in the pipeline has been expelled. The test pressure shall be 50 psi above the normal operating pressure. The minimum test time is 4 hours. The maximum allowable leakage shall not exceed 10 gallons per inch diameter per mile of pipe per day. If the quantity of leakage exceeds the maximum amount calculated, remedial action shall be taken to reduce the leakage to an amount within the allowable limit.

**632.03 Effluent/Reuse Line Pressure Testing:** Shall be performed in accordance with Section 621.01 Hydrostatic Testing of Water Mains. In no case shall the allowable leakage be greater than that specified in the TCEQ Chapter 217.

**632.04 Deflection Test:** Deflection tests shall be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid mandrel shall be used to measure deflection. See Appendix *Detail 25 – Go – No Go Mandrel Detail* for additional information. The test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of five percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place an additional 30 days. The tests shall be performed without mechanical pulling devices.

The design engineer should recognize that this is a maximum deflection criterion for all pipes and a deflection test less than five percent may be more appropriate for specific types and sizes of pipe. Upon completion of construction, the design engineer or other Texas Registered Professional Engineer appointed by the owner shall certify, to the Owner / Engineer, that the entire installation has passed the deflection test. This certification may be made in conjunction with the notice of completion.

Test(s) must be performed without mechanical pulling devices and must be witnessed by the Owner / Engineer or Inspector.



Any deficiencies noted shall be corrected by the Contractor and the test(s) shall be redone.

The rigid mandrel shall have an outside diameter (O.D.) equal to 95% of the inside diameter (I.D) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe, all dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.

The rigid mandrel shall be constructed of a metal material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" as long as the total number of legs is an odd number. The barrel section of the mandrel shall have a length of at least 100% of the inside diameter of the pipe.

A proving ring shall be provided and used for each size mandrel in use. Contractor shall submit his proposed pipe mandrels and proving rings to the Owner / Engineer or his designated representative for concurrence prior to testing the line.

Method Options:

- a) Adjustable or flexible mandrels are prohibited.
- b) A television inspection is not a substitute for the deflection test.
- c) A deflectometer may be approved for use on a case by case basis.
- d) Mandrels with removable legs or runners will be accepted.

## **633 Wastewater Main Television Inspection**

**633.1 Description:** The Contractor shall furnish all labor, materials, equipment, and incidentals to provide the televising and videotaping of sewer lines and manholes utilizing a color, closed-circuit television inspection unit to determine their condition.

**633.2 General:** After construction of the sanitary sewer main, the newly constructed sanitary sewer shall be televised immediately upon cleaning and flushing. Any abnormalities such as, but not limited to, misaligned joints, cracked/defective pipe, rolled gaskets, shall be repaired. Sections requiring repair shall be re-televised to verify condition of repair.

**633.3 Execution:** The Contractor shall provide a recording and logs of the televised inspection for review. The television unit shall also have the capability of displaying in color, on recorded media, pipe inspection observations such as pipe defects, sags, and points of root intrusion, offset joints, service connection locations, and any other relevant physical attributes. Each recording shall be permanently labeled with the following:

Project name;



Date of television inspection;  
Name of Owner Inspector observing;  
Station to station location and size of sanitary sewer;  
Street/easement location;  
Name of Contractor;  
Date tape submitted; and

The Contractor shall provide a line diagram area sketch and written log for each completed segment of videotaped sewer main describing the section being televised, flow and camera direction, position of service connections, description and location of failures, pipe condition, weather conditions, and other significant observations. The television inspection equipment shall have an accurate footage counter which displays on the monitor the exact distance of the camera from the center of the starting manhole. A camera with rotating and panning lens capabilities is required. The camera height shall be centered in the conduit being televised. The speed of the camera through the conduit shall not exceed 40 feet per minute. The Contractor shall be required to have all materials, equipment, and labor force necessary to complete all recording on the job site prior to isolating the sewer manhole segment and beginning inspection operations.

The Contractor shall not be allowed to float the camera. There may be occasions during the televised inspection of a manhole section when the camera will be unable to pass an obstruction. At that time, and prior to proceeding, the Contractor shall contact the Project Inspector. If the length of sewer line cannot be televised because of obstructions, the Contractor shall clean the system as is necessary. If, in the opinion of the Inspector, the obstruction is attributed to a collapsed main or pipe deflection, inspection shall be suspended.

## **640 Backfill Testing**

Backfill must meet the requirements as set forth in Section 400 and as shown in the standard details. During construction the backfill for water and sewer mains must be compacted to 95-100% Standard Proctor (ASTM D-698) for 4-10 feet of cover or 95-100% of Modified Proctor (ASTM D-1557) for more than 10 feet of cover and density tests must be taken and compared to the corresponding proctor at a minimum of every 500 linear feet under paved streets, at a minimum of every 1,000 linear feet non-paved areas and additional testing at the discretion of the inspection personnel if backfill compaction does not appear to meet specifications within the intervals mentioned previously and at each of the compacted 6" lifts. Backfill that fails a density test must be recompacted for a length and depth specified by the inspector and retested.

In addition, where Moisture Sensitive Material is used as backfill (See Section 400 and standard details) the material must be within 3% (+ or -) of the optimum moisture



content for the respective proctor, otherwise it will be wetted (or dried) and reworked as necessary. Backfill with too much moisture that, upon a visual inspection, shows pumping will be rejected and require drying and reworking.

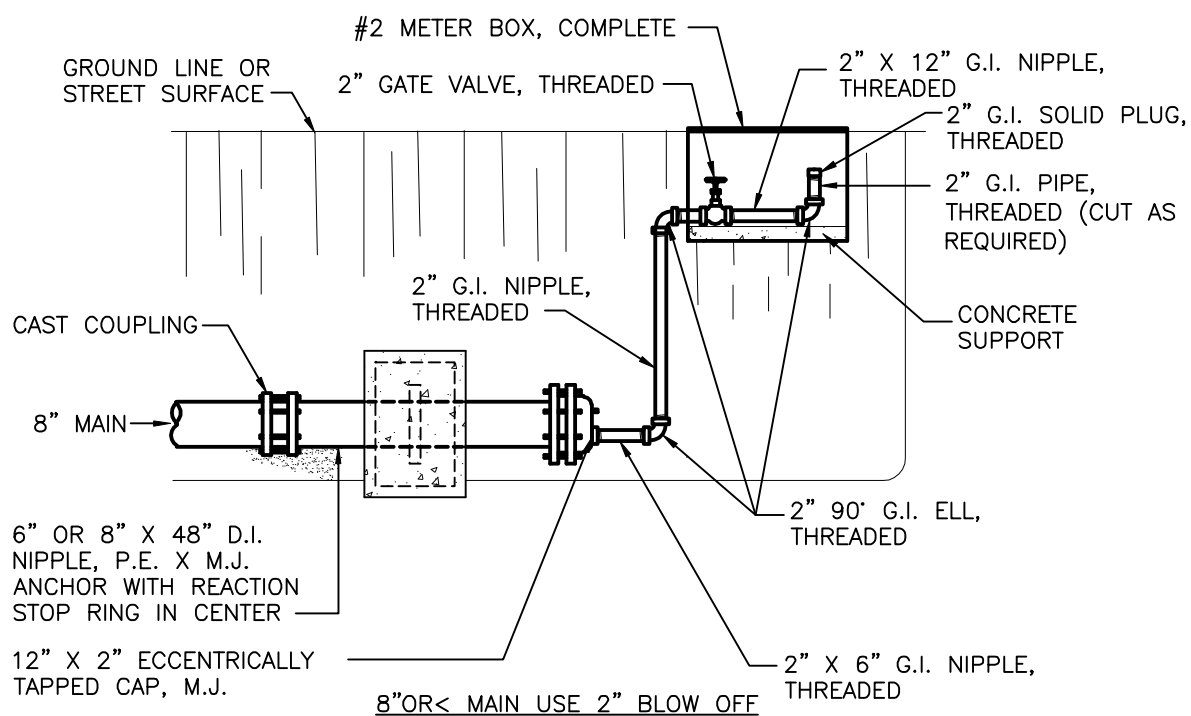
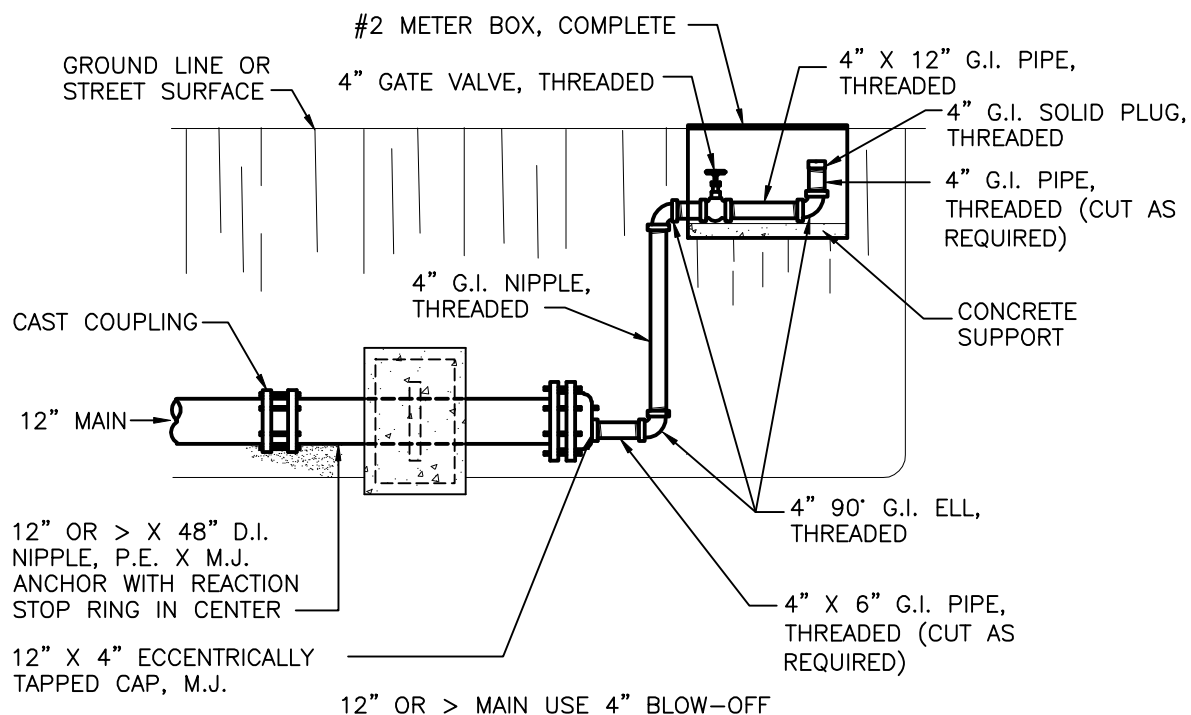
All tests must be done in the presence and under the direction of the Owner's inspector. Copies of all tests must be forwarded to the General Manager or his designated representative within two weeks of the test date. The General Manager or an inspector may require testing at intervals greater than described if needed.





## Appendix – Drawing Details





NOTE:

1. ALL G.I. PIPE SHALL BE POLY WRAPPED
2. FOR 4" BLOW-OFF, 4" C-900 PVC PIPE (FULLY RESTRAINED) CAN BE USED INSTEAD OF G.I. PIPE.



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EAGLE PASS WATER WORKS SYSTEM

## DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

## 2" & 4" PERMANENT BLOW-OFF ASSEMBLIES

Project No.:	000-0000-000
--------------	--------------

Date: AUG. 2012

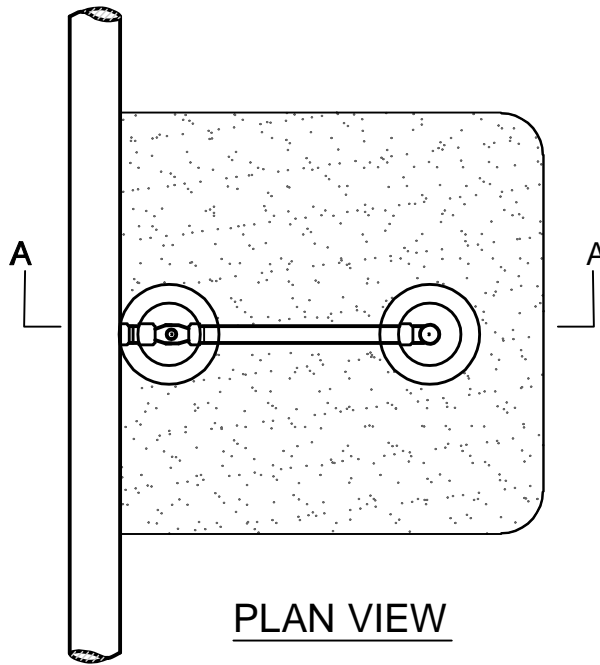
Designed By: JJS

**DETAIL**  
**01.A**

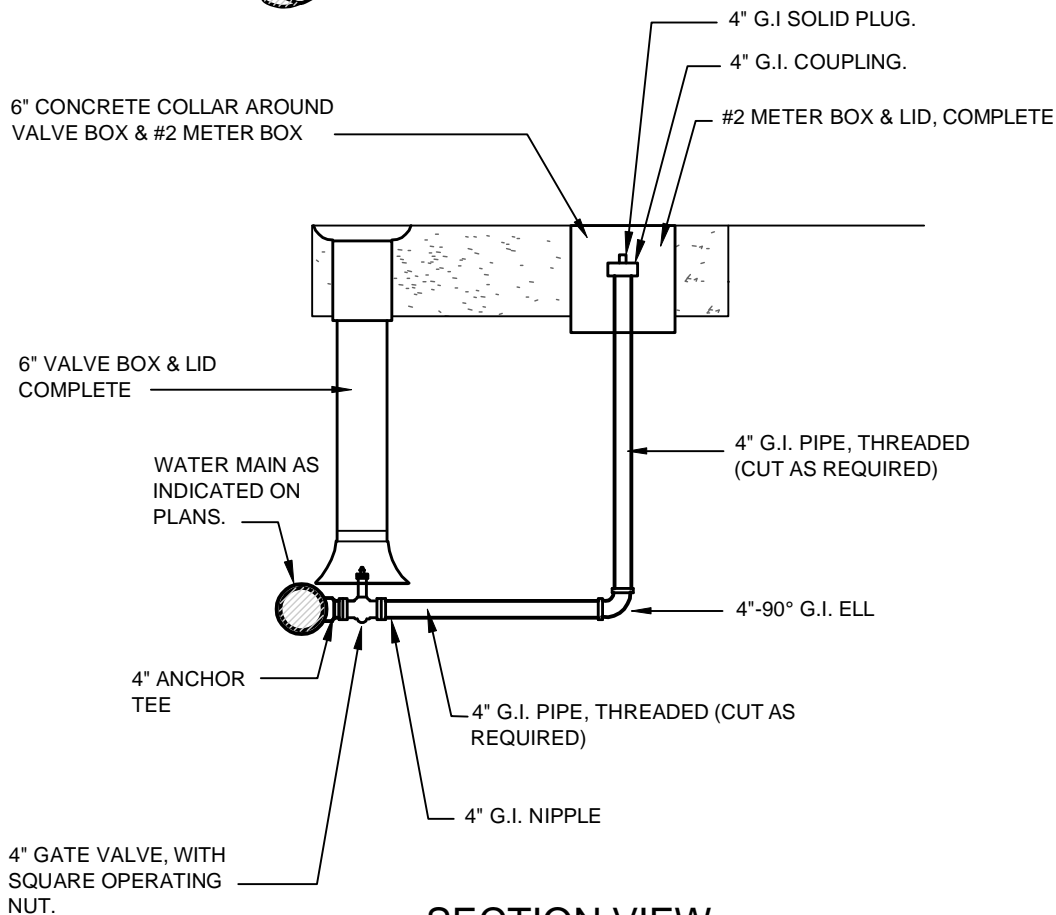
Bar Measures 1 inch



9/11/2012 12:11:57 PM - P:\09309131-09309-10075\CAD\STDs MANUAL\CADD DTL\SEPWW S & WW DETAIL\SDTL 01.B - 4IN IN-LINE BLOW-OFF ASSEMBLY.DWG - SOSA, JOSE



