

**SECTION 02510**  
**WATER DISTRIBUTION SYSTEM**

**PART 1: GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe and fittings for project water lines, to include domestic water lines, fire water lines, and culinary water lines.
- B. Valves, Fire hydrants, and appurtenant items.

**1.02 RELATED SECTIONS**

- A. Section 02250 - Excavation Protection
- B. Section 02315 - Excavation
- C. Section 02317 - Rock Excavation
- D. Section 02320 – Backfilling Trenches
- E. Section 02321 - Backfilling Structures and Landscapes
- F. Section 02322 - Backfilling Pavements
- G. Section 02324 - Compaction
- H. Section 02510 - Water Distribution and Transmission Systems
- I. Section 02512 - Hydrants
- J. Section 02518 - Disinfection
- K. Section 02660 - Ponds
- L. Section 02810 - Underground Irrigation Systems
- M. Section 02993 - Relocate Fire Hydrants and Water Meters
- N. Section 03304 - Cast-in-Place Concrete

**1.03 REFERENCES**

- A. ASME B16.18-2002 - Cast Copper Alloy Solder Joint Pressure Fittings.
- B. ASME B16.22-2001 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. ASTM B88-99 - Standard Specification for Seamless Copper Tube for Water.
- D. ASTM D3139-98 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- E. AWS A5.8-2004 - Specification for Filler Metals for Brazing and Braze Welding.

- F. AWWA C104-03 - Ductile-Iron Pipe and Fittings for Water.
- G. AWWA C105/A21.5-99 - ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
- H. AWWA C111/A21.11-00 - ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- I. AWWA C151/A21.51-02 - ANSI Standards for Ductile-Iron Pipe, Centrifugally Cast, for Water or other liquids.
- J. AWWA C500-02 - Metal-Seated Gate Valves for Water Supply Service.
- K. AWWA C502-94 - Dry Barrel Fire Hydrants.
- L. AWWA C504-00 - Rubber Seated Butterfly Valves.
- M. AWWA C508-01 - Swing-Check Valves for Waterworks Service, 2 inch through 24 inch, NPS.
- N. AWWA C509-01 - Resilient-Seated Gate Valves for Water Supply Service.
- O. AWWA C600-99 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- P. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping, Latest Edition.
- Q. AWWA C900-97 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inch through 12 inch, for Water Distribution.
- R. AWWA C200-97 - Steel Water Pipe, 6 inches and larger.
- S. ASTM A36/A36M-05 - Standard Specification for Carbon Structural Steel.
- T. ASTM A500-03a - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- U. ASTM A307-04 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- V. ASTM A123/A123M-02 - Standard Specification for Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- W. ASTM A153/A153M-05 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

#### **1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of pipe lines, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### **1.05 QUALITY INSURANCE**

- A. Perform work in accordance with owner's requirements as described herein.

## 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

## PART 2: PRODUCTS

### 2.01 WATER PIPE

- A. Ductile Iron Pipe: AWWA C151-02:
  - 1. Fittings: Ductile iron, standard thickness.
  - 2. Joints: AWWA C111-00, push-on type with rubber gasket.
  - 3. Joints: AWWA C111-00, mechanical joint type with gasket, bolts and nuts.
  - 4. Joints: AWWA C110-03, flange type with gasket, bolts, and nuts.
  - 5. Jackets: AWWA C105-99 polyethylene jacket.
- B. Copper Tubing: ASTM B 88-03, Type K, annealed:
  - 1. Fittings: ASME B16.18-2002, cast copper, or ASME B16.22-2001, wrought copper.
  - 2. Joints: Compression connection or AWS A5.8, BcuP silver braze.
  - 3.  $\frac{3}{4}$  - 1 inch flare, anything larger than 1 inch will be compression (Mueller 110).
- C. PVC Pipe: AWWA C900-97 Class 150 or 200, as indicated:
  - 1. Fittings: AWWA C111-00, cast iron.
  - 2. Joints: ASTM D3139-98, compression gasket rings.
- D. Tape: Magnetic detectable conductor, clear plastic covering, imprinted with "WATER SERVICE" in large letters.

### 2.02 VALVES

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valves Up To 3 Inches:
  - 1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
  - 2. Product: Powell U.S. Bronze Gate Valves, or accepted equal.
  - 3. Substitutions: only by permission of the Riverton City Water Director.
- C. Gate Valves 3 Inches and Over:
  - 1. AWWA C500-02, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
  - 2. AWWA C509-01, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
  - 3. Product: Mueller Gate Valve or Resilient Seat Gate Valve, with appropriate type Tyler 564 A Cast Iron Valve Box, or accepted equal.
- D. Swing Check Valves From 2 inches to 24 inches:
  - 1. AWWA C508-01, iron body, bronze trim, 45-degree swing disc, renewable seat and flanged ends.
  - 2. Product: Mueller Swing-Type Check Valve, or accepted equal.
- E. Butterfly Valves From 2 inches to 24 inches:
  - 1. AWWA C504-00, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve box.
  - 2. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
  - 3. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 for 10-inch and smaller valves, 52 for 12-inch thru 16-inch valves, and 76 for 18-inch thru 24-inch valves. Closing times for larger valves shall be accepted by the Engineer.
  - 4. Product: Mueller "Linesal III" Butterfly Valve with appropriate type Tyler 564 A Cast Iron Valve Box, or

accepted equal.

