

## SECTION 339000 - WATER DISTRIBUTION PIPING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All construction associated with this Contract shall comply with the requirements of the City of Salisbury Standard Utility Details and the *Uniform Construction Standards Manual 5<sup>th</sup> Ed.*, dated October 17, 2006 (Manual) or latest edition.  
<http://www.salisburync.gov/constructionstandards>. Every effort has been made to conform these specifications to the Manual, however, in the event there is a conflict between these Specifications and the Manual, the Manual shall take precedence.

#### 1.2 SUMMARY

- A. This Section includes water-distribution piping and related components for combined water service and fire-service mains.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- D. NSF Compliance:
  - 1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.

#### 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
  - 1. Notify the Owner and Engineer no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of water-distribution service without Owner's written permission.

## 1.7 COORDINATION

- A. Coordinate connection to water main with Salisbury-Rowan Utilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. All materials are to be domestic manufactured.

### 2.2 COPPER TUBE AND FITTINGS

- A. Copper tubing (¾”, 1” and 2”) shall be type “K” soft – ASTM B-88.
- B. Copper Couplings: ANSI/NSF Standard 61

### 2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: Class 350, AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Flanges: ASME 16.1, Class 125, ductile iron.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Cast Iron Pipe Co. (ACIPCO)
  - 2. Griffin Pipe
  - 3. Tyler Pipe / Union Foundry
  - 4. U S Pipe
  - 5. Atlantic States

## 2.4 PVC PIPE AND FITTINGS

- A. PVC, AWWA Pipe, DR 13.5: ASTM D 2241.
  - 1. Pipe for 2" diameter water line shall be PVC, DR 13.5, Pressure Rating 315 psi
  - 2. Gasketed joint
- B. PVC, AWWA Pipe & Fittings, C900 – DR14, Class 200 ASTM D-1784/ASTM D 2241
  - 1. Pipe for 6" – 8" diameter water lines (when indicated) C900 – DR14, Class 200.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corporation
  - 2. Diamond Plastics Corporation
  - 3. National Pipe & Plastics, Inc.
  - 4. North American Pipe Corporation
  - 5. Northern Pipe Products, Inc.

## 2.5 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Rigid Expansion Joints:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. EBAA Iron, Inc.
    - b. U.S. Pipe and Foundry Company.
  - 2. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
    - a. Pressure Rating: 250 psig minimum.
- B. Ductile-Iron Flexible Expansion Joints:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. EBAA Iron, Inc.
    - b. Hays Fluid Controls; a division of ROMAC Industries Inc.
    - c. Star Pipe Products.
  - 2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble

components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

- a. Pressure Rating: 250 psig minimum.

C. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. EBAA Iron, Inc.

2. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

- a. Pressure Rating: 250 psig minimum.

## 2.6 GATE VALVES

A. AWWA, Ductile-Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Cast Iron Pipe Co.; American Flow Control Div., Series 500 or 2500
- b. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa), Series F-6100
- c. Mueller Co.; Water Products Div., Series 2360

2. Nonrising-Stem, Wedge (bronze)-Seated Gate Valves (for existing water lines):

- a. Description: Ductile-iron body and bonnet; with bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

- 1) Standard: AWWA C500.
- 2) Minimum Working Pressure Rating: 200 psig.
- 3) Hydrostatic Test Pressure Rating: 300 psig.
- 4) Two (2) inch operating nut.
- 5) Interior and Exterior Coating: Epoxy coating complying with AWWA C550.
- 6) End Connections: Mechanical Joint, with slotted holes allowed only at the 11 o'clock and 1 o'clock positions.
- 7) Shoulder bolts (not tee bolts) shall be used in the slotted holes.
- 8) Open Direction: Left

3. Nonrising-Stem, Resilient-Seated Gate Valves (for new water lines):

- a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.

- 1) Standard: AWWA C509.
- 2) Minimum Working Pressure Rating: 200 psig.
- 3) Hydrostatic Test Pressure Rating: 300 psig.
- 4) Two (2) inch operating nut.
- 5) Interior and Exterior Coating: Epoxy coating complying with AWWA C550.
- 6) End Connections: Mechanical Joint, with slotted holes allowed only at the 11 o'clock and 1 o'clock positions.
- 7) Shoulder bolts (not tee bolts) shall be used in the slotted holes.
- 8) Open Direction: Left

## 2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

### A. Tapping-Sleeve Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Tapping Valve: American Cast Iron Pipe Co.; Waterous Co. Subsidiary, Series 500 or 2500 / McWane, Inc.; Clow Valve Co. Div. (Oskaloosa), F-5211
  - b. Tapping Sleeve: American Flow Control Series 2800 or Mueller H-615.
2. Description: Sleeve and valve compatible with drilling machine.
  - a. Standard: MSS SP-60.
  - b. Tapping Sleeve: Ductile-iron, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve (no slots on tapping flange side).
  - c. Valve: AWWA, ductile-iron, nonrising-stem, resilient-seated, gate valve with one raised face flange mating tapping-sleeve flange.
  - d. No slots on flange side.

