**ITEM NO. 813**
**Water Service for Firelines**

**813.1 DESCRIPTION:** This item shall consist of water service for fire line installations in accordance with these specifications and as directed by the Engineer.

**813.2 REFERENCE STANDARDS:** Reference standards cited in this Specification Item No. 813 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 813, unless a date is specifically cited.

1. San Antonio Water System (SAWS):
   a. Specifications for Water and Sanitary Sewer Construction
   b. SAWS Materials Specifications
2. City Of San Antonio (COSA) Standard Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ) Chapter 217 Design Criteria for Domestic Wastewater Systems
4. American National Standards Institute (ANSI)/American Water Works Association (AWWA)
   a. ANSI A 21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   b. ANSI/NSF Standard 61 - Drinking Water System - Health Components.
5. American Society for Testing and Materials (ASTM) International:
   a. ASTM A 36 - Standard Specification for Carbon Structural Steel.
   b. ASTM A 536 - Standard Specification for Ductile Iron Castings.
   c. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
   d. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
   e. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
   f. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod and Bar.
   g. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
   h. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
   i. ASTM E 709 - Standard Guide for Magnetic Particle Examination.
   j. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
   k. ASTM D2241, "Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR PR Series)"
6. American Water Works Association (AWWA)
   a. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
   b. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inches through 144 Inches.

c. AWWA C605, "Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

d. AWWA C651-05 Disinfecting Water Mains

e. AWWA C900, "Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100 mm through 300 mm) for Water Distribution"

f. AWWA C907, "Polyvinyl Chloride (PVC) Pressure Fittings for Water –4 in. through 8 In (100 mm Through 200 mm)

g. AWWA M28 Rehabilitation of Water Mains

h. AWWA Manual M27, External Corrosion: Introduction to Chemistry and Control.

i. AWWA Manual M41—Ductile-Iron Pipe and Fittings.

j. AWWA Manual M17, Installation, Field Testing, and Maintenance of Fire Hydrants.

7. American National Standards Institute (ANSI)/AWWA

a. ANSI/AWWA C151/A21.51—Ductile-Iron Pipe, Centrifugally Cast.

b. ANSI/AWWA C515—Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service (5.5 lb) Rammon and a 305 mm (12 in.) Drop.

c. ANSI†/AWWA C105/A21.5—Polyethylene Encasement for Ductile-Iron Pipe Systems.

d. ANSI/AWWA C111/A21.11—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

e. ANSI/AWWA C150/A21.50—Thickness Design of Ductile-Iron Pipe.

f. ANSI/AWWA C500—Metal-Seated Gate Valves for Water Supply Service.

g. ANSI/AWWA C509—Resilient-Seated Gate Valves for Water Supply Service.

h. ANSI/AWWA C651—Disinfecting Water Mains.

8. International Organization of Standardization (ISO)

a. ISO9001

9. Texas Commission on Environmental Quality (TCEQ)

a. Chapter 290; Subchapter D – Rules and Regulations for Public Drinking Water

**813.3 SUBMITTALS:** All submittals shall be in accordance with most recent version of SAWS's General Conditions requirements. Submit the following prior to performing any work.

1. Certifications:

a. Per General Conditions section 5.12.2 all Contractor submittals for all pipe and other products or materials furnished under this specification shall be marked as reviewed and approved by Contractor for compliance with Contract Documents and the referenced standards.

b. The Manufacturer shall provide ISO 9001 Certificate by a third party.

c. Submit written verification that the pipe Manufacturer has been manufacturing pipe per required ASTM with similar design pressure and size as this Project.

d. Submit written verification from the pipe Manufacturer demonstrating compliance with the production and delivery schedule of the pipe as indicated in the Contractor's schedule.

e. Submit written verification from mechanical fitting Manufacturer that fittings are compatible with proposed pipe and meets the requirements of this section.

2. Contractor shall submit Manufacturer's product data, installation recommendations, shop drawings, and certifications.

3. Shop Drawings:

a. Catalog Data Sheets for all materials confirming pipe, fittings, and other materials conform to requirements of this specification.

b. Pipe Supplier Information. Submit company name, contact name, and contact number.

c. Details of all piping systems components confirming that the pipe and fittings conform to the specified requirements.

d. The Contractor shall submit shop drawings of pipe, fittings, gaskets, hardware, flanges, appurtenances, special details sufficient to demonstrate compliance with these Specifications and applicable pipe installation Specification.

e. Fabrication drawings.