**PLAN VIEW**



**SECTION VIEW**

- NOTE:
1. ALL FITTINGS SHALL BE FULLY RESTRAINED.
  2. 4" C-900 PVC PIPE (FULLY RESTRAINED) MAY BE USED INSTEAD OF G.I. PIPE



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**4" IN-LINE PERMANENT  
BLOW-OFF ASSEMBLY**

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

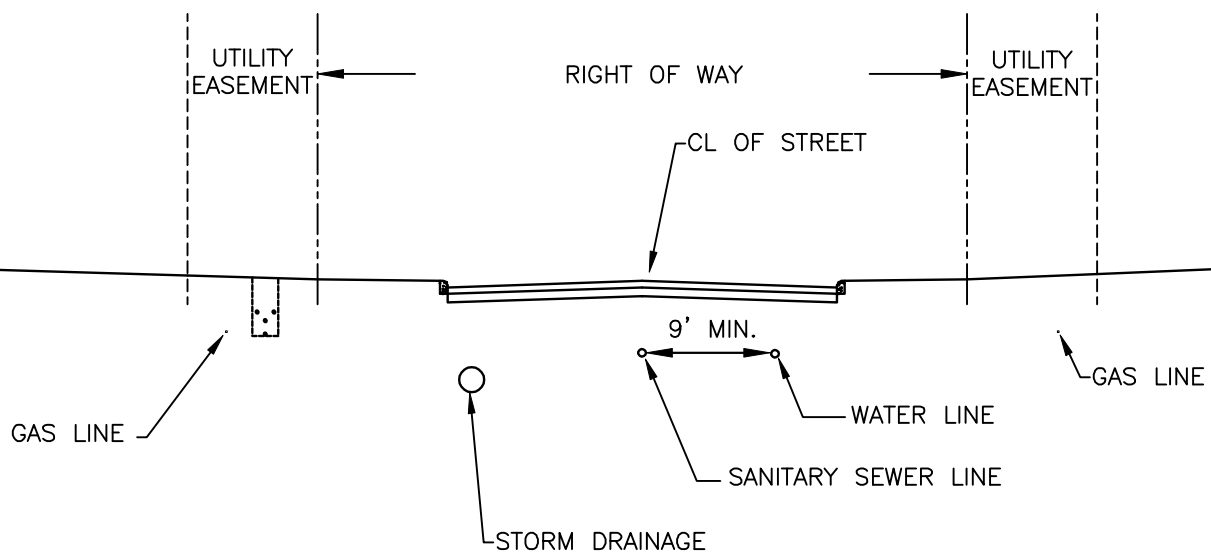
DETAIL  
**01.B**

Bar Measures 1 inch

Copyright: Tetra Tech



9/11/2012 12:12:07 PM - P:\09309\131-09309-10075\CAD\STD\STD MANUAL\CADD DTL\SEP\WWS W & WW DETAIL\SDTL 02 - TYP UTILITY PLACEMENT.DWG - SOSA, JOSE



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**TYPICAL UTILITY  
PLACEMENT SECTION**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

**Designed By:** JJS

**DETAIL**

**02**

Bar Measures 1 inch

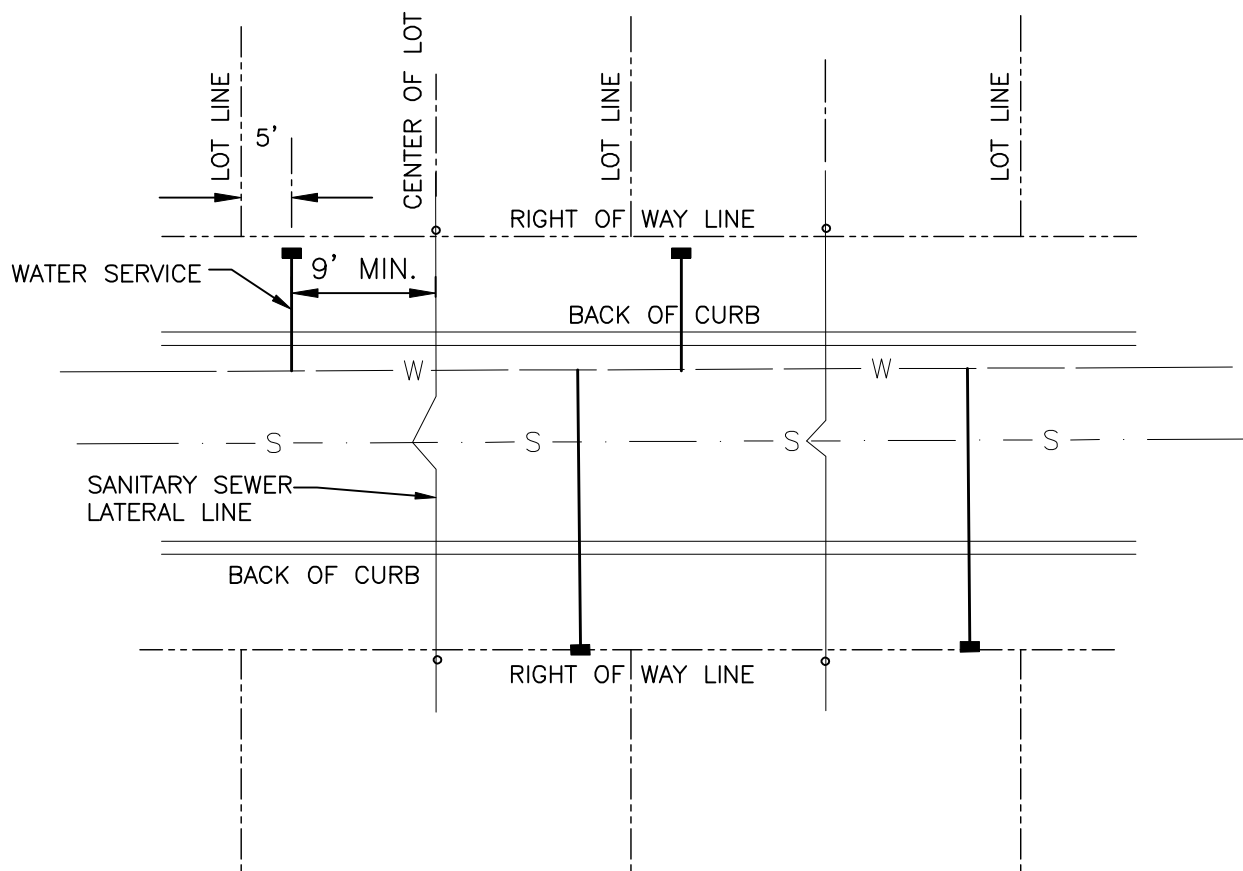
Copyright: Tetra Tech



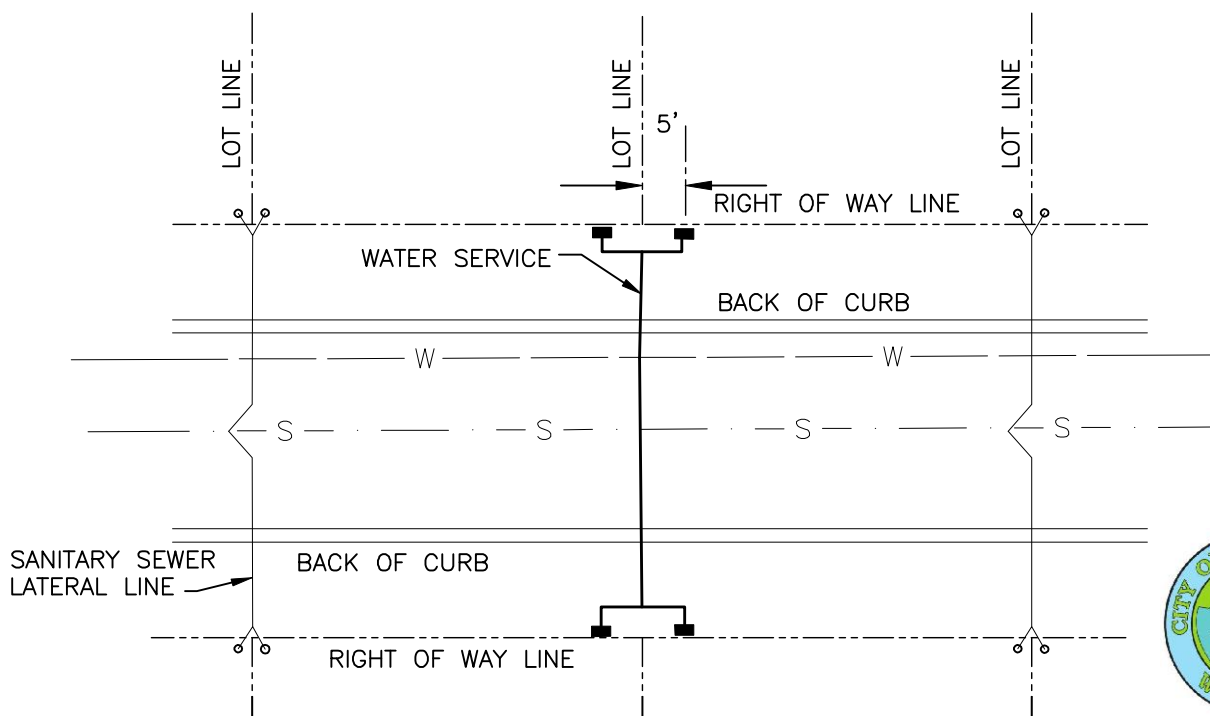


9/11/2012 12:12:17 PM - P:\09309131-09309-10075\CAD\STDs MANUAL\CADD DTLS\EPWWS W & WW DETAIL\SDTL 03 - TYP WATER SERVICE PLACEMENT.DWG - SOSA, JOSE

### FOR SINGLE WATER SERVICE



### FOR DUAL WATER SERVICE



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**TYPICAL WATER  
SERVICE PLACEMENT**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

**Designed By:** JJS

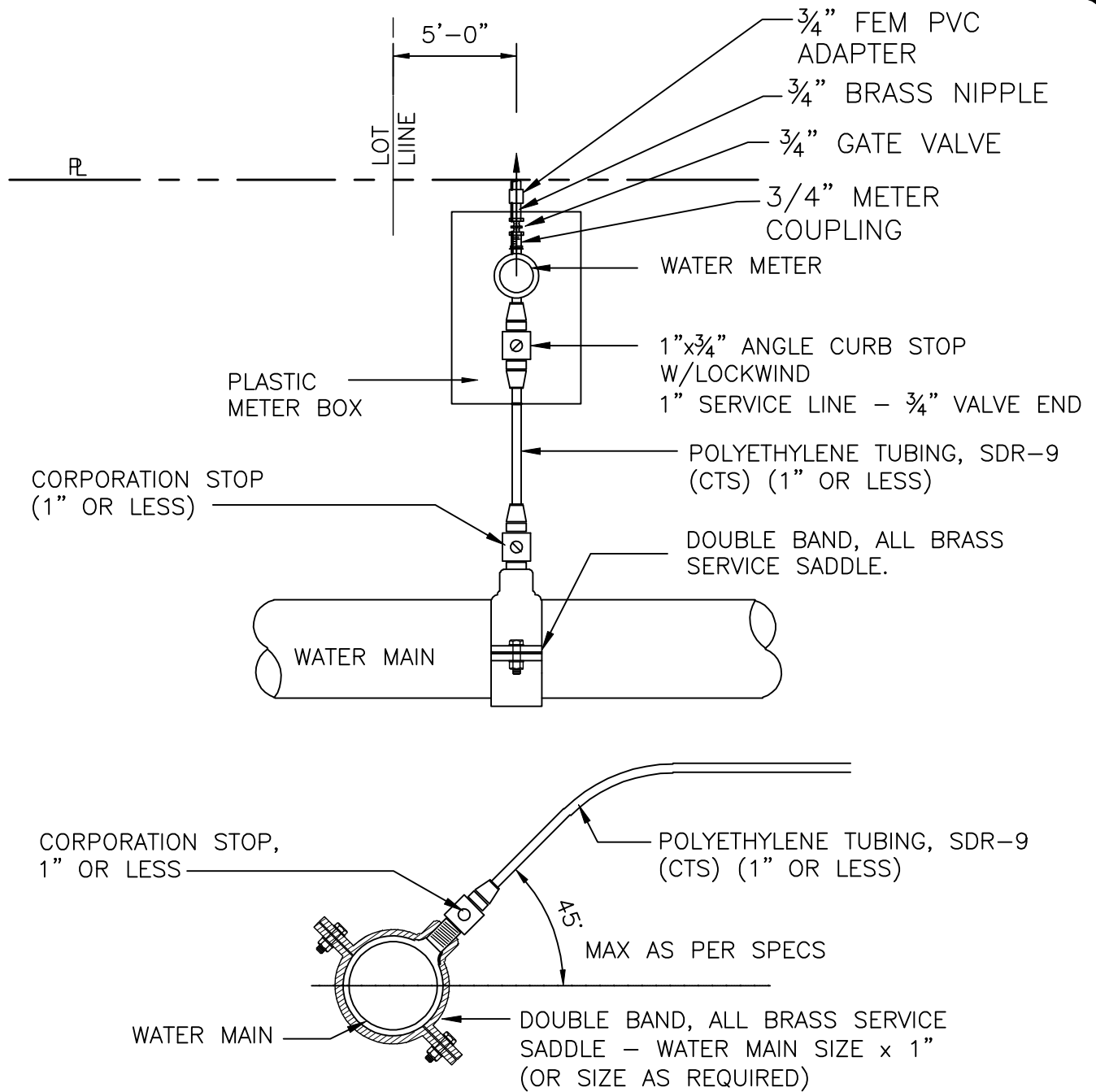
**DETAIL**

**03**

Bar Measures 1 inch

Copyright: Tetra Tech





NOTE:  
TAPS MUST BE IN EITHER THE 1:30 OR 10:30 O'CLOCK POSITION. NO TAPS WILL BE ALLOWED IN OTHER POSITIONS OF THE PIPE.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**SINGLE WATER  
SERVICE DETAIL**

