

Special Specification 7270

Fire Hydrant, Valve, and Meter Adjustment, Relocate and Reconnect



1. DESCRIPTION

Furnish, install, relocate, and reconnect fire hydrant assemblies and supporting materials in conformance with McAllen Public Utilities requirements and City of McAllen Standard Design Guide for Public Infrastructure adopted by the City of McAllen October 2009. Obtain necessary permits, provide testing as necessary, and request inspection of the completed water lines before being placed in service.

2. MATERIALS

Use materials that meet the requirements of the following items:

- Item 400, "Excavation and Backfill for Structures"
- City of McAllen, Section 15100, "Water Valves."

Submit manufacturer's descriptive literature and recommended method of installation for material used. Also submit manufacturer's certification that products meet specification requirements.

Deliver materials on manufacturer's original skids or in original, unopened protective packaging. Owner reserves the right to reject surplus material from a different project or jobsite. Protect materials during transportation, storage, and installation to avoid physical damage. All pipe must be stored at least 6 in. above ground.

2.1. Quality Assurance.

2.1.1. Comply with the latest published edition of American Water Works Association (AWWA) Standards:

- AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
- AWWA C105 - Polyethylene Encasement for Ductile Iron Pipe Systems
- AWWA C110 & C110a - Gray Iron and Ductile-Iron Fittings, 2 in. through 48 in. for Water and Other Liquids
- AWWA C111 - Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings
- AWWA C115 - Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
- AWWA C150 - Thickness Design of Ductile-Iron Pipe
- AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
- AWWA C153 - Ductile-Iron Compact Fittings, 3 in. through 24 in., and 54 in. through 64 in. for Water and Other Liquids
- AWWA C600 - Standard for Installation of Ductile Iron Water Mains and Their Appurtenances
- AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe 4 in. through 12 in. for water
- AWWA C907 - Polyvinyl Chloride (PVC) Pressure Fittings for Water, 4 in. through 8 in.
- AWWA C909 - Polyvinyl Chloride (PVC) Pressure Pipe 6 in. through 12 in. for water
- AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe 14 in. through 36 in. for water.

2.1.2. Comply with the latest published editions of the *American Society for Testing and Materials* (ASTM) Standards:

- D 1248 - Polyethylene Plastics Molding and Extrusion Materials
- D 2241 - Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR)
- D 3139 - Joints for PVC Pressure Pipes using Flexible Elastomeric Seals
- G 62 - Test Methods for Holiday Detection in Pipeline Coatings.

- 2.1.3. Comply with the latest published editions of *Plastics Pipe Institute (PPI) Standards*, for TR2 - PPI PVC Range Composition, Listing of Qualified Ingredients.
- 2.1.4. Comply with the latest published editions of *Canadian Standards Association (CSA) Standards*, for CSA B137.3 - Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- 2.1.5. Comply with the latest published editions of the *Steel Structures Painting Council (SSPC) Standards*, for Commercial Blast Cleaning.

- 2.2. **General Requirements.** All pipe and fittings should be marked in accordance with the applicable standard specification under which the pipe is manufactured, unless otherwise specified.

The quality of materials, the process of manufacture, and the finished pipe will be subject to inspection and approval at the pipe manufacturing plant and at the project site before and during installation. All water distribution pipe and fittings should be listed in the Fire Protection Equipment Directory, published by the Underwriter's Laboratories, Inc. or should be factory mutual approved for fire service.

2.3. **Polyvinyl Chloride (PVC) Pipe.**

Water pipelines must comply with the following requirements:

- pipe must be blue in color;
- water lines must be constructed of PVC water pipe, Pressure Class 235, in accordance with AWWA C900 (DR 18) or AWWA C909;
- water lines 30 in. and larger should not be constructed of PVC; and
- ductile iron (DI) pipe should be provided only where specifically identified on the drawings or in the specifications.

