

SECTION 02510
WATER DISTRIBUTION AND PIPING

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of water service piping work is shown on the drawings.
- B. Exterior water service distribution includes, but is not limited to, the following.
 - 1. Water main and service piping
 - 2. Control valves
 - 3. Fire hydrants
 - 4. Water meters
 - 5. Backflow preventers
 - 6. Emergency water distribution system
- C. Comply with requirements of Division 2, Section 02310 – Earthwork, for excavation and backfilling required in connection with exterior water service piping.
- D. Comply with requirements of applicable Division 3 sections for concrete work required in connection with exterior water service piping.
- E. Comply with all City of Melbourne requirements.

1.3 QUALITY ASSURANCE

- A. Installer: A firm with at least two (2) years of successful installation experience on exterior water service piping projects similar to this project.
- B. Code Compliance: Comply with applicable portions of National Standard Plumbing Code, local plumbing codes, and the **City of Melbourne Engineering Standards**.

PART 2 - PRODUCTS

2.1 PRESSURE PIPE (4" AND LARGER)

- A. Ductile Iron Pipe: Underground ductile iron pipe shall be cement-mortar lined, Class 52, mechanical or push-on joint and shall meet all the requirements of the following: ANSI/AWWA C-104/A-21.4; ANSI/AWWA C-111/A-21.11 (for rubber gasket joints); ANSI/AWWA C-150/A-21.50 (for thickness design); and ANSI/AWWA C-151/A-21.51 (for D.I.P. molds). Above ground ductile iron pipe to be Class 53, AWWA C-151, cement mortar-

lined in accordance with AWWA C-104, with flanged fittings complying with AWWA C-110 and AWWA C-115, and rubber gaskets complying with AWWA C-111.

- B. Lining: All ductile iron pipe and fittings shall be cement-mortar lined and seal coated in conformance with ANSI A-21.4.
- C. Joints: Pipe joints shall be mechanical or push-on joints, except where specifically shown or detailed otherwise.
- D. Pipe Fittings: All fittings 4" in diameter and larger shall be ductile iron with mechanical or push-on joints and shall conform to ANSI A-21.10 (AWWA C-110) for short body fittings with a 250 psi pressure rating for fittings up to 12" in diameter.
- E. Mechanical Joint Fittings: Mechanical joint ductile iron fittings shall conform to ANSI/AWWA C-110/A-21.10 and ANSI/AWWA C-111/A-21.11 and shall be of a class at least equal to that of the adjacent pipe. Mortar lining and seal coat for fittings shall be same thickness specified for pipe.
- F. Gaskets: The rubber-ring gaskets shall be suitable for the specified pipe sizes and pressure and shall conform to applicable parts of the latest Federal Specification WW-F-421, and shall be furnished with the pipe.
- G. Joint Lubricant: The joint lubricant for push-on joint pipe shall have been tested and approved for potable water service. No lubricant shall be used that will harbor bacteria or damage the gaskets.
- H. PVC Pipe: Polyvinyl chloride (PVC) pressure pipe shall conform to the requirements of AWWA C-900 with outside diameter equal to that of standard ductile iron pipe. PVC pipe shall be Class 150, or DR 18.
- I. PVC Pipe Fittings: Shall be of same class and rating of PVC pipe. Fittings for AWWA C-900 PVC pipe shall be ductile iron, mechanical joint fittings as specified above.
- J. Pipe Joints: Integral bell formed with a race designed to accept the gasket in accordance with AWWA C-900. The spigot end shall have a bevel and a stop mark on the outside diameter to indicate proper insertion depth. Provision shall be made for expansion and contraction at each joint.
 - 1. When assembled, the gasket shall be compressed radially on the pipe spigot so as to affect a positive seal under all combinations of joint tolerances and is the only element depended upon to make the joint flexible and watertight.
 - 2. All surfaces of the joint upon or against which the gasket may bear shall be smooth, free of cracks, fractures, or imperfections that could adversely affect the performance of the joint.
- K. Gaskets: The gasket shall be molded to circular form and to the proper cross section and shall consist of a vulcanized high grade elastomeric compound conforming to AWWA C-900, Elastomeric Seals for joining plastic pipe.
- L. Joint Lubricant: The joint lubricant shall have been tested and approved for potable water service. No lubricant shall be used that will harbor bacteria or damage the rings.