Project No.: 000-0000-000

Date: AUG. 2012

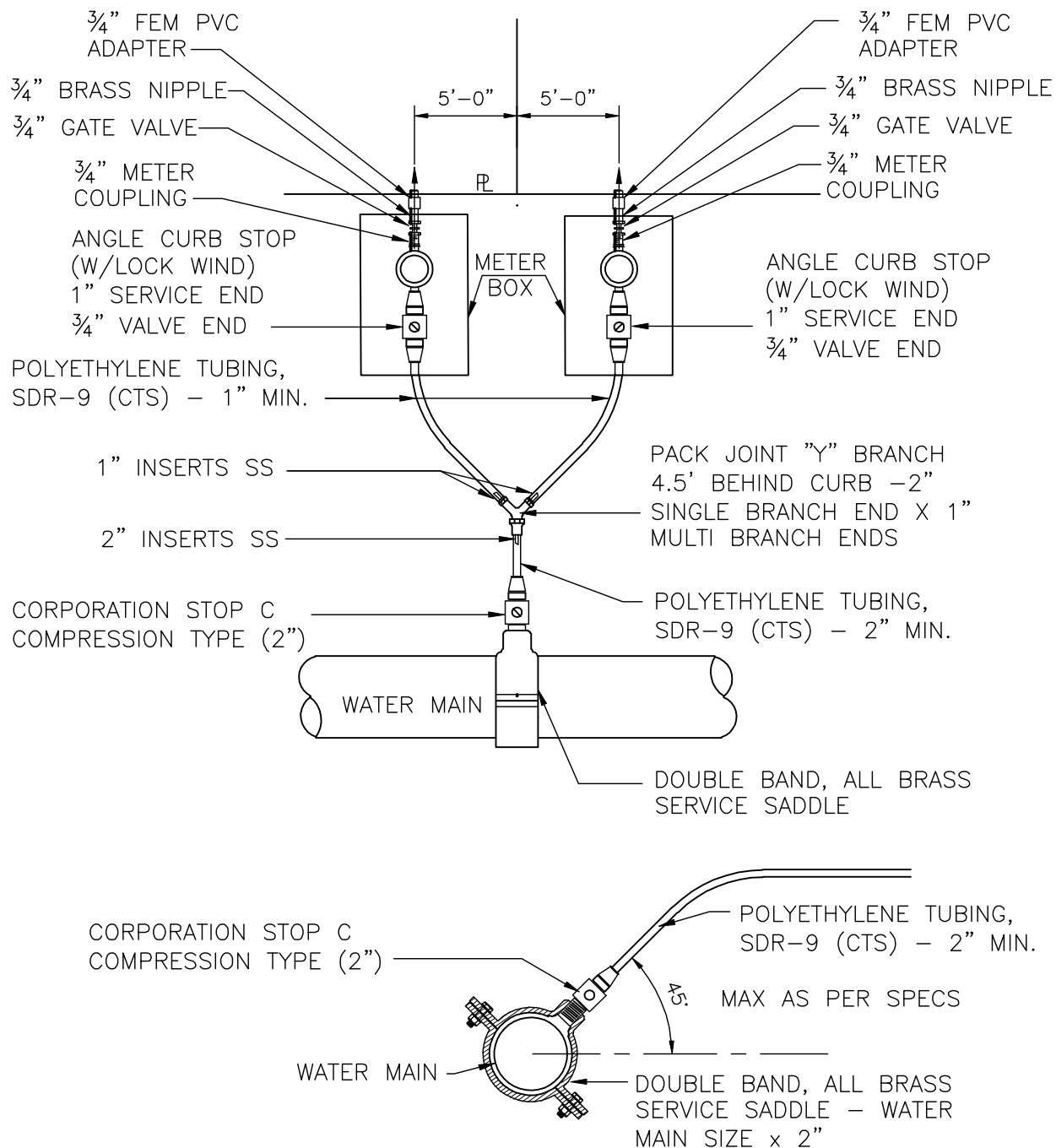
Designed By: JJS

DETAIL

**04**

Bar Measures 1 inch





**NOTE:**

TAPS MUST BE IN EITHER THE 1:30 OR 10:30 O'CLOCK POSITION.  
NO TAPS WILL BE ALLOWED IN OTHER POSITIONS OF THE PIPE.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**DUAL WATER  
SERVICE DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

**Designed By:** JJS

**DETAIL**

**05**

Bar Measures 1 inch

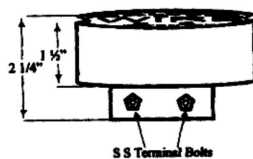




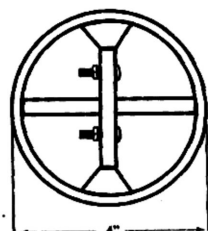
Lid Top View



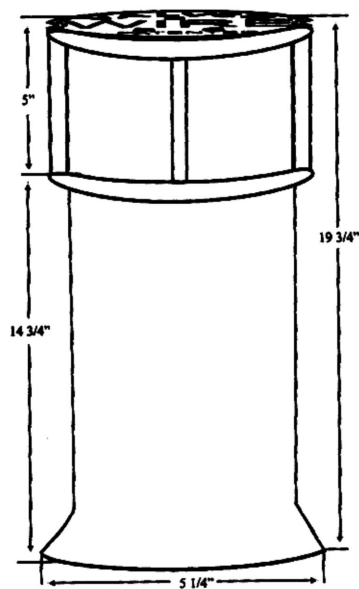
Lid Side View



Collar Top View



Complete Box Side View



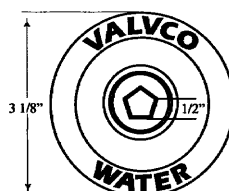
**Figure # RWAB**  
**Roadway Tracer Wire Access Box**  
**H-20 Rated**

Casting conforms to:  
ASTM specification A-48 Class 30  
Country of Origin: India

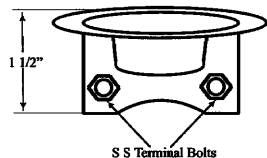
ABS conforms to:  
ASTM specification D1788  
Country of Origin: USA

C.P. Test Services - Valvco, Inc.

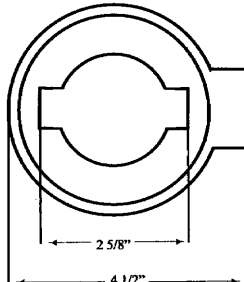
Lid Top View



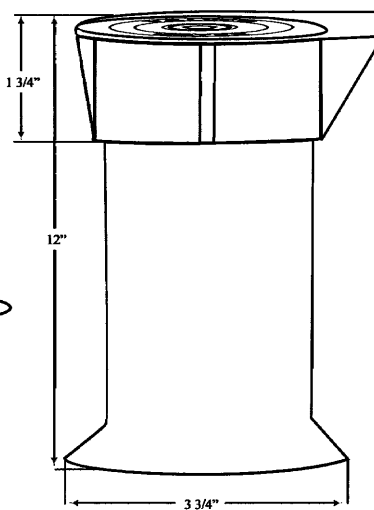
Lid Side View



Collar Top View



Complete Box Side View



**Figure # TWAB**  
**Tracer Wire Access Box**

Casting conforms to:  
ASTM specification A-48 Class 30  
Country of Origin: USA

ABS shaft conforms to:  
ASTM specification D-1788  
Country of Origin: USA

C.P. Test Services - Valvco, Inc.



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EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

TRACER WIRE  
ACCESS BOX DETAIL

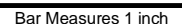
Project No.: 000-0000-000

Date: AUG. 2012

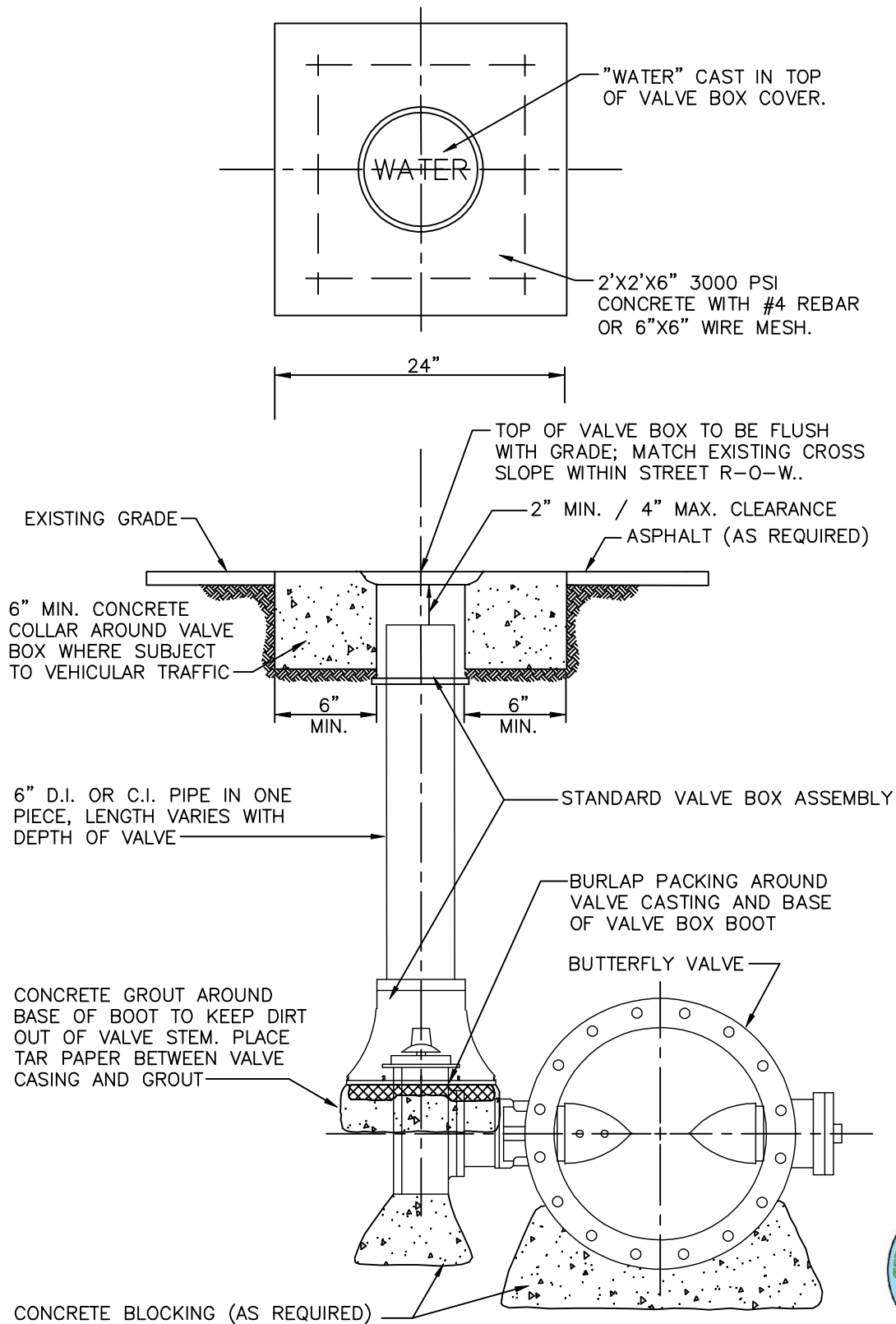
Designed By: JJS

DETAIL  
06









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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**BURIED BUTTERFLY  
VALVE DETAIL**