Wastewater pipelines comply with the following requirements:

- pipe must be green in color;
- force mains 12 in. and smaller may be constructed of PVC pipe in accordance with AWWA C900 - Pressure Class 165, DR25; AWWA C909 - Pressure Class 150; or ASTM 2241 - Pressure Rated 160 psi, SDR 26; and
- force mains 14 in. and larger may be constructed of PVC pipe in accordance with AWWA C905 - Pressure Rated 165 psi, DR 25; or ASTM 2241 - Pressure Rated 160 psi, SDR 26.

Reuse or reclaimed water pipelines should be as specified for water pipe except that the color of pipe must be purple.

Where PVC pipeline is installed using non-encased, trenchless methods, the pipe must conform to all preceding requirements for PVC pipe and may be one of the following with minimum wall thickness corresponding to DR 18.

- Jointless PVC. Pipe must conform to the requirements of AWWA C900/C905 and PPI TR2. The pipe must be extruded with plain ends square to the pipe and free of any bevel or chamfer. Pipe should be Fusible C900™ or Fusible C905™ as manufactured by Underground Solutions, Sarver, PA.
- Restrained Joint PVC. Couplings must be non-metallic and incorporate high-strength, flexible thermoplastic splines which must be inserted in to mating, precision-machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading. Couplings must be designed for use at or above the pressure class or rating of the pipe on which they are installed and must incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F 477. Pipe should be C900/RJ™ or C905/RJ™ as manufactured by CertainTeed Corporation, Valley Forge, PA.

Provide push-on joints with bell integrally cast into pipe or with coupling of same material as pipe.

Use elastomeric gaskets, as provided in AWWA C900 or ASTM D3139.

Provide sleeve type or restraint follower glands where indicated or required to join pipe or provide restraint to offset internal or hydrostatic test pressures.

All pipe must be designed and installed with a minimum of 4 ft. cover.

PVC pipe must be marked to indicate the following:

- nominal pipe size,
- material code designation,
- pressure rating,
- manufacturer's name or trademark,
- national sanitation foundation seal, and
- appropriate AWWA or ASTM designation number.

2.4. **Fittings for PVC Pipe.**

On PVC pipelines, provide compatible fittings meeting or exceeding all requirements and ratings for the pipe on which they are installed. Use long radius fittings where possible.

For water lines, provide either AWWA C907 PVC or ductile iron fittings as indicated on the drawings.

For wastewater force mains, fittings should be one of the following:

- AWWA C907 PVC or 200 psi pressure rated PVC for 8 in. and smaller sizes;
- fabricated PVC for 10 in. through 24 in. sizes. Fittings must be made from segments of AWWA C900, C905, or ASTM 2241 PVC pipe bonded together and over-wrapped with fiberglass-reinforced polyester; and
- ductile iron on 14 in. and larger lines conforming to AWWA C905. Ductile iron fittings for wastewater service must be coated as specified for ductile iron pipe.

2.5. **Ductile Iron Pipe (DIP).**

Ductile iron push-on and mechanical joint pipe for buried service must meet all requirements of standard AWWA C151, Class 350. Provide push-on joints unless otherwise indicated on the drawings.

Ductile iron flanged pipe for non-buried service must meet all requirements of AWWA C115. All flanged ductile iron pipe for wastewater service must be thickness class 53. Flanges must 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 completed by the Contractor other than the pipe barrel manufacturer, a complete product submittal and approval by the Utility will be required. Additionally, such fabricator must submit certification that each fabricated joint has been satisfactorily tested hydrostatically at a minimum pressure of 250 psi.

Joints must meet all requirements of AWWA C111 for push-on, mechanical, and flanged pipe. Threaded or grooved-type joints, which reduce pipe wall thickness below minimum requirements, are not acceptable.

Provide manufacturer's certifications that all ductile iron pipe and fittings meet provisions of this Section and have been hydrostatically tested at the factory.