2.2 PRESSURE PIPE (UNDER 4")

- A. Polyvinyl chloride (PVC) pressure pipe shall be Schedule 40 conforming to ASTM D-1785 or SDR 26 conforming to ASTM D-2241 with cement-solvent welded joints or push on elastomeric joints. Mark pipe with "NSF-PW" according to NSF14.

2.3 CONTROL VALVES

- A. General: Provide valves and flow control devices as indicated. All valves shall be furnished with mechanical joint ends.
- B. Minimum working pressure, 200 psi unless otherwise indicated.
- C. Gate Valves (4" and larger): Resilient seat type with non-rising stem, cast iron body and bronze fittings conforming to AWWA C-500. Gate valves located on fire protection mains must be FM approved.
- D. Valve Boxes: Shall be of cast iron with adjustable top. The size shall be large enough for operation of the valve on which it is used with a minimum shaft diameter of 5-1/4". The cover shall have the word "water" cast on it.
- E. Gate Valves (Smaller than 4"): Shall be non-rising stem, handwheel operated, wedge discs, all bronze with flanged ends, conforming to Fed. Spec. WW-V-54, Class B, Type 1. For below ground installation, valves shall be furnished with mechanical joint ends or iron pipe thread and 2" square operating nut.
- F. Thrust Blocks: Thrust blocking or mechanical pipe joint restraints shall be provided as necessary to prevent movement of pipe or piping system appurtenances in response to thrust exerted by water under pressure. The size and shape of the thrust blocking or the number and details of pipe joint restraints shall be as shown on the drawings and standard details. All mechanical restraints shall be galvanized or otherwise rustproofed as approved by the Engineer.
- G. Meter: Water meter and backflow preventer assemblies shall be in accordance with the **City of Melbourne Engineering Standards**.
- H. Air release valves shall be cast iron body and cover, stainless float with brass seats conforming to AWWA C-512.

2.4 EMERGENCY WATER DISTRIBUTION SYSTEM (WHEN REQUIRED)

- A. Provide a 10,000-gallon black steel ASME approved tank. Minimum inlet and outlet piping shall be 4" and be located at opposite ends of the tank. The tank and exposed piping shall be painted both inside and out in conformance with AWWA Standard D-102, O-1-S for outside and I-1-W for the inside. The tank shall be disinfected in accordance with AWWA D-105 Standard. The tank shall be supported by two cradle-type piers meeting the approval of the Owner's Authorized Representative.
- B. Provide a black steel ASME approved hydro-pneumatic tank as shown on drawings. Minimum inlet and outlet piping shall be 4" and shall be located at opposite ends of the tank.

The tank and exposed piping shall be painted both inside and outside in conformance with AWWA Standard D-102, OP-1-S for outside and I-1-W for the inside. The tank shall be disinfected in accordance with AWWA D-105 Standard. The tank shall be supported by two cradle-type piers meeting the approval of the Owner's Authorized Representative. The tank shall incorporate a sight glass, low and high-water electrodes to control the operation of pump and air-compressor package capable of automatic operation and controlled by the air pressure inside the tank. Tank pressure controls shall be set so as to operate between 40 psi and 60 psi. Pump No. 1 starts at 40 psi and stops at 60 psi.