Project No.: 000-0000-000

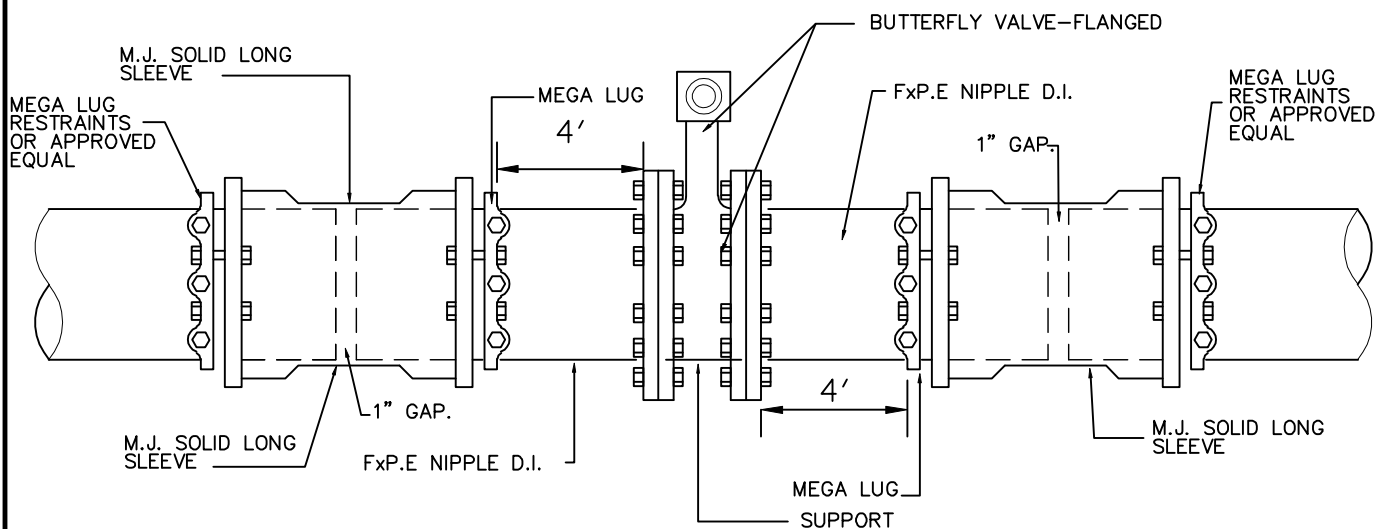
Date: AUG. 2012

Designed By: JJS

DETAIL  
**08.A**

Bar Measures 1 inch





**NOTES:**

1. FLG. x PE D.I. NIPPLE SHALL BE EPOXY COATED INTERNALLY & IN EXTERIOR, BE COLD TAR EPOXY COATED AS PER NSF SPECIFICATIONS.
2. ALL BOLTS AND NUTS SHALL BE OF 316 STAINLESS STEEL MATERIAL.
3. BUTTERFLY VALVE ASSEMBLY SHALL ALL BE POLY WRAPPED AND TAPED TO PROVIDE A WATER TIGHT SEAL. POLY WRAP SHALL EXTEND BEYOND ASSEMBLY TO CONNECTING PIPE. END OF POLY WRAP SHALL BE TAPED TO PROVIDE WATER TIGHT SEAL. USE WATERPROOF POLY TAPE; DUCT TAPE NOT ALLOWED.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**BUTTERFLY VALVE ASSEMBLY  
ON PVC OR D.I. PIPE**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

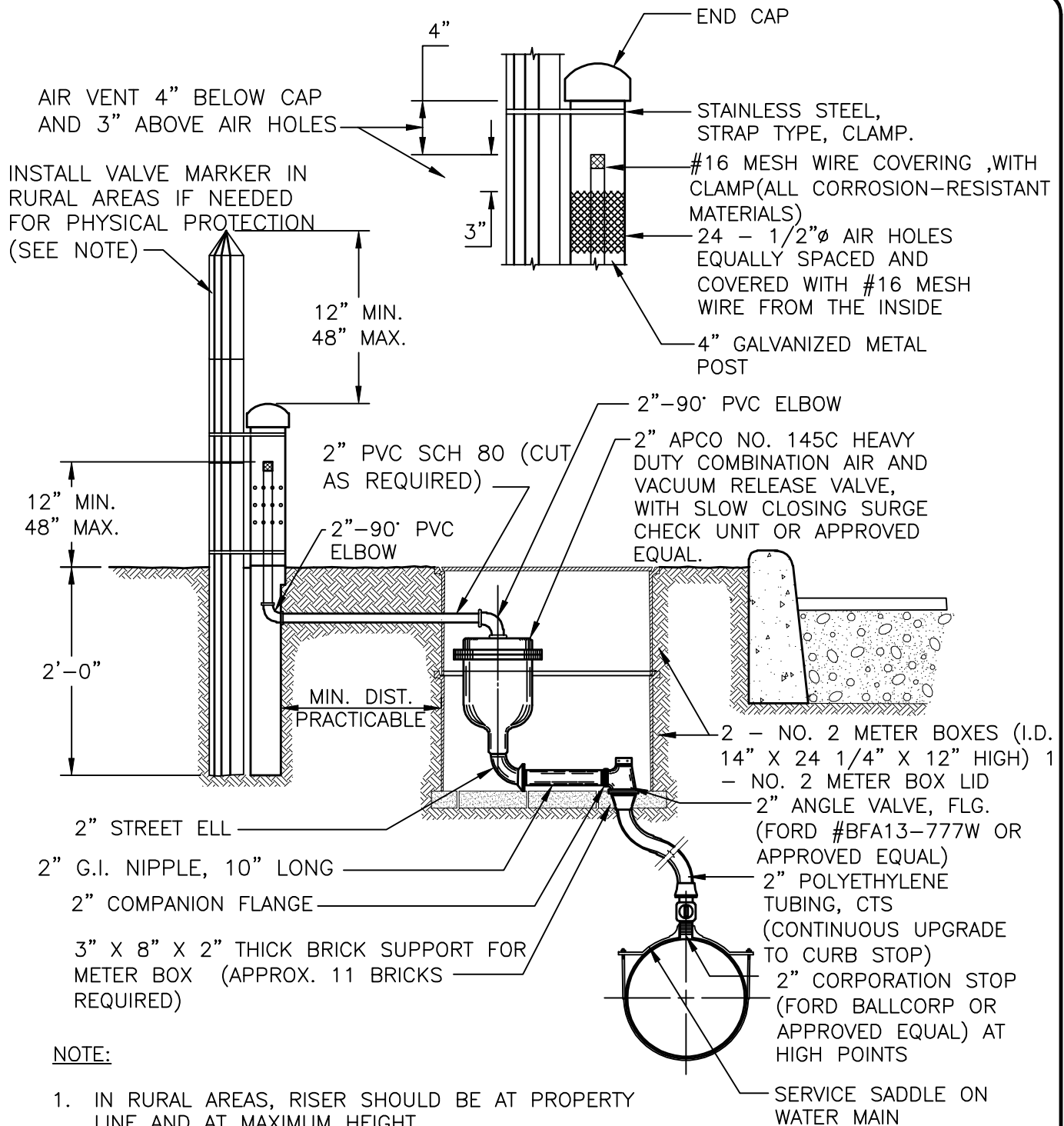
**Designed By:** JJS

**DETAIL  
08.B**

Bar Measures 1 inch







**NOTE:**

1. IN RURAL AREAS, RISER SHOULD BE AT PROPERTY LINE AND AT MAXIMUM HEIGHT.
2. INCREASE VALVE BOX HEIGHT AS NECESSARY TO MAINTAIN COVER TO ACCOMMODATE SURGE CHECK UNIT.
3. DETAIL TO BE USED ONLY FOR INSTALLATION OF AIR RELEASE VALVE OUTSIDE OF FEMA 100 YR FLOOD PLAIN



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**AIR-VACUUM RELEASE VALVE DETAIL**

Project No.: 000-0000-000

Date: AUG. 2012

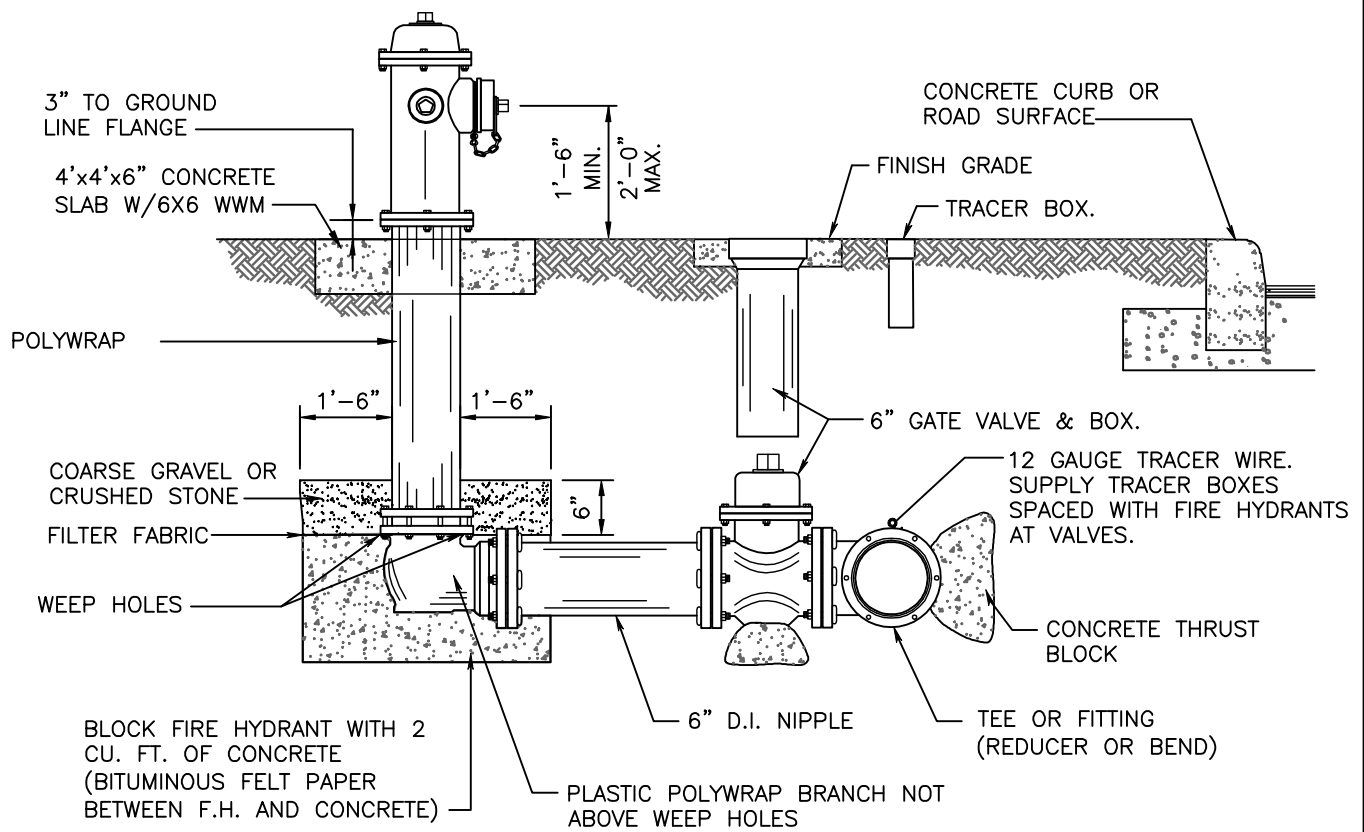
Designed By: JJS

DETAIL

**09**

Bar Measures 1 inch





**NOTE:**

1. POLYWRAP BELOW GROUND.
2. USE:
  - (A.) ANCHORING TEE WITH M.J. FITTING OR M.J. VALVE.
  - (B.) STD. M.J. TEE WITH ANCHORING COUPLING OR ANCHORING FITTING.
3. HYDRANT BURY LENGTH: 3 FEET MIN. & 5 FEET MAX.
4. ALL BURIED BOLTS & NUTS FOR FLANGE CONNECTIONS SHALL BE OF 316 OR 304 STAINLESS STEEL MATERIAL.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**STANDARD FIRE HYDRANT DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