2.5.1. Joint Materials must comply with the following:

- gaskets for ductile iron pipe must conform to AWWA C111;

- joining of slip joint iron pipe must be accomplished with the natural or synthetic rubber gaskets of the pipe manufacturer. Pipe to be installed in areas potentially contaminated by petroleum must have nitrile rubber gaskets. Where other contaminants are present, gaskets should be as recommended by the pipe manufacturer;
- gaskets for flanged joints must be continuous full, face gaskets, of 1/8 in. minimum thickness of natural or synthetic rubber, cloth reinforced rubber or neoprene material, preferably of deformed cross-section design, and must meet all applicable requirements of AWWA C111 for gaskets. Flange gaskets must be manufactured by, or satisfy all recommendations of, the manufacturer of the pipe or fittings being used;
- tee-head bolts, nuts, and washers for mechanical joints must be high strength, low alloy, corrosion resistant steel stock equal to "COR-TEN A" with UNC Class 2 rolled threads or alloyed ductile-iron conforming to ASTM A 536; either must be fabricated in accordance with ASTM B18.2 with UNC Class 2 rolled threads;
- hex-head bolts and nuts must satisfy the chemical and mechanical requirements of ASTM A449 SAE Grade 5 plain and must be fabricated in accordance with ASTM B 18.2 with UNC Class 2 rolled threads;
- bolts, washers, and nuts on flanged fittings must be Grade B, ASTM A-307, 304 stainless steel. Bolts, nuts, and washers must be 316 stainless steel when used in corrosive environments such as wastewater lift station wet wells. They must be coated after assembly in the same manner specified above for piping; and
- all threaded fasteners must 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 must provide adequate literature to facilitate such identification; painted markings are not acceptable.

2.5.2 **Polyethylene Film Wrap.** All iron pipe, fittings, and accessories including polyurethane coated pipe must be wrapped with standard 8 mil (minimum) low density polyethylene film or r-fill (minimum) cross laminated high-density polyethylene conforming to AWWA C105, with all edges overlapped and taped securely with duct 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.

For flanged joints in buried service, provide petrolatum wrapping system, Denso, or equal, for the complete joint and alloy steel fasteners. Alternatively, provide bolts made of type 304 stainless steel.

2.5.3 **Markings.** Each ductile iron pipe joint and fitting must be marked as required by the applicable AWWA specification including the following:

- manufacturer's identification;
- country where cast;
- year of casting;
- "DUCTILE" or "DI;"
- barrels of flanged pipe must show thickness class; others should show pressure class;
- the flanges of pipe sections must be stamped with the fabricators identification;
- fittings must show pressure rating, the nominal diameter of openings, and the number of degrees for bends; and
- painted markings are not acceptable.

2.5.4. **Linings and Coatings.**

Interior. Pipe and fittings for water pipelines must be cement-mortar lined and seal coated as required by AWWA C104. The type and brand of interior lining must 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 should be used on a given project.

Pipe and fittings for wastewater pipelines must be coated to a minimum 40 mils dry film thickness with an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Coating should be "Protecto 401" ceramic epoxy, as manufactured by Induron Protective Coatings.

Exterior. Buried ductile iron piping and fittings must have a prime coat and outside asphaltic coating conforming to the applicable AWWA standard for the pipe or fitting being installed. Pipe to be installed in potentially contaminated areas must have coatings and linings recommended by the manufacturer and approved by the engineer as resistant to the contaminants identified.

Above-ground ductile iron piping should have a shop prime with one coat of Koppers No. 621 Rust Inhibitive Primer or equal, and a finish coat of Tnemec 75 Endura-Shield or equal.

Ductile iron piping and fittings in non-buried, corrosive environments such as wastewater lift station wet wells must be coated with one of the following:

- minimum 25 mils DFT with "Ceramawrap" ceramic epoxy as manufactured by Induron Protective Coatings;
- minimum 40 mils DFT with "Corropipe II TX-15 (AM)" as manufactured by Madison Chemical; and
- equally approved.