4. Testing Plan: Submit at least prior to start of construction.

5. Testing Reports:

7. Detail drawings indicating type, number, and other pertinent details of the slings and/or other methods proposed for pipe support and handling during manufacturing, transport, and installation. All pipe handling equipment and methods shall be acceptable to Engineer.

8. Pipe Manufacturer's Written Quality Assurance/Quality Control Program.

9. Field Service Representative Resume

**813.4 MATERIALS:** The materials for water main installation shall conform to the specifications contained within the latest revision of SAWS Material Specifications:

1. 05-11. "Ductile Iron Pipe,"
2. 05-12, "PVC C-900 Water Pipe."
3. 21-30 Dry Barrel Fire Hydrants
4. 95-10 Joint Restraint Systems
5. 30-30 Fire Service water Meter
6. The pressure rating for pipe materials apply to any work performed in SAWS Pressure Zones. Minimum pressure rating for all pipes in high pressure zones shall be 235 psi. Pressure Zone Tables shall be obtained from SAWS Development Department.

**813.5 CONSTRUCTION:**

1. The Contractor shall start his work near a tie-in or point designated by the Inspector.
2. Pipe shall be laid with bell ends facing in the direction of pipe laying, unless otherwise authorized or directed by the Inspector.
3. All valves and fire hydrants must be installed as soon as pipe laying reaches their established location.
4. All pipe shall be installed to the required lines and grades with fittings, valves, and hydrants placed at the required locations.
5. Spigots shall be centered in bells or collars, all valves and hydrant stems shall be set plumb, and fire hydrant nozzles shall face as per SAWS standard details.
6. No valve or other control on the existing system shall be operated for any purpose by the Contractor unless a representative of SAWS is present.
7. New water mains crossing any other utility shall have a minimum of 5 feet of cover over the top of the pipe, unless otherwise waived or modified by the Engineer.
8. Excavation around other utilities shall be done by hand for at least 12 inches all around. Any damage to the protective wrap on gas lines or electrodes shall be reported immediately to the CPS Energy, phone (210) 353-4357. Any damages will be at Contractor's expense.
9. Any damage to other utilities shall be reported to their proper governing entity. Any damages will be at Contractor's expense.
10. In any case of utility damage, the Contractor shall also promptly notify the Inspector.
11. New waterline installation shall comply with TCEQ Chapter 290; Subchapter D – Rules and Regulations for Public Drinking Water criteria for the location and installation of waterlines. See Drawings in this Specification.
12. All separation distances shall be measured from the outside surfaces of each of the respective pieces.
13. The bedding and backfill of the existing wastewater mains or laterals shall not be disturbed.
14. All water mains shall have a minimum of 5 feet of cover from the proposed final finish ground/street/elevation unless otherwise adjusted by the Engineer.
15. Pipe grades shall be as required by the contract documents or as directed by the Engineer.
    a. Grades shall be met as specified in Specification Item No. 804 Excavation, Trenching and Backfilling.
    b. Changes in grade shall be made only at joints
16. Precaution shall be taken to ensure that the pipe barrel has uniform contact with the cushion material for its full length except at couplings.
17. The couplings shall not be in contact with the original trench bottom prior to backfilling.
18. Cushion material shall be placed under the coupling and compacted by hand prior to backfilling so as to provide an even bearing surface under the coupling and

pipe.