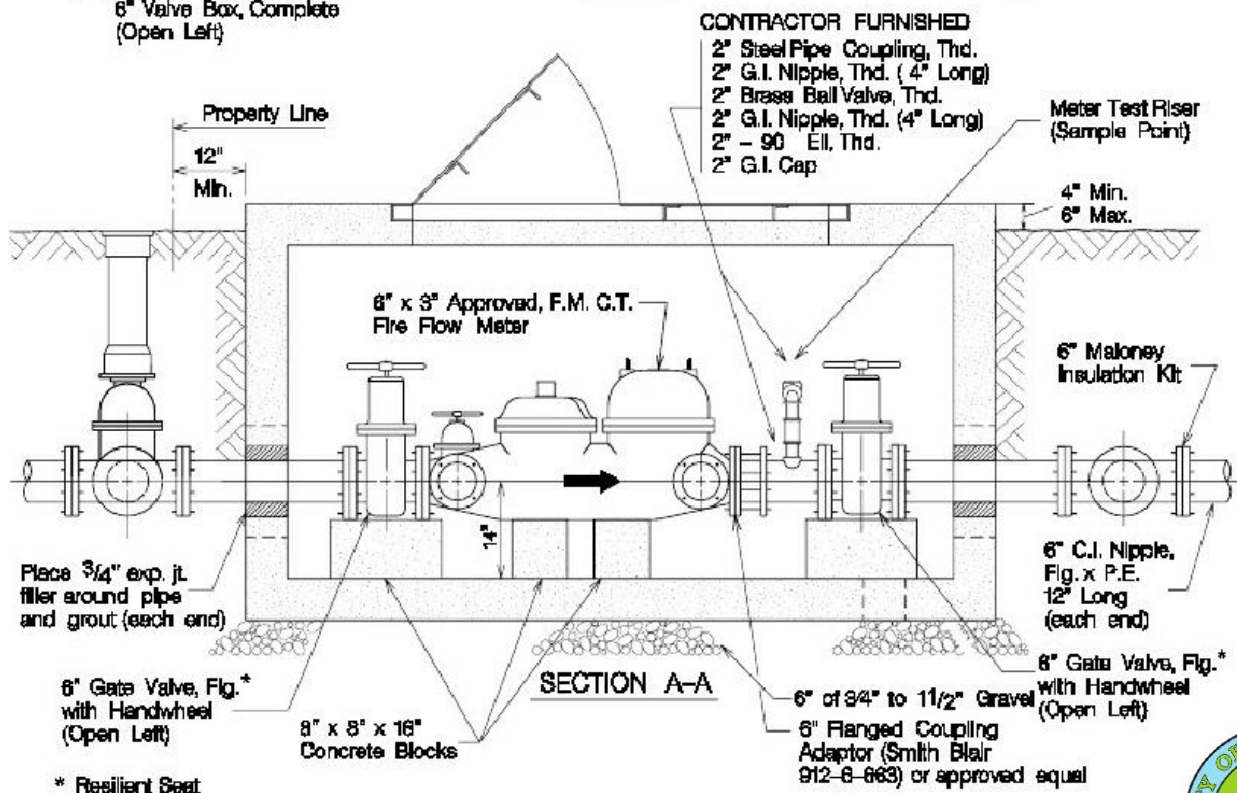
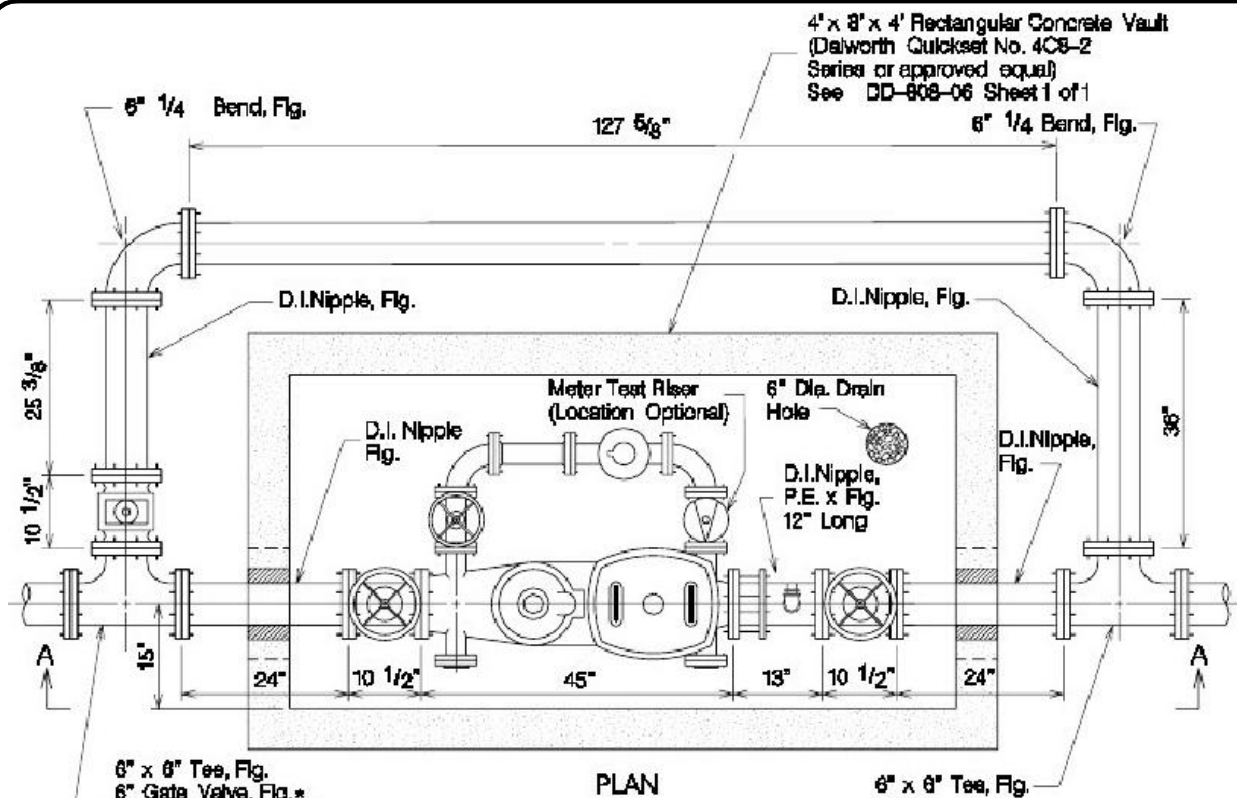
**Designed By:** JJS

**DETAIL**

**10**

Bar Measures 1 inch





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EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

6" x 3" FIRE FLOW  
METER INSTALLATION DETAIL

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

DETAIL

11

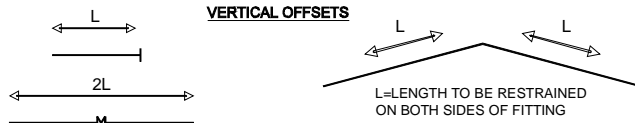
Bar Measures 1 inch







L=LENGTH TO BE RESTRAINED ON BOTH SIDES OF FITTING.  
WHEN RESTRAINED LENGTHS OVERLAP ON THE DIAGONAL  
PIPE, ALL PIPE BETWEEN FITTINGS SHOULD BE RESTRAINED.



DEAD END AND IN-LINE VALVES

HORIZONTAL BENDS

PIPE SIZE (IN.)	BRANCH SIZE (IN.)	LENGTH OF RUN (FT.)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 PSI	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 PSI
6	4	0	42	31
6	4	5	7	1
6	4	10	1	1
6	6	0	59	44
6	6	5	35	20
6	6	10	11	1
8	4	0	42	31
8	4	5	1	1
8	6	0	59	44
8	6	5	28	13
8	6	10	1	1
8	8	0	77	58
8	8	5	53	34
8	8	10	30	11
8	8	15	6	1
12	12	0	110	83
12	12	5	83	56
12	12	10	57	29
14	14	0	126	94
14	14	5	99	67
14	14	10	72	41
16	16	0	142	106
16	16	5	115	79
16	16	10	88	52
18	18	0	157	118
18	18	5	130	91
18	18	10	103	64

PIPE SIZE (IN.)	BEND ANGLE (DEG)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 PSI	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 PSI
6	90	23	17
6	45	9	7
6	22.50	5	3
6	11.25	2	2
8	90	30	22
8	45	12	9
8	22.50	6	4
8	11.25	3	2
12	90	43	32
12	45	18	13
12	22.50	8	6
12	11.25	4	3
14	90	45	34
14	45	19	14
14	22.50	9	7
14	11.25	5	4
16	90	51	38
16	45	21	16
16	22.50	11	8
16	11.25	5	4
18	90	56	42
18	45	24	18
18	22.50	12	9
18	11.25	6	5

PIPE SIZE (IN.)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 PSI	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 PSI
6	59	44
8	77	58
10	93	69
12	109	82
14	126	94
16	142	106
18	157	118

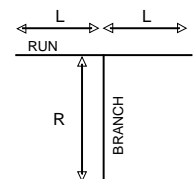
PIPE SIZE (IN.)	BEND ANGLE (DEG.)	LOW SIDE DEPTH	UPPER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE=200 P.S.I.	LOWER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE=200 P.S.I.	UPPER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE=150 P.S.I.	LOWER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE=150 P.S.I.
6	45	5	24	8	18	6
6	22.5	5	12	4	9	3
6	11.25	5	6	2	4	1
6	45	10	24	5	18	4
6	22.5	10	12	2	9	2
6	11.25	10	6	1	4	1
8	45	5	32	11	24	8
8	22.5	5	15	5	11	4
8	11.25	5	8	3	6	2
8	45	10	32	7	24	5
8	22.5	10	15	3	11	2
8	11.25	10	8	2	6	1
12	45	5	45	16	34	12
12	22.5	5	22	7	16	6
12	11.25	5	11	4	8	3
12	45	10	45	10	34	7
12	22.5	10	22	5	16	3
12	11.25	10	11	2	8	2
14	45	5	52	16	39	12
14	22.5	5	25	8	19	6
14	11.25	5	13	4	10	3
14	45	10	52	8	39	6
14	22.5	10	25	4	19	3
14	11.25	10	13	2	10	2
16	45	5	59	18	44	13
16	22.5	5	29	9	22	7
16	11.25	5	14	5	11	4
16	45	10	59	10	44	7
16	22.5	10	29	5	22	4
16	11.25	10	14	3	11	2
18	45	5	65	19	49	15
18	22.5	5	32	10	24	7
18	11.25	5	16	5	12	4
18	45	10	65	11	49	8
18	22.5	10	32	5	24	4
18	11.25	10	16	3	12	2

**RESTRAINED LENGTH DESIGNS:**

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C. PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY.

**NOTE:**

- THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.
- 6" WATER PIPELINE (MIN.) W/ REVIEW OF HYDRAULIC CALCULATIONS & ENGINEERING APPROVAL



LR=LENGTH OF PIPE ALONG THE RUN FREE OF JOINTS.  
L=LENGTH TO BE RESTRAINED

TEES



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**MECHANICAL JOINT  
RESTRAINT TABLE**

Project No.: 000-0000-000

Date: AUG. 2012

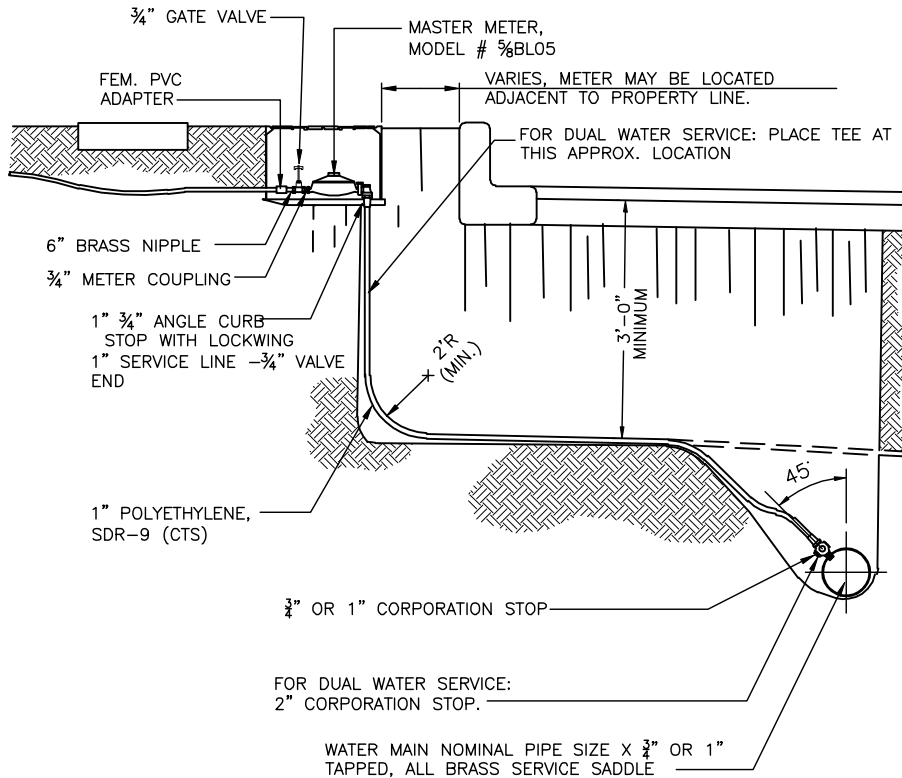
Designed By: JJS

DETAIL

**12**

Bar Measures 1 inch





**NOTE:**

1. FOR DIRECT TAP TO MAIN, SEE TAPPING SCHEDULE.
2. SERVICES LINES WHICH ARE NOT OF POLYETHYLENE TUBING SHALL BE REPLACED WITH 3/4" OR 1" POLYETHYLENE TUBING.
3. REPLACEMENT OF SERVICE LINES TO A MAIN SHALL BE MADE FROM THE METER TO THE PROPOSED MAIN.
4. WATER STUBOUTS SHALL CONTAIN A GATE VALVE AND BOX AT ITS END WITH A CAP.
5. CONTRACTOR TO PROVIDE A LIST OF ADDRESSES WHERE POLY WATER SERVICES WERE INSTALLED.

TAPPING SCHEDULE				
PIPE DIAMETER	SERVICE SIZE			
	3/4"	1"	1 1/2"	2"
6" A.C.	TAP	TAP	TAP W/SERVICE SADDLE	
6" C.I. OR D.I.	TAP	TAP	TAP W/SERVICE SADDLE	
6" PVC	TAP W/SERVICE SADDLE		TAP W/SERVICE SADDLE	
8" A.C.	TAP	TAP	TAP W/SERVICE SADDLE	
8" C.I. OR D.I.	TAP	TAP	TAP W/SERVICE SADDLE	
8" PVC	TAP W/SERVICE SADDLE		TAP W/SERVICE SADDLE	
10" A.C.	TAP	TAP	TAP W/SERVICE SADDLE	
10" C.I. OR D.I.	TAP	TAP	TAP W/SERVICE SADDLE	
10" PVC	TAP W/SERVICE SADDLE		TAP W/SERVICE SADDLE	
12" A.C.	TAP	TAP	TAP W/SERVICE SADDLE	
12" C.I. OR D.I.	TAP	TAP	TAP W/SERVICE SADDLE	
12" PVC	TAP W/SERVICE SADDLE		TAP W/SERVICE SADDLE	
16" A.C.	TAP	TAP	TAP W/SERVICE SADDLE	
16" C.I. OR D.I.	TAP	TAP	TAP W/SERVICE SADDLE	



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**WATER SERVICE TAP INSTALLATION**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

**Designed By:** JJS

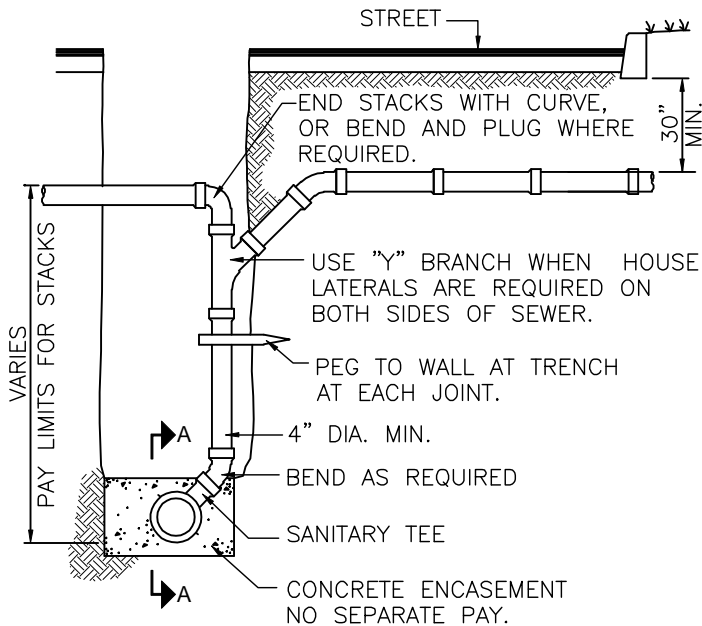
**DETAIL**

**13**

Bar Measures 1 inch

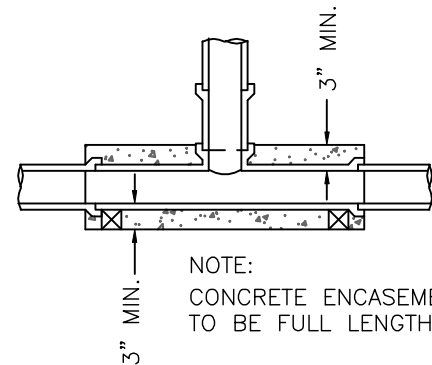


9/11/2012 12:14:19 PM - P:\09309\131-09309-10075\CAD\STD\SS LATERAL.DWG - SOSA, JOSE

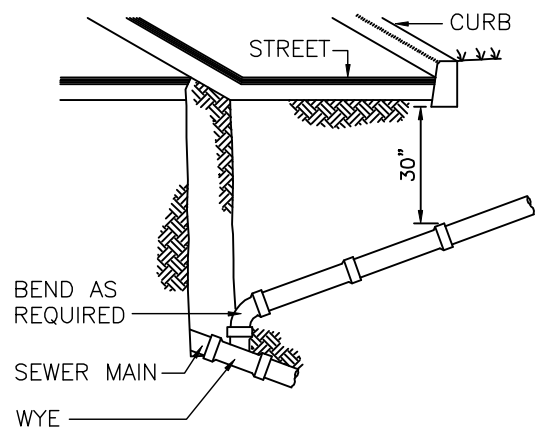


TYPICAL STACK DETAIL

NOTE:  
DEPTH AND GRADE OF SERVICE LATERALS AS SHOWN ARE TYPICAL ONLY. ACTUAL DEPTH, ALIGNMENT AND GRADE OF SERVICE LATERALS SHALL BE AS DETERMINED BY THE ENGINEER BASED ON ELEVATIONS OF THE SEWER MAIN, STREET, NATURAL GROUND AND BUILDING TO BE SERVICED.