Non-buried pipe with specified coating must be provided with touch-up kit for field repair of damaged coating.

Pipe and fittings to receive external coating must be shop primed or delivered to the coating applicator bear as recommended by the manufacturer of the finish coat. Pipe and fittings for non-buried service receiving asphaltic coating at any point before application of the specified coating are not acceptable.

2.6. **Ductile Iron Pipe Fittings.**

Fittings must be flanged for above-ground service or mechanical joint for buried service unless otherwise indicated or approved, and must meet all requirements of the following standards:

- AWWA C110 or AWWA C153 (buried service only), and
- AWWA C111.

Use fittings of same size as pipe. Reducers are not permitted to facilitate an off-size fitting. Reducing bushings are also prohibited. Make reductions in piping size by reducing fittings.

Where long radius bends are indicated, fittings must have center-to-face and radius dimensions according to the ANSI B16.1 Class 125 standard for long radius bends and must conform to all other applicable requirements of AWWA C110 including pressure rating.

Must be compatible with joint type of adjacent pipe.

Provide all specials, taps, plugs, flanges, and wall fittings, as required.

Linings and coatings for ductile iron fittings must be as specified for ductile iron pipe.

Submit certification that all testing requirements of AWWA C110 and C153 have been met. Submittal must indicate foundry or foundries of manufacture for all fittings.

2.7. **Valves, Hydrants, Meters and Appurtenances.**

For valve requirements refer to Section 15100, "Water Valves," per City of McAllen.

2.7.1 Valve boxes required for all buried valves. Must comply with the following:

- use nominal 6 in. cast-iron sliding type pipe shaft with cover and base casting;
- set box top at finished grade; and
- furnish drop cover appropriately marked "WATER."

- 2.7.2 Corporation Stops must Conform to AWWA C800. Use 1 in. unless indicated otherwise.
- 2.7.3 Hydrants design must meet the latest edition of AWWA C502, traffic model with break flange. The following are acceptable:
- Mueller Centurion - A423,
 - American-Darling - B-84-B, and
 - Kennedy Guardian - K-81A.
- The following requirements must be met
- provide 6 in. inlet, two 2 1/2 in. hose nozzles, and one 5 in. pumper;
 - provide compression type main valve, minimum size 5< in.;
 - pentagon operating nut;
 - design to open counterclockwise;
 - provide mechanical joint bell on footpiece;
 - furnish depth as noted on plans; and
 - furnish National (American) Standard Fire Hose Coupling Screw Thread (NH).
- 2.8. Polyethylene wrapping must meet AWWA C105 with a thickness of 8 mils.
- 2.9. Polyethylene Plastic Pipe (PE) must meet the following:
- ASTM D2737, "Material,"
 - ASTM D2683, "Fittings," and
 - size: 1 in. unless shown otherwise on plans.

3. CONSTRUCTION

Provide all labor, equipment, and materials, and install all pipe fittings, specials, and appurtenances as indicated or specified.

3.1. Pipe Installation.

- 3.1.1. **Handling.** Handle in a manner to ensure installation in sound and undamaged condition. Do not drop or bump. Use slings, lifting lugs, hooks, and other devices designed to protect pipe, joint elements, and coatings.

Ship, move, and store with provisions to prevent movement or shock contact with adjacent units. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

- 3.1.2. **Installation.** Install pipe with orientation of labeling point upward. Use equipment, methods, and materials ensuring installation to lines and grades as indicated. Do not lay piping on blocks unless pipe is to receive total concrete encasement.

- 3.1.2.1. Accomplish horizontal and vertical alignment adjustments with fittings or deflection of joints.

Limit joint deflection to not more than 80% of pipe manufacturer's recommended maximum for PVC pipe. Deflection must conform to AWWA C600 for ductile iron pipe.

Use short specials preceding curves, as required.