19. Prior to placing pipe in a trench, the trench shall have been excavated to the proper depth as required in plans and Specification Item No. 804 "Excavation, Trenching, and Backfilling."
20. Approved imported materials or Engineer-approved native materials, as per Specification Item No. 804 "Excavation, Trenching, and Backfilling," shall be smoothly worked across the entire width of the trench bottom to provide a supporting cushion.
21. When either the Inspector or Engineer note that the material at the bottom of a trench is unstable or unsuitable, it shall be removed and replaced with approved material which may be properly compacted in place to support the pipe. See Specification Item No. 804 "Excavation, Trenching, and Backfilling," If required the Contractor shall also construct a foundation for the pipe consisting of piling, concrete beams, or other supports in accordance with contract documents prepared by the Engineer.
22. Proper implements, tools, and facilities satisfactory to the Inspector shall be provided and used by the Contractor for the safe and convenient completion of work.
23. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece, by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings, polywrap sleeving, and linings.
24. Under no circumstances shall water main materials, pipes, fittings, etc., be dropped or dumped into the trench.
25. Extreme care shall be taken to avoid damaging polywrap films. No chains or slings shall be allowed unless the entire sling is wrapped with a protective nylon web sock.
26. To prevent pipe damage, proper implements, tools, and equipment should be used for placement of the pipe in the trench; pipe and/or accessories should never be dropped into the trench.
27. After placing a length of pipe in the trench, the jointed end shall be centered on the pipe already in place, forced into place, brought to correct line and grade, and completed in accordance with requirements.
28. The pipe shall be secured in place with approved backfill material tamped around it.
29. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be rejected by the Engineer and/or Inspector and shall be replaced with pipe and fittings of proper dimensions.
30. Precautions shall be taken to prevent dirt or other foreign matter from entering the joint space.
    a. Every precaution shall be taken to prevent foreign material from entering the pipe during installation.
    b. Under adverse trenching conditions, work stoppage for more than 24

hours and/or as otherwise required by the Inspector, a manufactured water tight cap/plug is to be used at each end to prevent any foreign type material entering the pipe and to make the pipe watertight.

c. This provision shall apply during all periods when pipe laying is not in progress.

d. Should water enter the trench, the seal shall remain in place until the trench is pumped completely dry.

e. The Contractor shall provide all plugs and caps of the various sizes required.

f. The cap/plug shall be left in place until the pipe is connected to an adjacent pipe.

g. The interior of each pipe shall be inspected for foreign material or defects, and the pipe shall be cleaned or rejected if any defects are found.

31. Deviations in Alignment

a. Wherever obstructions not shown in the contract documents, to include changes in depth and/or alignment, are encountered during the progress of the work and interfere to an extent that an alteration in the plan is required, the Engineer shall have the authority to change the contract documents and direct a deviation from the alignment or to arrange with the owners of the structures for the removal, relocation, or reconstruction of the obstructions.

b. Any deviation from the alignment shall be accomplished by the use of appropriate bends unless such requirement is specifically waived by the Engineer.

c. These deviations shall clearly and accurately be reflected in the Contractor's submittal of their redline drawings for permanent recording purposes.

d. Whenever it is necessary to deflect pipe from a straight line, the deflection shall be as directed by the Engineer.

e. In no case shall the amounts shown in Table 1, Maximum Deflections of Ductile Iron Pipe, or as per manufacture’s recommendation for pipe deflection be exceeded.

f. If deflection is exceeded, bends must be incorporated.

| TABLE 1 | | | | | |
|---|---|---|---|---|---|
| **MAXIMUM DEFLECTIONS OF DUCTILE-IRON** | | | | | |
| **Nominal Pipe Diameter** | **Maximum Deflection Angle** | **Maximum Deflection In Inches** | | **Approximate Radius Of Curve In Inches** | |
| | | **18 Ft.** | **20 Ft.** | **18 Ft.** | **20 Ft.** |
| 6" | 4°25' | 16.7 | 18.5 | 234 | 260 |
| 8" | 3°51' | 14.6 | 16.2 | 268 | 297 |
| 10" | 3°42' | 14.0 | 15.5 | 279 | 310 |
| 12" | 3°08' | 11.9 | 13.2 | 327 | 363 |
| 16" | 2°21' | 8.8 | 9.7 | 440 | 488 |
| 20" | 1°55' | 7.2 | 8.0 | 540 | 600 |
| 24” | 1°35' | 6.0 | 6.7 | 648 | 720 |

32. Cutting Pipe:

a. The cutting of pipe for inserting valves, fittings, or closure pieces shall be accomplished in a neat and workmanlike manner so as to produce a smooth end at right angles to the axis of the pipe.

b. The recommendations of the pipe manufacturer shall be strictly followed by the Contractor.

c. Only qualified and experienced workmen shall be allowed to cut pipe and, under no circumstances, shall a workman not equipped with proper safety goggles, helmet and all other required safety attire be permitted to engage in this work.