SECTION A-A



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**SANITARY SEWER LATERAL DETAIL**

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

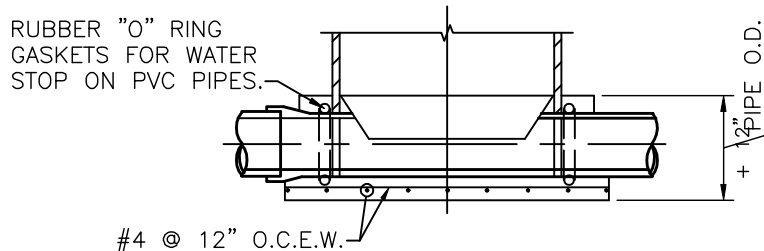
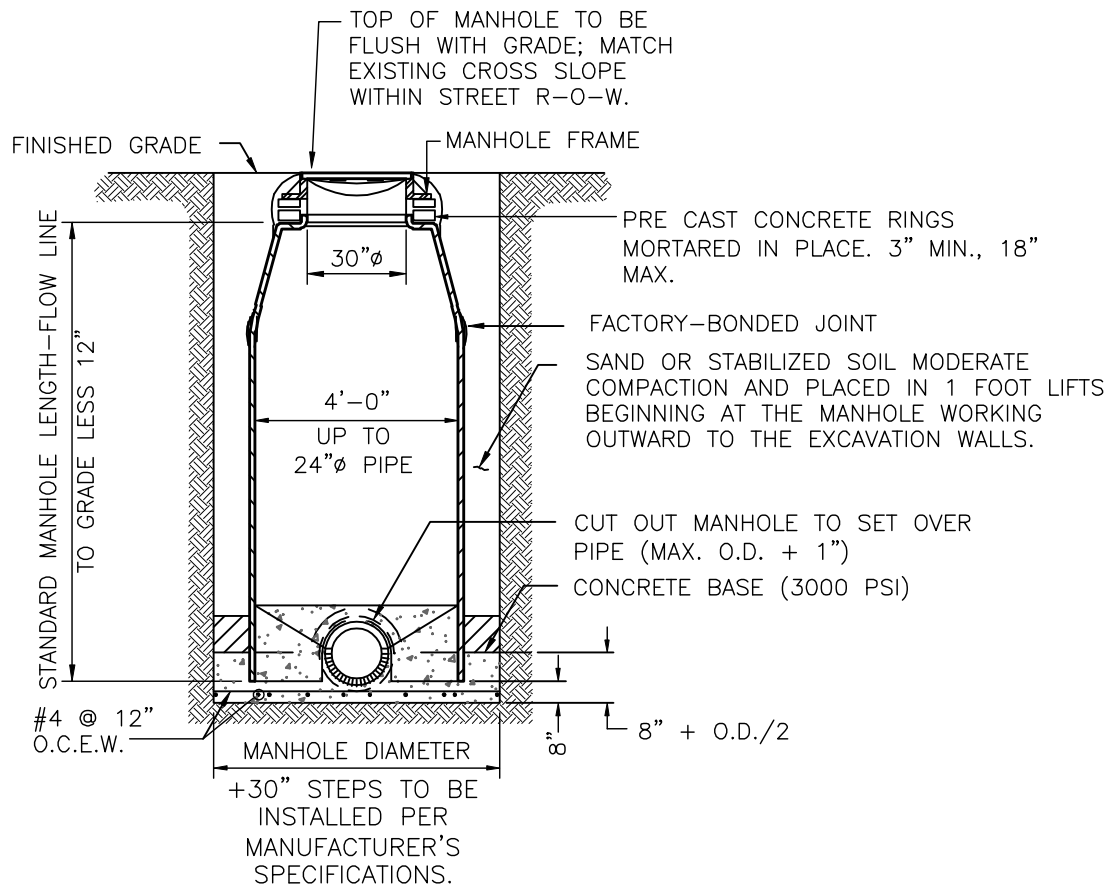
DETAIL

**14**

Bar Measures 1 inch

Copyright: Tetra Tech





TYPICAL FLOOR SECTION

\*\* DROP MANHOLE REQUIRED WHERE PIPE ENTERS MORE THAN 30" ABOVE INVERT.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**SANITARY SEWER FIBERGLASS  
MANHOLE DETAIL**

**Project No.: 000-0000-000**

**Date: AUG. 2012**

**Designed By: JJS**

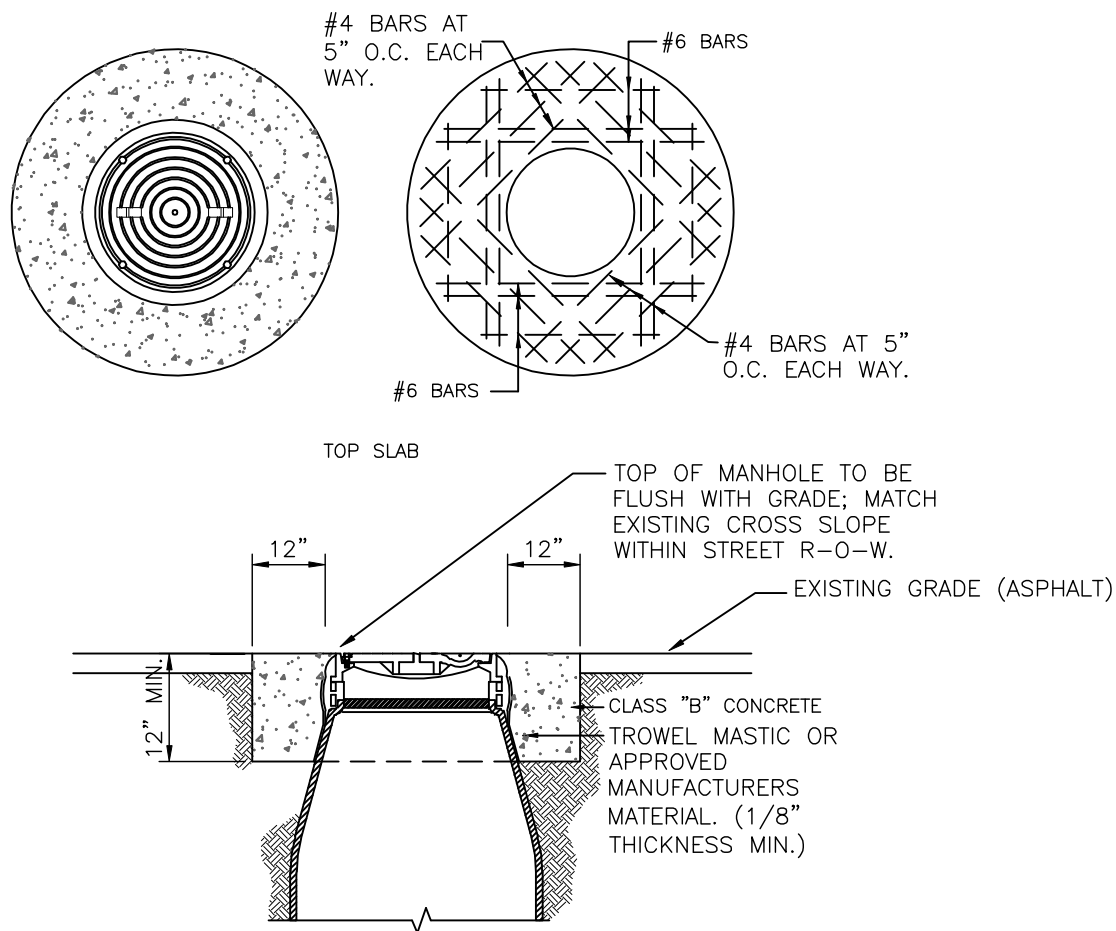
**DETAIL**

**15**

Bar Measures 1 inch







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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**SANITARY SEWER MANHOLE  
RING ENCASMENT**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

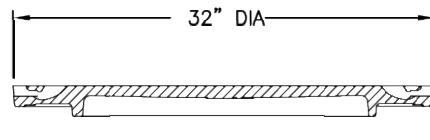
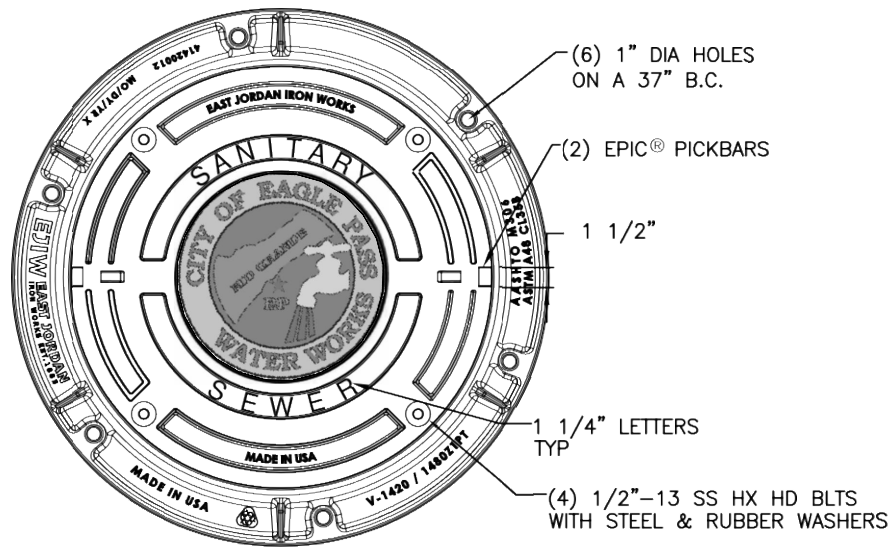
**Designed By:** JJS

**DETAIL**

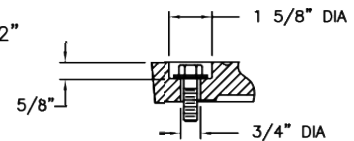
**16**

Bar Measures 1 inch

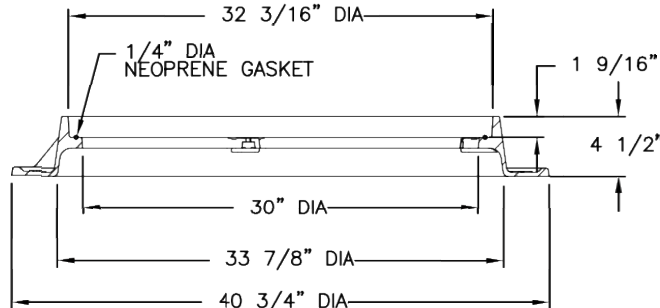




COVER SECTION



BOLTING DETAIL



FRAME SECTION



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**SANITARY SEWER MANHOLE  
RING & COVER DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

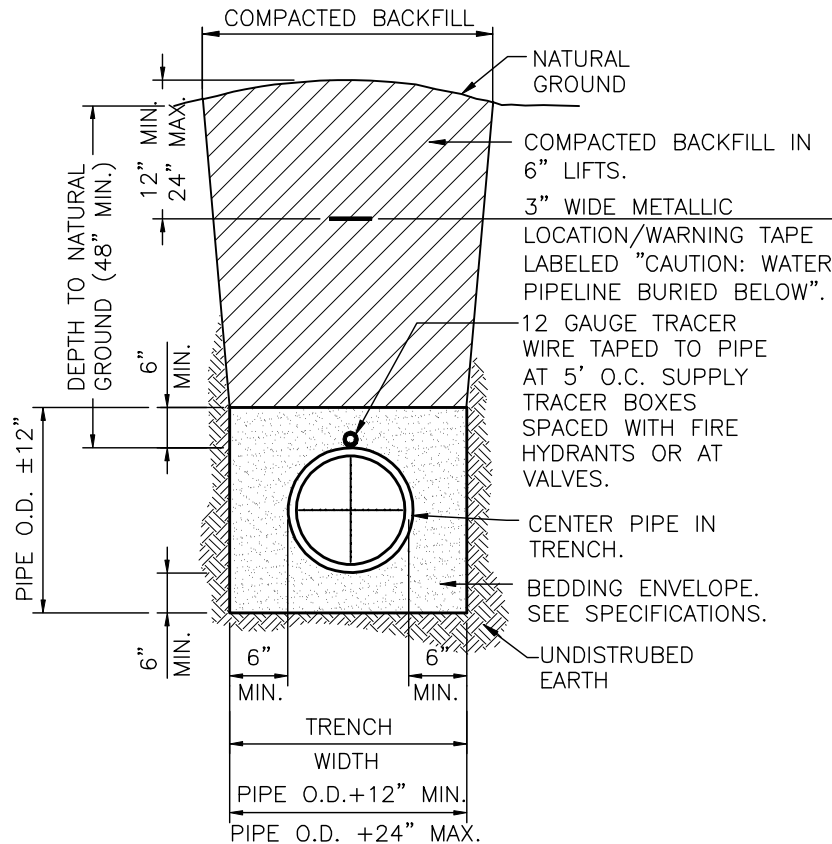
**Designed By:** JJS

**DETAIL**

**17**

Bar Measures 1 inch





# **NOTES:**

1. BACKFILL DENSITY TESTING SHALL CONFORM TO ASTM D 1556 OR ASTM D 2922.
2. DENSITY TESTING SHALL BE CONDUCTED AT A MIN. OF EVERY 1,000 LINEAR FEET UNDER NON-PAVED AREAS AND ADDITIONAL TESTING AT THE DISCRETION OF THE INSPECTION PERSONNEL WITHIN THE 500 LINEAR FEET INTERVAL FOR EVERY LIFT.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**UNFINISHED SURFACE  
TRENCHING DETAILS**