Obtain approval of engineer of method proposed or transfer of line and grade from control to the work.

- 3.1.2.2. Install pipe of size, material, strength class, and joint type with embedment as shown on the drawings or specified herein.
- 3.1.2.3. Clean interior of all pipe, fittings, and joints before installation. Exclude entrance of foreign matter during discontinuance of installation.
- 3.1.2.4. Close open ends of pipe with snug fitting closures.
- 3.1.2.5. Do not let water fill trench. Prevent flotation of pipe where potential for trench flooding is present.
- 3.1.2.6. Remove water, sand, mud, and undesirable materials from trench before removal of end cap.
- 3.1.2.7. Inspect pipe before installation to determine if any pipe defects are present.
- 3.1.2.8. Brace or anchor as required to prevent displacement after establishing final position.
- 3.1.2.9. Perform only when weather and trench conditions are suitable. Do not lay pipe in water.
- 3.1.2.10. Observe extra precaution when hazardous atmospheres might be encountered.
- 3.1.2.11. Sanitary sewer separation distance from water line must conform to all TCEQ requirements for separation. Reuse or reclaimed water lines must be treated as sewer lines with regard to separation distance requirements.

Maintain 9 ft. horizontal separation whenever possible. When conditions prevent a lateral separation of 9 ft., water line may be installed closer to a sewer subject to the following conditions.

- For crossings, sewer must be constructed of PVC pipe meeting the requirements specified above for pressure sewer lines and have a minimum working pressure rating of 150 psi or greater for pipe and fittings. The water line may be placed no closer than 6 in. from the sewer. The separation distance must be measured between the nearest outside pipe diameters. The water line must be located at a higher elevation than the sewer line whenever possible and one length of the sewer pipe must be centered on the water line.
- For Parallel alignments, the water line must be separated by a minimum vertical distance of 2 ft. (water above sewer) and a minimum horizontal distance of 4 ft., measured between the nearest outside diameters of the pipes.

- 3.1.2.12. Separation of water lines must be maintained from sewer manholes. No water pipe must pass through or come in contact with any part of a sewer manhole. A minimum horizontal separation of 9 ft. must be maintained.
- 3.1.2.13. Construct service lines where shown on the plans in accordance with standard detail drawing. Use pipe material specified on the plans or in the Contract documents.
- 3.1.2.14. Wrap ferrous pipe, fittings, and tie rods with polyethylene where shown on the plans in accordance with AWWA C105.

3.1.3. **Jointing.**

- 3.1.3.1. Must comply with the following general requirements:

- locate joint to provide for differential movement at changes in type of pipe embedment, at changes from rock to soil trench bottom, and within 18 in. of structure walls;
- perform in accordance with manufacturer's recommendations;
- clean and lubricate all joint and gasket surfaces with lubricant recommended;
- use methods and equipment capable of fully homing or making up joints without damage; and
- check joint opening and deflection for specification limits.

3.1.3.2. Must comply with the following special provisions for jointing ductile iron pipe:

- conform to AWWA C600;
- visually examine while suspended and before lowering into trench;
- paint bell, spigot, or other suspected portions with turpentine and dust with cement to check for cracks invisible to the eye;
- remove turpentine and cement by washing when test is satisfactorily completed; and
- reject all defective pipe.

3.1.3.3. Must comply with the following special provisions for jointing and laying PVC pipe:

- conform to AWWA C600 and ASTM D2321; and
- allow pipe to reach trench soil temperature before installation in ditch.

3.1.4. **Cutting.** Cut in a neat workmanlike manner without damage to pipe. Smooth cut by power grinding to remove burrs and sharp edges. Repair lining as required and approved. Cut cast iron with Carborundum saw or other approved method.

3.1.5. **Closure Pieces.** Connect two segments of pipelines or a pipeline segment and existing structure with short sections of pipe fabricated for the purpose.

Observe specifications regarding location of joints, type of joints, pipe materials, and strength classifications.