d. All cuts made on ductile-iron pipe shall be done with a power saw.

i. The cuts shall be made at right angles to the pipe axis and shall be smooth.

ii. The edges of the cut shall be finished smoothly with a hand or machine tool to remove all rough edges.

iii. The outside edge of pipe should be finished with a small taper at an angle of about 30 degrees.

iv. Solid sleeves or cast couplings shall be allowed on precast/prefab

vaults only.

v. All fire line services shall be installed with full joints of pipe.

e. Tapping of CSC pipe is only allowed by manufactures' contractor.

i. Contractor must be trained by CSC Manufacturer of pipe brand being tapped.

ii. Contractor must be approved for pipe tapping by CSC Manufacturer of pipe brand being tapped.

iii. Contractor must have experience tapping specific brand of CSC pipe proposed for tapping.

iv. Contractor must have experience with similar pipe size being tapped.

v. SAWS must approved Contractor after CSC Manufacture has trained and approved Contractor.

f. To facilitate future repair work on water mains, no sections less than 3 feet in length between fittings shall be allowed.

g. Asbestos Cement (AC): No field cutting, breaking, or crushing will be allowed on AC pipe.

i. Repairs to AC pipe shall be accomplished by removing one full joint of AC pipe and replacing with appropriate PVC, Ductile Iron pipe, CSC, or HDPE pipe and fittings.

ii. All work associated with removing and disposing of AC pipe shall conform to the provisions of Item No. 3000, "Handling of Asbestos Cement Pipe."

34. Joint Assembly:

a. Rubber Gasketed Joints: The installation of pipe and the assembly of rubber gasketed joints for ductile iron pipe shall conform to the pipe manufacturer's assembly instructions.

b. The method of inserting spigot ends of pipe in bells or collars known as "stabbing" shall not be permitted with pipe larger than 6 inches in size.

c. Spigot ends of pipe larger than 6 inches in size must be properly inserted in the joint by means of suitable pushing/pulling devices or an approved manufacture's method.

d. Mechanical couplings shall be assembled and installed according to the standards recommended by the manufacturer.

i. Prior to the installation of the mechanical coupling, the pipe ends shall be cleaned by wire brush or other acceptable method to provide a smooth bearing surface for the rubber compression gasket.

ii. The pipe shall be marked to align the end of the coupling which will center it over the joint.

iii. After positioning, the nuts shall be drawn up finger tight.

iv. Uniform pressure on the gaskets shall be applied by tightening alternate bolts on the opposite side of the circle in incremental amounts.

v. Final tensioning shall be accomplished with a torque wrench and

in a manner similar to the tightening procedure.

vi. Final torque check shall then be made prior to coating and wrapping the joint.

vii. Refer to manufacturer's recommendations for proper torque.

e. Restraint Joints shall be installed as shown on the contract documents or as directed by the Engineer.

i. Installation shall conform to the manufacturer's recommendation.

ii. Refer to Specification Item No. 839 Anchorage/Thrust Blocking and Joint Restraints see Specification Item No. 812 Water Main Installation for Submittals.

**813.6 MEASUREMENT:** Fire lines installed will be measured by the linear foot for each size and type as follows:

1. Measurements will be from the center line intersection of fire line with the main distribution line to the property line.
2. Measurements will be from the center line intersection of runs and branches of tees to the end of the valve of a dead end run.
3. Measurements will also be between the center line intersection of runs and branches of tees.
4. Where the branch is plugged for future connection, the measurement will include the entire laying length of the branch or branches of the fitting.
5. The measurement of each line of pipe of each size will be continuous shall include the full laying lengths of all fittings and valves installed between the end.

**813.7 PAYMENT:** Payment for fire lines main installed will be made at the unit price bid per linear foot of pipe of the various sizes installed by the open cut method.

1. Such payment shall also include excavation, selected embedment material, backfill, compaction, of testing of compaction, tie-in, polyethylene sleeve, hauling, disposition of surplus excavated material, and restoration of the surface, including asphalt, concrete, curbing, sidewalks, sod, grass, landscaping, appurtences to be abandoned or removed, all weather surface, and other required testing as per Specification Item No. 804.
2. All replacement mains shall include tie-in costs for existing fire lines.

**- End of Specification -**