- F. Corporation Stops: shall be type for connecting to copper or polyethylene pipe; Mueller No. H- 15000, or acceptable equal, for up to 2-inch service line.

### **2.03 HYDRANTS**

- A. Hydrants: AWWA C502-94, UL 246, dry barrel type.
  - 1. Inside dimension: 7 inches minimum, with minimum 5 inches diameter valve seat opening.
  - 2. Minimum net water area of barrel not less than 190 percent of valve opening.
  - 3. 6 inch flanged inlet connection with accessories, gland bolts, and gaskets.
  - 4. Product: Mueller "Super Centurion 200" Fire Hydrants.
- B. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.
- C. Hose and Streamer Connection: Two hose nozzles, 2 1/2-inch size, one pumper nozzle, 4 1/2 inch size.
- D. Finish: Buried portion of hydrant shall be painted with two coats of CA50 coal tar enamel. Exposed portion shall be painted with Primer and two coats of enamel in acceptable red color.

### **2.04 BEDDING AND COVER MATERIALS**

- A. Bedding and Backfill: As specified in Sections 02320, 02321 and 02322.

### **2.05 ACCESSORIES**

- A. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134, or acceptable equal, for up to 2 inch service lines.
- B. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

### **2.06 AIR VAC STAND PIPES (2 INCH AND 3 INCH)**

Air vac stand pipes shall be Model #SP12X6 for 2 inch or Model #SP14X8 for 3 inch as manufactured by Utility Coatings & Fabrication, or approved equal. Standpipes shall meet the following qualifications.

- A. Design
  - 1. Stand pipe shall be of adequate size to accommodate a 2 inch or 3 inch riser with a 180 degree return on top.
  - 2. Standpipe shall have 1/2 inch holes equally spaced around top sides such that the area is 2 times greater than the area of the standpipe riser.
  - 3. Standpipe shall have a 1 inch weep hole at grade level.
  - 4. Standpipe shall be 2-piece construction.
- B. Quality Assurance
  - 1. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient capacity to produce required units.
  - 2. Welding: Qualify procedures and personnel according to the following:
    - a. AWS D1.1 - Structural Welding Code - Steel (current edition)
    - b. AWS D1.3 - Structural Welding Code - Sheet Steel (current edition)
    - c. Certify that each welder has recently (prior 12 months) satisfactorily passed AWS qualification test for

welding processes involved and, if pertinent, has undergone re-certification.

3. Metal Surfaces: For metal fabrications exposed to view in the completed work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

#### C. Metals

1. Steel Plates, Shapes, and Bars: ASTM A36/A36M-05. Steel Plate shall be 3/16 inch minimum thickness.
2. Tube Steel: ASTM A500-03a Grade B.
3. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded: E70-97 for ASTM A36/A36M-05.
4. Lifting eye shall be capable of lifting 2 times the weight of the vent cover and shall rotate flat so as not to protrude more than 1/2 inch above the cover.

#### D. Fasteners

1. Bolts
  - a. Flange bolts shall be A307-04 zinc plated.
  - b. Headed stud anchors: C1008/C1010.

#### E. Fabrication

1. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for re-assembly and coordinated installation.
2. Shear, punch and drill metals cleanly and accurately. Remove burrs. No burning of holes shall be allowed.
3. Ease exposed edges to a radius of approximately 1/32 inch (1mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impair work.
4. Weld corners and seams continuously to comply with the following:
  - a. Use materials and methods which minimize distortion and develop strength and corrosion resistance of base metals.
  - b. Obtain fusion without undercut or overlap.
  - c. Remove welding flux immediately.
  - d. At exposed connections, finish exposed welds and surfaces smooth and blend so that no roughness shows. Contour of welded surface shall match that of adjacent surface.
5. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
6. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items.
7. Joints which may be exposed to weather, shall be made water tight or weep holes shall be provided where water may accumulate.
8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

F. Steel Finishes

1. Galvanizing: Hot-dip galvanize items as indicated to comply with the following applicable standards:
  - a. ASTM A123/A123M-02.
  - b. ASTM A153/A153M-05.

**PART 3: EXECUTION**

**3.01 EXAMINATION**

- A. Verify that water main and main line tee size, location, and invert are as indicated.

**3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or mechanical joints.

**3.03 TRENCHING**

- A. See Sections 02250, 02315 and 02317 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required sq ft of thrust restraint bearing on subsoil as indicated on the drawings.
- D. Backfill around sides and to top of pipe with backfill material, tamp in place and compact, then complete backfilling.