May be accomplished with sleeve coupling of rating equal to or greater than that of pipe.

- Length must be such that gaskets are not less than 3 in. from pipe ends.
- Include spacer ring identical to pipe end such that clear space does not exceed 1/4 in.

3.1.6. **Temporary Plugs.** Install Temporary Plugs whenever installed pipe is left unattended. Use water-tight plug rated for 150 psi or greater.

3.1.7. **Joint Restraint.**

Provide thrust blocks for all horizontal or vertical bends, and on all dead-ends, tee fittings, and changes in pipe diameter. Construct to undisturbed edge of trench for bearing.

Install thrust blocks as indicated on standard detail drawing.

Mechanical joints must be protected by felt roofing paper before placing concrete. Concrete must not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms or sand bags must be provided for thrust blocks.

Provide minimum bearing area in square feet based on 150 psi test pressure and 2000 psf soil bearing capacity listed in Table 1 below.

Table 1
Bearing Area (in Square feet)

Pipe/Tee Size	Tee/Dead Ends	11¼° Bend	22¼° Bend	45° Bend	90° Bend
4"	1.4	0.3	0.5	1.0	1.9
6"	2.8	0.5	1.1	2.1	4.0
8"	4.8	0.9	1.9	3.7	6.8
10"	7.3	1.4	2.8	5.6	10.3
12"	10.3	2.0	4.0	7.9	14.5
14"	13.8	2.7	5.4	10.6	19.5
16"	17.8	3.5	7.0	13.6	25.2

Adjust thrust block areas accordingly if pressures or soil bearing capacity varies.

Restraint follower glands for use with mechanical joint fittings must be used in addition to thrust blocks where indicated on the drawings. Restraint gland must have torque limiting twist-off nuts and must meet the requirements of ASTM 1674-96 for use with PVC pipe and be equal to "MEGALUG®" as manufactured by EBAA Iron, Eastland, TX.

After installation, non-buried pipe must be visually inspected for damage to protective coating and repaired using coating manufacturer's repair kit.

3.2. **Valve and Appurtenance Installation.**

3.2.1. Install valves with stems vertical when installation is horizontal. Set valves on concrete thrust block with 4 sq. ft. of bearing area on undisturbed earth.

3.2.2. Center valve boxes on valves. Carefully tamp earth around each valve box to a distance of 4 ft. on all sides of box or to undisturbed trench face, if less than 4 ft.

3.2.3. Set hydrants, where shown on plans, in accordance with standard detail drawing. Install gravel, blocks, and anchors in accordance with standard detail drawing. Set reference elevation 3 in. above existing grade or to elevation established by Engineer (not to exceed 6 in.) Break-a-way flange to be either ground level where applicable or between 3 in. and 6 in. above curb as established by the Engineer.

3.3. **Acceptance Tests for Pressure Mains.**

Perform hydrostatic pressure and leakage test, after backfilling. Conform to AWWA C600 procedures, as modified herein. Applies to all pipe materials specified.

Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.

Contractor to furnish and install test plugs, including all anchors, braces, and other temporary or permanent devices to withstand hydrostatic pressure on plugs, at no additional cost to the owner. Contractor is responsible for any damage to public or private property caused by failure of plugs.

Limit fill rate of line to available venting capacity. Fill rate must be regulated to limit velocity in lines when flowing full to not more than 1 fps.

Owner will make water for testing available to Contractor at nearest source.

Valves of existing water system will at all times be operated by City personnel only.

- 3.3.1. **Pressure test.** Test must comply with the following items:
- test must be conducted at a pressure at least 1.5 times the normal working pressure (not less than 150 psi test pressure);
 - maintain pressure for a minimum of 2 hr.; and
 - test pressure must not vary by more than +5 psi.