**Project No.: 000-0000-000**

**Date: AUG. 2012**

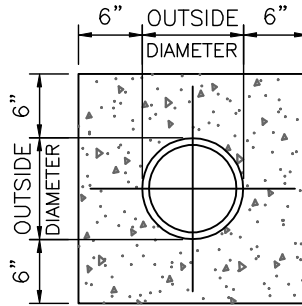
**Designed By: JJS**

**DETAIL**

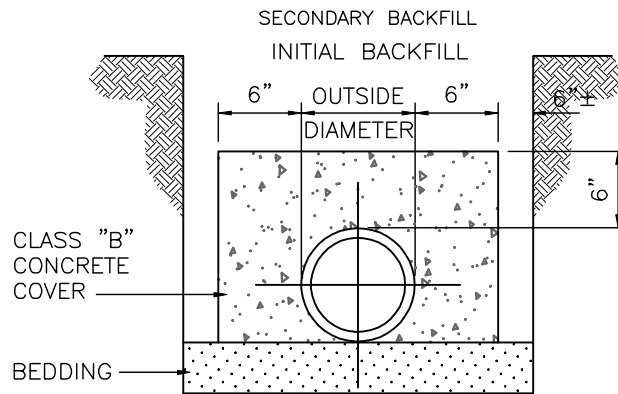
**18**

Bar Measures 1 inch





### CONCRETE ENCASEMENT



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#### EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

#### CONCRETE ENCASEMENT DETAIL

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

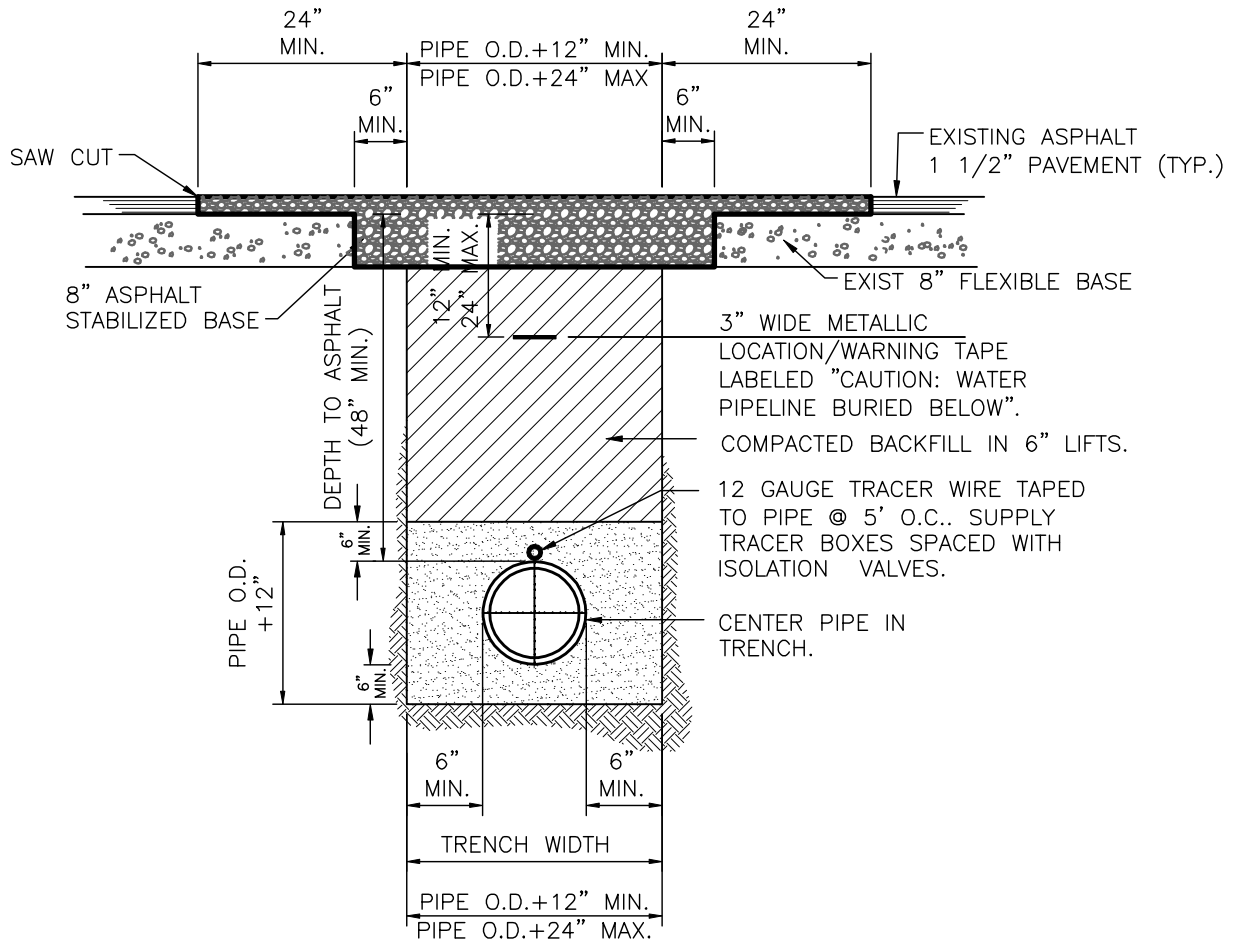
DETAIL

19

Bar Measures 1 inch







#### NOTES:

1. ALL PAVEMENT REPAIRS SHALL MEET OR EXCEED THE REQUIREMENTS OF THE CITY OF EAGLE PASS ORDINANCE 2010-11.
2. BACKFILL DENSITY TESTING SHALL CONFORM TO ASTM D 1556 OR ASTM D 2922.
3. DENSITY TESTING SHALL BE CONDUCTED AT A MIN. OF EVERY 500 LINEAR FEET UNDER PAVED STREETS AND ADDITIONAL TESTING AT THE DISCRETION OF THE INSPECTION PERSONNEL WITHIN THE 500 LINEAR FEET INTERVAL FOR EVERY LIFT.



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#### EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

#### TEMPORARY SURFACE TRENCHING DETAIL

Project No.: 000-0000-000

Date: AUG. 2012

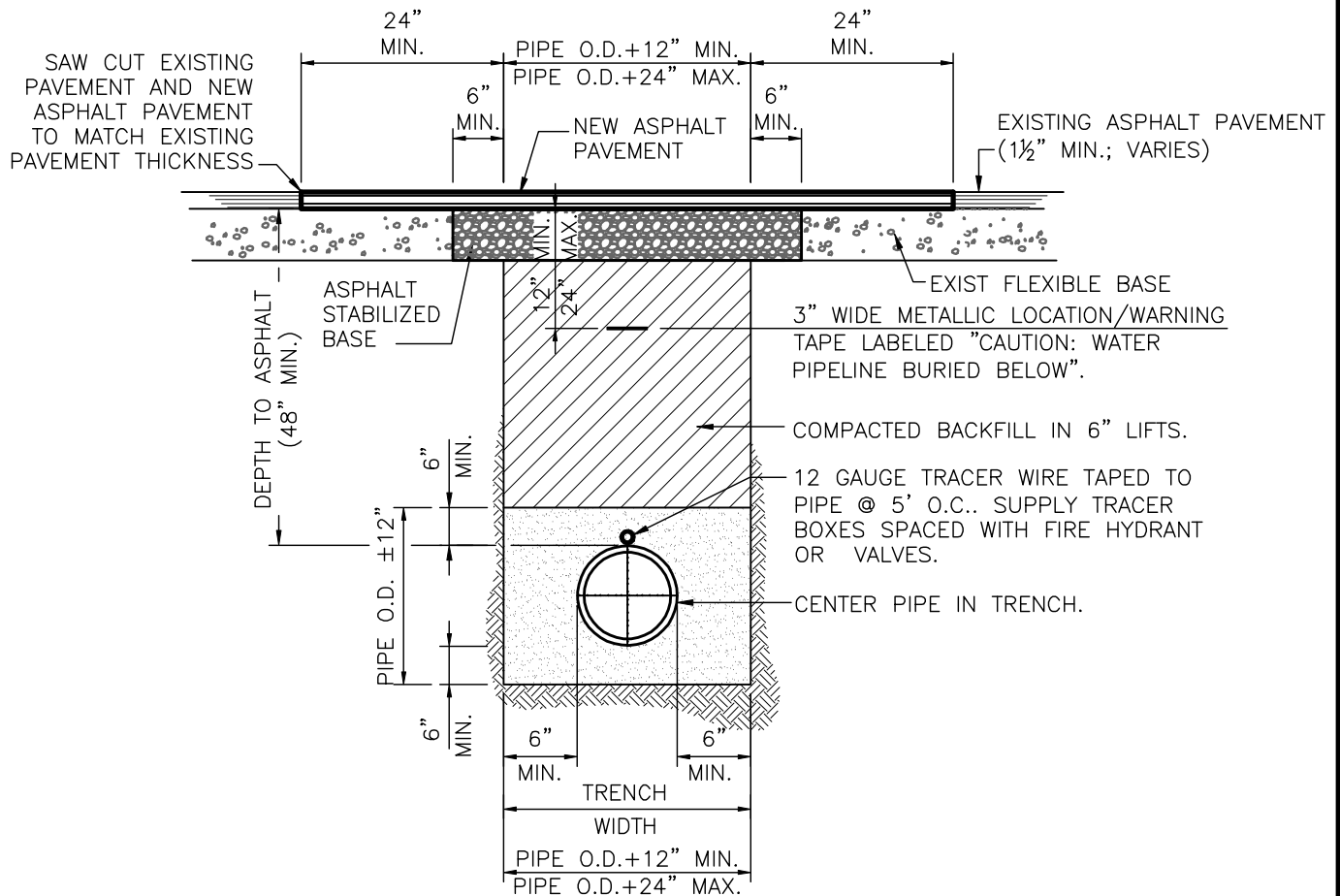
Designed By: JJS

DETAIL

20

Bar Measures 1 inch





#### NOTES:

1. ALL PAVEMENT REPAIRS SHALL MEET OR EXCEED THE REQUIREMENTS OF THE CITY OF EAGLE PASS ORDINANCE 2010-11.
2. ASPHALT PAVEMENT SHALL BE AS PER TXDOT ITEM 334 - HOT MIX-COLD LAID ASPHALTIC CONCRETE PAVEMENT OR ITEM 340 - HOT MIX ASPHALTIC CONCRETE PAVEMENT.
3. FLEXIBLE BASE MATERIAL SHALL BE 8" COMPACTED THICKNESS (95% OF MAXIMUM DENSITY ASTM D697-78 METHOD) APPROVED CRUSHED AGGREGATE AT OUTLINED IN TXDOT ITEM 247 OR ASPHALT STABILIZED BASE.
4. NEW ASPHALT PAVEMENT SHALL MATCH THE EXISTING PAVEMENT THICKNESS.
5. BACKFILL DENSITY TESTING SHALL CONFORM TO ASTM D 1556 OR ASTM D 2922.
6. DENSITY TESTING SHALL BE CONDUCTED AT A MIN. OF EVERY 500 LINEAR FEET UNDER PAVED STREETS AND ADDITIONAL TESTING AT THE DISCRETION OF THE INSPECTION PERSONNEL WITHIN THE 500 LINEAR FEET INTERVAL FOR EVERY LIFT.



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#### EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

#### FINAL SURFACE TRENCHING DETAIL

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

DETAIL

21

Bar Measures 1 inch



CARRIER PIPE DIAMETER [IN]	PIPE OD [IN]	PIPE & SPACER DIA [IN]	BELL OD [IN]	MECHANICAL RESTRAINT OD (1) [IN]	MECHANICAL RESTRAINT & CLEARANCE [IN]	WALL THICKNESS [IN]	STEEL PIPE SIZE ND [IN]
6	6.90	10.90	9.500	11.25	15.25	0.375	24
8	9.05	13.05	12.125	14.75	18.75	0.375	24
12	13.20	17.20	17.375	19.45	23.45	0.375	24
18	19.50	23.50	24.375	27.76	31.76	0.375	36
20	21.60	25.60	26.875	30.01	34.01	0.375	36
24	25.80	29.80	31.125	35.00	39.00	0.375	42
30	32.00	36.00	38.100	42.88	46.88	0.375	48
36	38.30	42.30	45.600	49.76	53.76	0.500	54

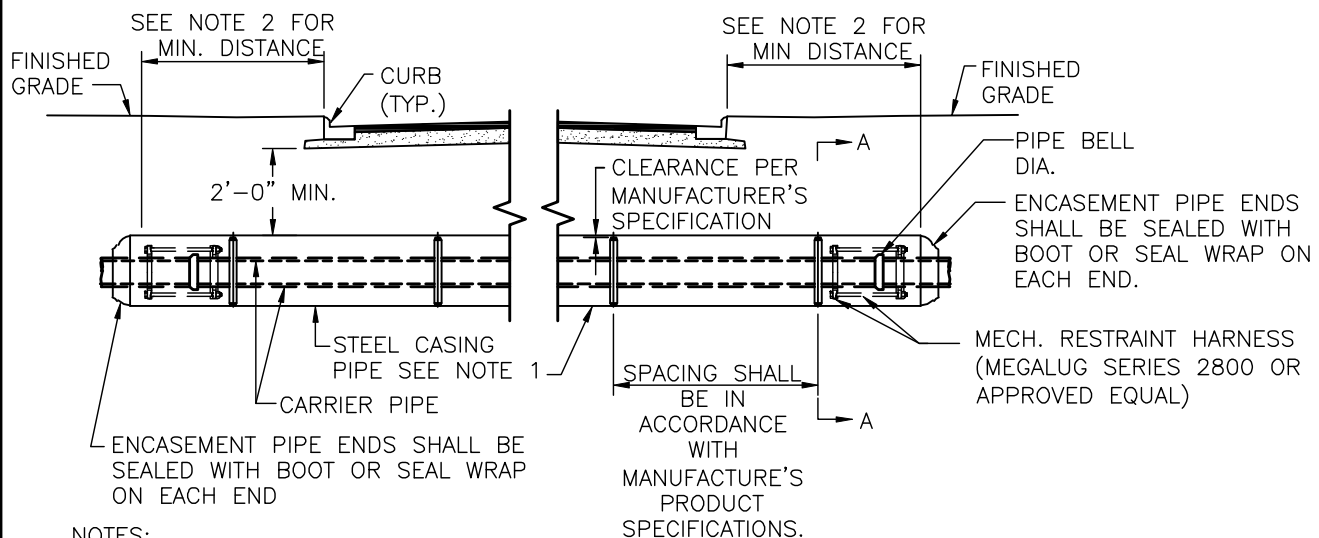
**Sources:**

(1) EBAA PRODUCT DATA SHEETS – MECHANICAL RESTRAINTS SERIES 1500 & 2800

(2) AWWA, "PVC PIPE – DESIGN AND INSTALLATION – MANUAL OF WATER SUPPLY PRACTICES, M23 (2ND EDITION)"

JM EAGLE, "AWWA C900 & C905 PVC WATER TRANSMISSION & DISTRIBUTION PIPE"

CRANE, TECHNICAL PAPER NO. 410



1. CASING PIPE SHALL BE NEW STEEL PIPE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARD C200, LATEST EDITION. MINIMUM WALL THICKNESS AND DIAMETER SHALL BE IN ACCORDANCE WITH CASING DIMENSION TABLE SHOWN ON THIS DETAIL.