**3.04 INSTALLATION - PIPE**

- A. Maintain separation of water main from sewer piping in accordance with State code.
- B. Establish elevations of buried piping to ensure not less than four ft of cover over pipe; or as indicated on the drawings and as directed by the City Engineer.
- C. Install pipe to indicated elevation to within tolerance of one inch.
- D. Install ductile iron piping and fittings to AWWA C600-99.
- E. Install PVC pressure pipe and fittings to ASTM D2774-04.
- F. Install pipe lines to line and grade indicated.
- G. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- H. Install access fittings to permit disinfection of water system performed under Section 02518.
- I. Install trace wire above top of PVC pipe; coordinate with Section 02320.

### **3.05 INSTALLATION - VALVES AND HYDRANTS**

- A. Set valves on concrete block or other acceptable solid bearing.
- B. Center and plumb valve box over valve operating nut. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground.
- E. Locate hydrant control valve as indicated on the drawings and as directed by the Engineer.
- F. Provide a drainage pit 24 inches square by 12 inches deep filled with one inch washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- G. Paint hydrants in accordance with manufacturer's standards.

### **3.06 SERVICE CONNECTIONS**

- A. Provide water service as indicated with meter box, meter yoke, reduced pressure backflow preventer and water meter.

### **3.07 CONNECTIONS TO EXISTING WATER LINES**

- A. Connection to existing water lines shall be made where and as indicated on the drawings and as directed by the Engineer. The sizes of pipe, fittings, valves and appurtenant items required to make connection shall correspond to the sizes of existing pipe and of project pipe.
- B. Excavate to existing pipe line at point of connection; determine actual conditions of existing pipe and all fittings and appurtenant items required to make the connection; and have all materials needed on site prior to any shut down or cutting into existing pipe lines.
- C. Connection which involve cutting into existing pipe lines include: cutting and removing sections of existing pipe and fittings as required; cleaning and preparing ends of existing pipe as required for connection; furnishing and installing all new pipe, fittings and valves required to make the connection of project pipe to the existing pipe as indicated; and all appurtenant work required to complete the connection.
- D. Connection into existing pipe lines under pressure include: furnishing and installing mechanical joint tapping sleeve of the appropriate size on the existing pipe at point of connection; furnishing and installing tapping valve, with valve box, on sleeve; tapping existing pipe with acceptable type drilling machine and equipment, without interrupting flow in existing pipe line; and all appurtenant work required to complete the connection.
- E. Connection to existing pipe line shall be made at such times and within the time limits and according to the directions as agreed to between the Contractor and the Owner.
- F. Cut and plug existing pipe lines where indicated and as directed by the Engineer. Excavate as required to locate existing pipe lines to be abandoned in place; cut the existing pipe, as required; and install permanent plug in end of pipe to be abandoned.

### **3.08 RECONNECT EXISTING WATER SERVICE LINES**

- A. Reconnect existing water service lines where and as indicated on the drawings and as directed by the Engineer. The sizes of pipe, fittings, saddles, corporation stops, and appurtenant items required to make reconnections shall correspond to the sizes of existing service lines and of project pipe.
- B. Excavate as required to locate the existing service line; determine actual conditions of existing service line and all fitting and appurtenant items needed to make the reconnections; and have all materials needed on site prior to any shut down of existing service line.
- C. After project pipe line has been thoroughly tested, disinfected and put into operation, disconnect existing water service lines from the existing water line. Excavate as required to expose the existing service line; cut the existing service line and remove a section of the line as required and as directed; and remove the existing corporation stop from the existing pipe and install a permanent plug in the tap in the existing water line which is to be abandoned.
- D. Tap the project pipe line with the appropriate size tapping machine and install a double strap service saddle, with corporation stop, on the project pipe. New copper tubing shall be furnished and installed to make the connection from the end of the existing service line to the new corporation stop. The new copper tubing shall be connected to the end of the existing service line with the appropriate type coupling and to the new corporation stop. In all reconnections, at least five feet of new tubing shall be installed, as indicated. Insulating couplings or adapters shall be used to connect pipe of dissimilar material.
- E. After the existing water service line has been disconnected from the existing water line, the reconnection work shall be pursued diligently so that the service line is reconnected to the project water line and put back into service in the shortest possible time.

### **3.09 REMOVING EXISTING FIRE HYDRANTS**

- A. Existing fire hydrant installations shall be removed and delivered to the Owner as indicated and as directed by the Engineer.
- B. Excavate as required to locate the existing hydrant supply line and control valve; determine actual conditions of existing supply line and all fitting required to complete the removal; and have all material needed at the job site prior to any shut down or cutting into existing pipe.
- C. After project pipe line has been thoroughly tested, disinfected and put into operation, cut the existing hydrant supply line and remove a section of the existing pipe from the cut the hydrant and install a plug in the end of the pipe to be abandoned. Remove the existing hydrant, control valve and valve box and deliver the material to the Owner as directed.
- D. After the hydrant installation has been completely removed and the existing pipe plugged, backfill the excavation to match adjacent ground surfaces; and compact material as described herein.

### **3.10 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01450.
- B. Pressure test water piping to 1.5 times pipe line working pressure in psi.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

**END OF SECTION**