- 3.3.2. **Leakage Test.** Test must comply with the following items:
- conduct concurrently with the pressure test;
 - maintain pressure for a minimum of 2 hr.; and
 - acceptable when leakage does not exceed that determined by the following formula:

$$L = \frac{N \cdot D \cdot P^{0.5}}{7400}$$

L = Maximum permissible leakage in gallons per hour.

N = Number of pipe joints in segment under test.

D = Nominal internal diameter of pipe being tested in inches.

P = Average actual leakage test pressure, psig.

Repeat leakage test as necessary.

- After location of leaks and repair or replacement of defective joints, pipe, or fittings.
- Until satisfactory performance of test.
- At no increase in cost to the owner.

- 3.3.3. Refit and replace all pipe not meeting the leakage or pressure requirements. Repair clamp is not permitted.

- 3.3.4. Repair all visible leaks regardless of the amount of leakage.

- 3.3.5. Owner or Engineer will observe all tests.

3.4. **Disinfection of Pipelines for Conveying Potable Water.**

- 3.4.1 Contractor to provide all equipment and materials and perform in accordance with AWWA C601, as modified herein. Include chlorination and final flushing.

- 3.4.2. Add chlorine to attain an initial concentration of 50 mg/l chlorine with 10 mg/l remaining after 24 hr.

- 3.4.3. Flush main until concentration is 2 mg/l or current disinfectant levels of treatment or less before placing main in service.

- 3.4.4. Obtain approval of materials and methods proposed for use.

- 3.4.5. May be conducted in conjunction with acceptance tests.

- 3.4.6. Dispose of flushing water without damage to public or private property.

- 3.4.7. Repeat disinfection procedure should initial treatment fail to yield satisfactory results, at no additional cost to the owner. Owner will provide water under terms specified for acceptance tests.

- 3.4.8. Do not exceed 500 gpm rate in flushing.
- 3.4.9. Provide safe bacterial sample results before requesting main to be placed into service.
- 3.4.10. No valves separating city potable water from newly installed mains must be operated by anyone other than TCEQ certified water operators as authorized by the Department Manager in charge of maintenance of the distribution system.

4. MEASUREMENT

- 4.1. **Pressure Lines.** Line must be measured along the center of the pipe without considering fittings or other pipe connections. The line will be paid at the Contract bid price per linear foot.

Compensation will be for furnishing all materials, labor, equipment, tools, and incidental work required by the construction of the pressure line, all in accordance with the plans and these Specifications.

If pressure line fails any test procedure, trouble spots to be corrected all as incidental to the construction of the pressure line.
- 4.2. **Fire hydrant relocate and reconnect will be measured for Payment per each, complete in place.** Offsets, bends, fittings, or any supporting materials needed to complete relocating and reconnecting of the fire hydrant will be considered subsidiary to the price bid for the fire hydrant relocate and reconnect.
- 4.3. **Water meter box.** Adjustment will be measured for Payment per each, complete in place. Relocation will be measured for Payment per each, complete in place.

For the diameter, pressure class, and material specified, for all depths, and must include all necessary tapping saddles, service line extension, curb stops, reconnections, new meter and box if damaged, or any supporting material, permits, and fees to complete relocation and adjustment will be considered subsidiary to the price bid.
- 4.4. **Adjustment of water valve cover and valve stacks will be measured for Payment per each, complete in place.** Must include concrete collar and appurtenances necessary to adjust upward or downward or any supporting material to complete adjustment to finished grade will be considered subsidiary to the price bid for valve adjustment.

5. PAYMENT

The work performed, with this Item and measured as provided under "Measurement," will be paid for at the unit price bid per each, complete in place. This price will be full compensation for furnishing all labor, tools, equipment, and incidentals necessary to satisfactorily complete the work prescribed in the document and as detailed on the plans. Miscellaneous piping, fittings, concrete blocking, sterilization, excavation, trench protection, embedment, and testing required to complete the work will not be paid for directly, but will be subsidiary to this Item unless otherwise shown on the plans.