

SECTION 026402
WATERLINES

1. DESCRIPTION

This specification, in conjunction with the City of Corpus Christi's Water Distribution System Standards, shall govern all work necessary for the installation of all waterline facilities required to complete the project.

2. MATERIALS

Concrete: Concrete shall have a minimum compressive strength of 3000 psi at 28 days.

Bedding Sand for Encasement: Bedding sand and initial backfill around the pipe shall be granular material of low plasticity as indicated on the drawings.

Ductile Iron Pipe and Fittings: See City Standard Specification Section 026206.

Polyvinyl Chloride Pipe: See City Standard Specification Section 026210.

Tapping Sleeves and Valves: See City Standard Specification Section 026409.

Gate Valves for Waterlines: See City Standard Specification Section 026411.

Fire Hydrants: See City Standard Specification Section 026416.

3. CONSTRUCTION METHODS

(1) **HANDLING MATERIALS**

- a) General: The Contractor shall be responsible for the safe storage of all materials furnished to, or by him, and accepted by him, until it has been incorporated into the completed project.

All material found during the progress of the work to have cracks, flaws or other defects will be rejected, and the Contractor shall remove such defective material from the site of the work.

- b) Unloading and Distribution of Materials at Work Site: Pipe and other materials shall be unloaded at point of delivery, hauled to and distributed at the job site by the Contractor. Materials shall at all times be handled with care and in accordance with manufacturer's recommendations. Care shall be taken not to scratch PVC pipe. Excessive scratching shall be considered cause for rejection of PVC pipe. Materials may be unloaded opposite or near the place where it is to be installed provided that it is to be incorporated into the work within 10 days. The Contractor shall not distribute material in such a manner as to cause undue inconvenience to the public.

- c) Storing Materials: Materials that are not to be incorporated into the work within 10 days shall be stored on platforms. The interior of pipes and accessories shall be kept free from dirt and foreign matter.

(2) **ALIGNMENT AND GRADE**

- a) General: All pipe shall be laid and maintained to the required lines and grades. Fittings, valves and hydrants shall be at the required locations with joints centered, spigots home, and all valve and hydrant-stems plumb.

Temporary support and adequate protection of all underground and surface utility structures encountered in the progress of the work shall be furnished by the Contractor.

Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, connections to sewers or drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the Contractor at the Contractor's expense, in cooperation with the owners of such utility structures.

One 20' section of waterline pipe shall be centered over/under gravity wastewater line at all gravity wastewater line crossings. Waterline shall be ductile iron pipe with mechanical joint fittings, in accordance with City Standard Specification Section 026206, wherever new waterline crosses under new gravity wastewater line.

Maintain a minimum of 18" clearance from the new water main pipe OD in all directions (typical) per City Water Standard Details. Maintain a minimum of 18" (2' typical) vertical clearance between outsides of pipes where a new waterline crosses over a new wastewater line and center the wastewater pipe joint and the water pipe joint on the crossing. Do not cross a new waterline under a new wastewater line without following all current TCEQ water/wastewater minimum separation and encasement requirements. TCEQ minimum allowable separation for new waterline crossing above a new wastewater line, is 6" when the new wastewater line below is constructed of PVC or Ductile Iron and has a pressure rating of 150 psi or greater.

At gravity wastewater line crossings, the proposed PVC waterline shall be encased in a 20' joint of ductile iron or PVC pipe with a minimum pressure rating of 150 psi that is at least two nominal sizes larger than the carrier pipe. The carrier pipe shall be supported in the casing at 5' intervals with spacers or shall be filled to the spring line with clean washed sand, graded as shown in the City Standard Water Details. The casing pipe shall be centered on the gravity wastewater line as indicated on the drawings, and both ends of the casing shall be sealed with cement grout or manufactured seal. Follow all current TCEQ minimum separation distance requirements.

- b) Deviation from Drawings: No deviation from the line and grade shown on the plans may be made without the written consent of the OAR.

- c) Depth of Cover: Depth of cover will be measured from the established street grade or the surface of the permanent improvement, or from finished grade to the top of the pipe barrel. Unless otherwise shown on drawings, the minimum depth of cover shall be 36 inches. Waterlines 12" and larger located under streets shall have 48 inches of cover at all points.
- d) Separation Distance from Structures: Waterlines shall be placed no closer than 15' to any habitable structure.

(3) **TRENCH EXCAVATION AND BACKFILL**

See City Standard Specification Section 022020, "Excavation and Backfill for Utilities" and applicable City Standard Details for Water.

(4) **POLYETHYLENE WRAPPING**

All ductile iron pipe, valves and fittings, except pipe or valves which are laid in encasement pipe or in concrete valve boxes, shall be wrapped in polyethylene. The polyethylene material shall have a thickness of 8 mils and may be either clear or black. The wrapping shall be lapped in such manner that all surfaces of pipe, valves and fittings, including joints, shall have a double thickness of polyethylene. If a single longitudinal lap is made using a double thickness of polyethylene, it shall be lapped a minimum of 18" and the lap shall be placed in the lower quadrant of the pipe and in such a manner that backfill material cannot fall into the lap. The polyethylene shall be secured in place with binder twine at not more than 6' intervals. If wrapping is applied before the pipe is placed in the trench, then special care shall be taken in handling the pipe so that the wrapping will not be damaged. Care shall also be exercised in backfilling around the pipe and fittings and in blocking fittings so as not to damage the wrapping. Any wrapping that may be damaged shall be repaired in a manner satisfactory to the OAR and so as to form the best protection to the pipes.