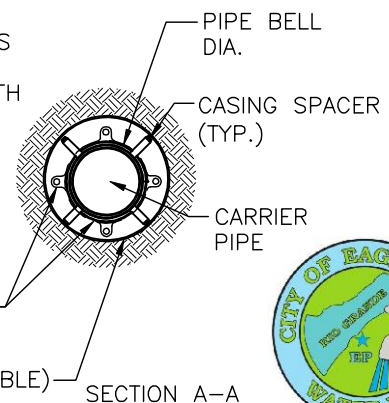
2. THE DISTANCE BETWEEN THE BACK OF CURB OR EDGE OF ASPHALT AND THE END OF THE CASING SHALL CONFORM TO THE REQUIREMENTS AND DISTANCES IN THE BORING PERMIT.

3. CARRIER PIPE SHALL HAVE RESTRAINED JOINTS THRU ENTIRE CASING PIPE.

NUMBER OF RUNNERS AND CONFIGURATION SHALL COMPLY WITH MANUFACTURER'S APPROVED SHOP SUBMITTAL.

MECH. RESTRAINT HARNESS (MEGALUG SERIES 2800 OR APPROVED EQUAL)

ENCASEMENT PIPE (DIA. VARIES; SEE TABLE)



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**TYPICAL JACK & BORE DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

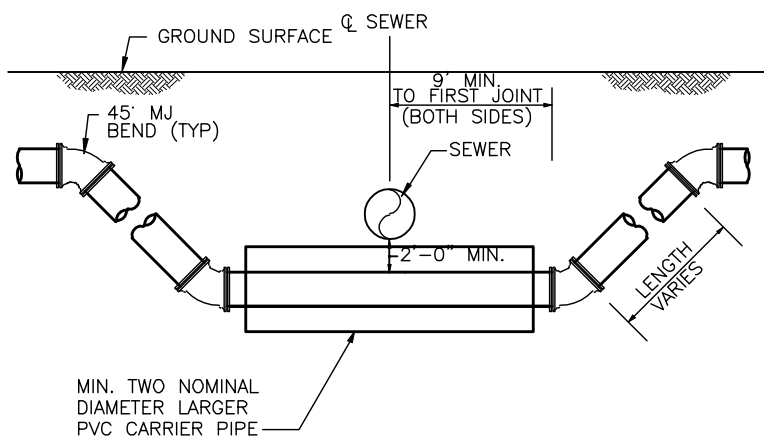
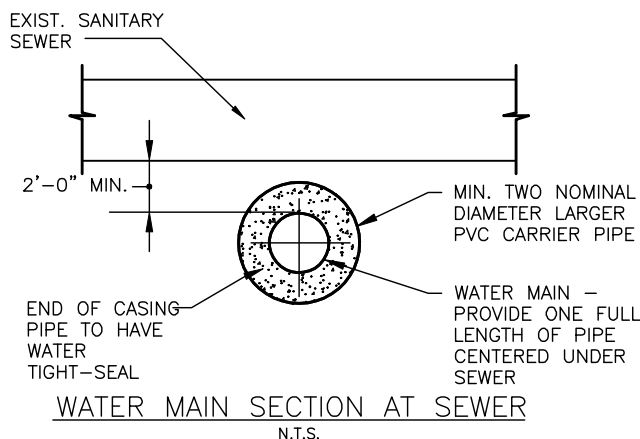
**Designed By:** JJS

**DETAIL**

**22**

Bar Measures 1 inch





**NOTE:**

1. THE WATERLINE SHALL BE ENCASED IN A 18-FOOT (OR LONGER) SECTION OF PIPE. FLEXIBLE ENCASED PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 115 PSI AT 5.0% DEFLECTION. THE ENCASED PIPE SHALL BE CENTERED ON THE WATERLINE AND SHALL BE AT LEAST TWO NOMINAL PIPE DIAMETERS LARGER THAN THE WASTEWATER MAIN OR LATERAL. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT FIVE-FOOT (OR LESS) INTERVALS WITH SPACERS. EACH END OF THE CASING SHALL BE SEALED WITH WATERTIGHT NON-SHRINK CEMENT GROUT OR A MANUFACTURED WATERTIGHT SEAL. A MINIMUM SEPARATION DISTANCE OF ONE FOOT BETWEEN THE WATERLINE AND THE WASTEWATER MAIN OR LATERAL SHALL BE PROVIDED. BOTH THE WATERLINE AND WASTEWATER MAIN OR LATERAL MUST PASS A PRESSURE AND LEAKAGE TEST AS SPECIFIED IN AWWA C600 STANDARDS.

SEE SECTION 30 TAC 290.44(e) FOR ADDITIONAL DETAILS REGARDING WATERLINE CROSSINGS.



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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**WATERLINE CROSSING SANITARY  
SEWER & OTHER UTILITIES DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

**Designed By:** JJS

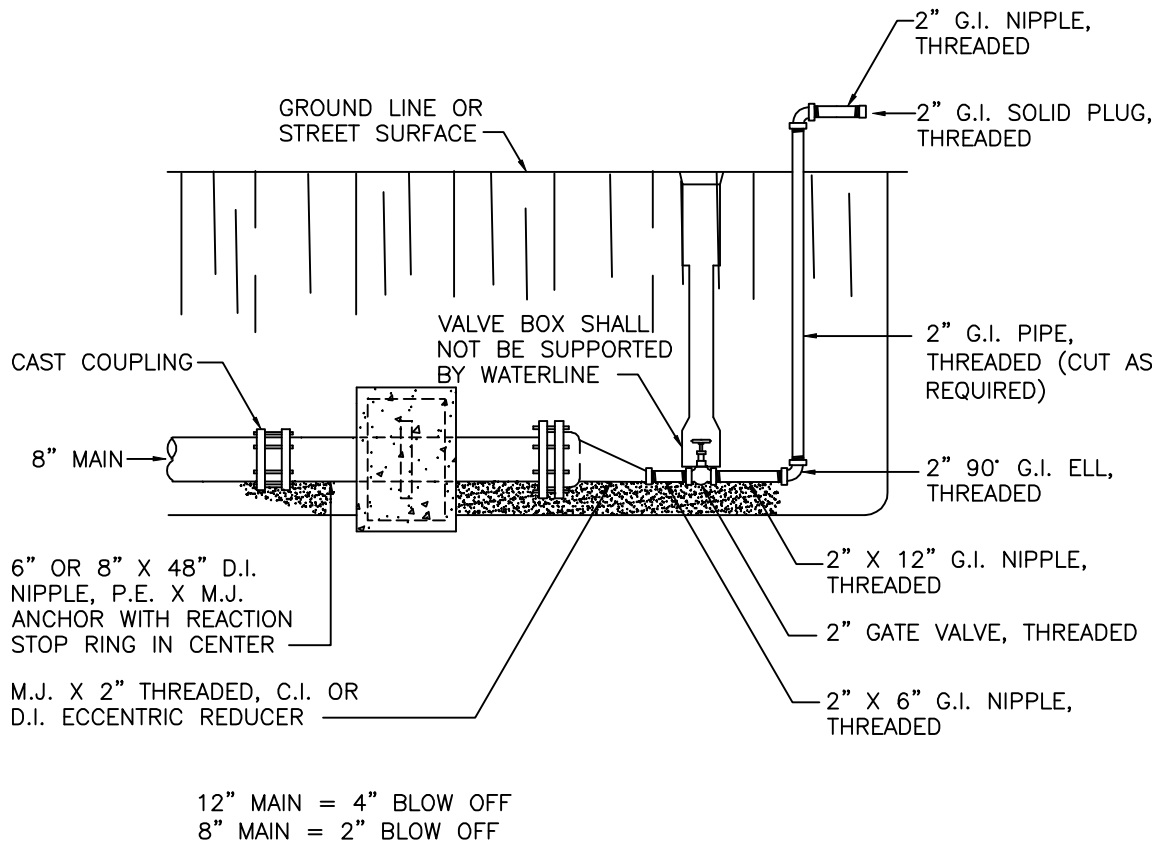
**DETAIL**

**23**

Bar Measures 1 inch







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**EAGLE PASS WATER WORKS SYSTEM**

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

**2" TEMPORARY BLOW-OFF DETAIL**

**Project No.:** 000-0000-000

**Date:** AUG. 2012

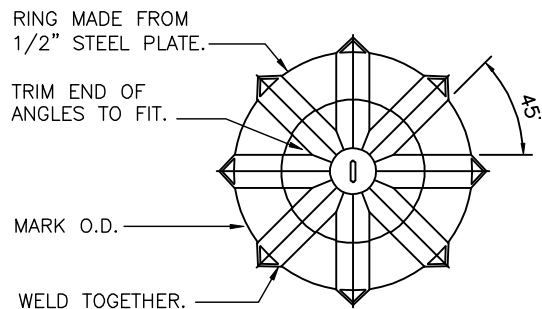
**Designed By:** JJS

**DETAIL**

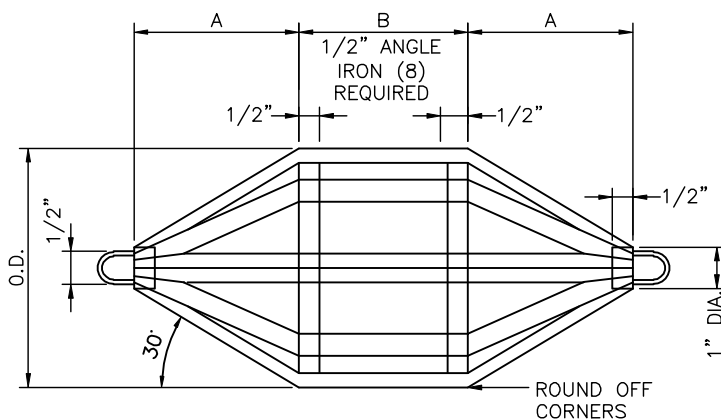
**24**

Bar Measures 1 inch





END VIEW



NOTE:  
ALL MANDRELS MUST BE  
APPROVED BY THE CITY'S  
INSPECTOR PRIOR TO USE.

SIDE OR TOP VIEW

NOTE:

DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE AND SEMI-RIGID PIPES. THE TESTS SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS. NO PIPE SHALL EXCEED A DEFLECTION OF FIVE PERCENT. IF THE DEFLECTION TEST IS TO BE RUN USING A RIGID BALL OR MANDREL, SUCH TEST DEVICE SHALL HAVE A DIAMETER EQUAL TO 95% OF THE INSIDE DIAMETER OF THE PIPE. THE TESTS SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES. THE DESIGN ENGINEER SHOULD RECOGNIZE THAT THIS IS A MAXIMUM DEFLECTION CRITERION FOR ALL PIPES. AFTER CONSTRUCTION IS COMPLETED TRUE O.D. DIMENSION FOR THE FULL LENGTH OF FIN TO 0.010 INCH BY TOOL AND LATHE OR GRINDING. MANDREL DIMENSIONS SHALL BE CERTIFIED BY MANUFACTURER AND THE O.D. SHALL BE STAMPED ON THE MANDREL.

SIZE	A	B
6"	4.0"	4"
8"	5.3"	6"
10"	6.7"	6"
12"	8.0"	8"
15"	10.0"	9"
18"	12.0"	11"
21"	14.0"	12"
24"	16.0"	15"
27"	18.0"	16"
30"	20.0"	18"
36"	24.0"	21"
40"	26.8"	24"
48"	32.0"	29"

5% DEFLECTION DIMENSION IS BASED  
ON 95% OF THE BASE I.D.

\* BASE I.D. IS DEFINED AS THE DIAMETER  
REPRESENTATIVE OF THE PIPE'S ACTUAL I.D.  
WHICH TAKES INTO ACCOUNT THE INHERENT  
MANUFACTURING TOLERANCES OF INSIDE DIAMETER  
AND OUT OF ROUNDNESS.

MANDREL O.D. IS TO BE BASED ON ABOVE  
CRITERIA AND SELECTED PIPE I.D.



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EAGLE PASS WATER WORKS SYSTEM

DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

SANITARY SEWER: GO - NO GO MANDREL  
DEFLECTION TEST

Project No.: 000-0000-000

Date: AUG. 2012

Designed By: JJS

DETAIL

25

Bar Measures 1 inch