- C. Provide base mounted, end suction pump as shown on drawings.
- D. Control Panel
 - 1. Furnish and install an automatic enough water supply control system for operation and control of the complete emergency potable water supply system. Provide a NEMA 12 lockable, hinged door cabinet to house the control and electrical components for the system. Provide main circuit breakers, branch circuit breakers, terminal strips, contractors, pilot lights (power on, pump running), control switches, reset switches overload protection, relays, motor starters, surge protection, etc. as required to comply with the system operation. The pump shall be controlled through a motor starting contactor with overload protection and Hand-off-Auto selector switches in the control panel.
 - 2. The control panel and all electrical components and wiring shall comply with the requirements of Division 16, NEMA, NEC, and UL requirements.
 - 3. The panel shall contain three stage surge protection to comply with ANSI/IEEE C62.41 and C62.1 guidelines and UL 1449 Standards.
 - 4. A 277/480-volt three-phase, four-wire electrical service will be provided to the control panel under Division 16 with final connections to the remote well pumps under this section of work.
 - 5. The control panel shall be wall mounted.
- E. Protective Coatings
 - 1. Prior to the operation of the water well facilities, the Contractor shall apply protective coatings to all surfaces that come in contact with potable water, except those surfaces which have been previously coated and not damaged during installation.
 - 2. All coatings applied by the manufacturer shall be in accordance with the requirements of the State of Florida Department of Environmental Protection. A certified copy attesting to the type of protective coating shall be submitted by the manufacturer along with all associated shop drawings. All surfaces showing exposed rust or oxidation shall first be wire brushed or sand blasted and a corrosion resistant primer from the approved list shall be applied in accordance with the manufacturer's recommendations. All primed surfaces shall receive a minimum of two final coats from the approved list.
 - 3. The Contractor should verify all planned coatings for compliance with FDEP and local health requirements and shall be verified by the Engineer prior to application.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install water piping system in compliance with local governing regulations.
- B. Water Service Piping: Extend water service piping of size and in locations indicated to water service entrance at buildings. Provide sleeve in foundation wall for water service entry; make entry watertight.
- C. Polyvinyl Chloride (PVC) Pipe and Fittings: Install in accordance with Uni-bell Handbook of PVC Pipe.
- D. Ductile Iron Pipe: Install in accordance with AWWA C-600.
- E. Control Valves: Install in accordance with manufacturer's instructions.
- F. Fire Hydrant Assemblies, Meters and Reduced Pressure Backflow Preventers: Install in accordance with the City of Melbourne Utilities Department Construction Standards and Details requirements.
- G. Interior Inspection: Inspect conduit to determine whether line placement or other damage has occurred.
- H. If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects to satisfaction of Architect/Engineer.
- I. Cleaning Conduit: Clear interior of conduit of dirt and other superfluous material as work progresses. Cleaning shall be accomplished by flushing and pigging with polyurethane foam pig. Each section of pipeline shall be thoroughly cleaned twice with one pig in the presence of the engineer. Flush lines after pigging until water runs clear. Place plugs in end of uncompleted conduit at end of day or whenever work stops.
- J. Place plugs in end of uncompleted conduit at end of day or whenever work stops.
- K. Disinfection: At completion of water service line installation, flush and disinfect in conformance with AWWA C-651, to the satisfaction of local authorities having jurisdiction.

3.2 TESTING

- A. Hydrostatic and Leakage Test: All site water distribution piping shall be tested after installation. Ductile iron pipe shall be tested in accordance with the applicable portions of AWWA Standard C-600, and PVC pipe shall be tested in accordance with the applicable portions of AWWA Standard C 603. Acceptable leakage must be less than the number of gallons per hour as determined by the formulas in AWWA C-600 and C-603.
- B. The potable water lines shall be tested to 150 psi test pressure and the fire line shall be tested to 200 psi test pressure, both for two (2) hours duration. All gauges and appurtenances necessary shall be furnished by the Contractor. All leaks shall be repaired by removing and replacing defective pipe and joints with pipe and joints free of defects, after which the lines shall be retested. Such repair and retesting shall be done until the lines pass the specified test.
- C. All valves shall be hydrostatically tested with the line in which they are installed.

- D. Perform operation testing of hydrants and valves by opening and closing under water pressure to ensure proper operation.
- E. All fire hydrants shall be flow tested.

3.3 APPROVAL FOR PUMP AND HYDROPNEUMATIC TANK SYSTEM (WHEN REQUIRED)

- A. The Contractor shall submit a pump performance curve complete with power requirements for the pump at any point on the pump curve, also complete descriptive literature of the hydropneumatic tank and accessories for approval by the Owner's Authorized Representative.
- B. Three complete manuals covering all shop drawings and all phases of care, operations and maintenance of each piece of equipment shall be submitted to the Owner's Authorized Representative for review. The manuals shall become the property of the Florida Tech Facilities Management Department.
- C. Upon completion of the installation and acceptance by the Owner's Authorized Representative, the Contractor shall provide any service or parts incidental to the required performance of the systems for a period of one year. Any parts replacement or service conducted under the warranty shall be provided at no additional cost to the Owner.
- D. The Contractor shall transfer to the Florida Tech Facilities Management Department all warranties on equipment used for the system described under this specification.

3.4 BACKFILLING

- A. Conduct backfilling operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

END OF SECTION 02510