(5) **SAND ENCASEMENT**

All pipe and fittings that are not enclosed in concrete valve boxes or laid in encasement pipe, shall be completely encased with a minimum of 8" of sand on the bottom and sides of waterlines smaller than 16" in diameter, and 12" over the top of the waterline, unless otherwise indicated on the drawings. This encasement includes the bottom, sides and top of pipe and fittings including bells, so that all portions will be encased with sand to insulate the pipe from the natural ground and from the backfill. The sand shall be compacted to a minimum of 90% Standard Proctor density. Provide twelve 12" of sand encasement all around the pipe for 16" diameter and larger waterlines.

Sand shall be placed in a manner that will not injure the polyethylene wrapping and shall be compacted under, around the side, and over the pipe in a manner that will reduce settlement to a minimum and as approved by the OAR.

In order to reduce the amount of sand required, the trench bottom may be excavated in a rounded manner so as to maintain at least a minimum of 8" of sand between the excavation

and the pipe (twelve inches for 16" diameter and larger waterlines), unless otherwise indicated on the drawings.

(6) LOWERING PIPE AND ACCESSORIES IN THE TRENCH

- a) General: The trench shall be excavated true and parallel to the pipe center line with a minimum clearance of eight inches below the pipe bottom and with a like clearance from the bottom of the bell to the bottom of the bell hole. The trench shall then be refilled to the proper grade with sand as specified. The placing of the encasing material shall be done in such a manner so as to be free of all natural soil rock or other foreign matter.

After final grading in the trench of the encasing material, bell holes shall be excavated at each joint.

Proper implements, tools and facilities satisfactory to the OAR shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants and accessories shall be carefully lowered into the trench by means of a derrick, ropes or other suitable equipment, in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

- b) Inspection of Pipe and Accessories: The pipe and accessories shall be inspected for defects prior to lowering in the trench. Any defective, damaged or unsound pipe shall be replaced.
- c) Clean Pipe: All foreign matter or dirt shall be removed from the interior of the pipe prior to lowering into the trench. Pipe shall be kept clean both in and out of the trench at all times during the laying.

(7) JOINTING PIPES

All pipes shall be made up in accordance with manufacturer's recommendation. Pipe deflection shall not exceed 75% of the maximum amount recommended by the manufacturer.

(8) CONCRETE THRUST BLOCKS

Temporary thrust blocks or other means of carrying thrust loads generated by hydrostatic testing shall be provided at all ends of lines to be tested. Details of the end connections and method of temporary blocking shall be submitted to the OAR for approval. After satisfactory completion of the hydrostatic testing, this temporary blocking shall be removed so that connections may be made with existing lines. This work is subsidiary to waterline installation and no separate payment will be made for it.

Temporary thrust blocks are not allowed for long term use.

Permanent thrust blocks shall only be used on transmission mains, as determined and designed by the Engineer. When used on transmission mains, the thrust blocks shall be placed such that the pipe and fittings are accessible for repair.

(9) METAL HARNESS

Metal harness, tie rods and clamps, or swivel fittings shall be used to prevent pipe movement. Steel rods and clamps shall be galvanized or otherwise rust proofed, or coated with hot coal tar enamel, then wrapped with two layers of polyethylene wrapping.

(10) STERILIZATION

- a) Fittings: Valves, hydrants and fittings shall be stored on timbers and kept clean. Where soil or other substance has come in contact with the water surfaces of the fittings, the interior shall be washed and sterilized with 2% solution of calcium hypochlorite.
- b) Pipe: As each joint of pipe is laid, the Contractor, unless otherwise directed by the OAR, shall throw powdered calcium hypochlorite (70%) through the length of the joint (one pound for each 1,680 gallons of water to give 50 ppm). When the waterline is complete, and before testing, the waterline shall be slowly filled with water between valves and allowed to stand for 48 hours. After the sterilization period is completed, lines shall be flushed by the Contractor under the direct supervision of a representative of the City Water Department. The OAR will take sample for testing two hours after refilling. If the sample does not pass State Health Department purification standards, the procedure shall be repeated. The entire procedure shall be coordinated under the supervision of the Water Division Superintendent/Engineer.

During the sterilization process, valves shall be operated only under the supervision of the Water Division Superintendent/Engineer. There shall be a base fee of \$100 paid by the Contractor to the City for each retest that is required.

(11) HYDROSTATIC TESTING WATER SYSTEM

See City Standard Specification Section 026202, "Hydrostatic Testing of Pressure Systems".

(12) WATER SERVICE CONNECTIONS

See Standard Specification Section 026404, "Water Service Lines".

4. MEASUREMENT AND PAYMENT

Unless otherwise specified on the Bid Form, waterlines will be measured by the linear foot for each size installed. Payment for waterlines will be made under the appropriate pipe material item and shall include, but not be limited to, trenching, dewatering, bedding, pipe (except for fittings), restraints, temporary thrust blocking, backfill, sterilization, and hydrostatic testing. Payment shall be full compensation for all labor, materials, tools, equipment and incidentals required to complete the work.