### B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable (slip type only) extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

## 2.8 WATER SYSTEM CONNECTIONS

- A. Water system connections (meter setters and meter boxes) shall comply with Standard Detail W-9, W-9A and W-12 provided in the Contract Drawings.
- B. Meter setters and meter boxes for use on this project may be purchased by the Contractor from the City of Salisbury.

## 2.9 FIRE HYDRANTS

### A. Dry-Barrel Fire Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American AVK Co.; Valves & Fittings Div., MK-73-2
  - b. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa), Medallion
  - c. Mueller Co.; Water Products Div., Super Centurion
2. Description: Freestanding, with one NST 4-1/2" Pumper Nozzle and two NST 2-1/2" outlets, 4-1/2-inch main valve, drain valve, and 6" mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron/ductile iron body.
  - a. Standard: AWWA C502
  - b. Minimum Pressure Rating: 200 psig
  - c. Open Direction: Left
  - d. Paint Color: Silver
  - e. UL listed, FM approved
  - f. Grease filled only

## PART 3 - EXECUTION

### 3.1 RELATED DOCUMENTS

- A. All construction executed in associated with this Contract shall comply with the requirements of the City of Salisbury Standard Utility Details and the *Uniform Construction Standards Manual 5<sup>th</sup> Ed.*, dated October 17, 2006 (Manual) or latest edition.  
<http://www.salisburync.gov/constructionstandards>. If there are any conflicts between these Specifications and the Manual, the Manual shall take precedence.

### 3.2 EARTHWORK

- A. Refer to Division 33 Section "Trenching and Backfilling" for excavating, trenching, and backfilling.

### 3.3 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground Combined Water-Service and Fire-Service-Main Piping 6" or larger shall be any of the following as approved by the Engineer:
  - 1. Gasketed ductile-iron, mechanical-joint fittings.

### 3.4 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for 3" and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use corporation valves and curb valves with ends compatible with piping, for 2" and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Underground Valves, 3" and Larger: AWWA, ductile iron, nonrising-stem, bronze-seated gate valves with valve box on existing water lines, and resilient-seated gate valves with valve box on new water lines.

### 3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Make connections larger than 2" with tapping machine according to the following:
  - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
  - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
  - 5. City inspection of the tap is required, with a minimum 48 hour notice (2 business days).
- C. Make connections 2" and smaller with drilling machine according to the following:
  - 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
  - 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
  - 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
  - 4. Install corporation valves into service-saddle assemblies.
  - 5. Install manifold for multiple taps in water main.
  - 6. Install curb valve in water-service piping with head pointing up and with service box.

- D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- E. Bury piping with depth of cover over top at least 36 inches.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.6 ANCHORAGE INSTALLATION

- A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches.
- B. Concrete blocking on the end of waterlines or hydrants is not permitted. A thrust collar and mega lugs shall be used to restrain hydrant legs, end caps and plugs, multiple bend configurations. Threaded rods (stainless steel or coal tar epoxy steel) may be required in addition to mega lugs by the A-E or Owner's Representative if field conditions dictate.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box. Place 8" of washed stone under the valve.
- B. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

### 3.8 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties for water meter installation according to Owner specifications.

### 3.9 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or mega-lugs, and support in upright position.
- B. Install according to Owner specifications, see drawing details.
- C. AWWA Fire Hydrants: Comply with AWWA M17.

### 3.10 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Connect water-distribution piping to utility water main as directed by the Owner and Engineer in conformance to the Owner's Manual (*Uniform Construction Standards Manual 5<sup>th</sup> Ed.*) or latest edition.

### 3.11 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Use only potable water.

- B. Hydrostatic Tests - Water Lines

1. The water line shall be tested for leakage. The water leakage test is a two part test; Part A (pressure loss) and Part B allowable leakage. Part A & Part B must pass for the test to be considered successful.
2. Water line leakage tests shall be conducted on a schedule agreed upon by the Engineer/Owner representative, contractor, and city inspector. A representative of the Engineer/Owner and city inspector is required during the tests with a minimum 48 hour notice (2 business days).
3. Water services (tap, service line, and meter setter) shall be installed prior to water line leakage test. The pipe shall be filled with potable water for a period of 24 hours before testing begins. It shall be ensured that the pipe is full of water and all air has been removed before testing. Contractor shall pretest the water line prior to scheduling a test with Engineer/Owner.
4. The water line shall be tested at 1.25 times the highest working pressure along the section, or 200 psig, whichever is greater. The test shall be of at least 2 hours duration and the pressure may not drop more than 5 psig during the test.
5. All exposed pipe, fittings, valves and hydrants shall be visually examined during the test. Leakage shall be no greater than the amount determined by the formula:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

Where L = allowable leakage (gallons/hour)  
S = length of pipe in test (feet)  
D = nominal pipe diameter (inches)  
P = average test pressure (psig)

6. Pipe having more than allowed leakage shall be repaired. All visible leaks shall be repaired regardless of the amount of leakage.

- C. Hydrostatic Tests - Valves

1. Valves shall be field tested as directed by AWWA Specification C500 and C504 as applicable.
  - a. During the last stages of the test and without any reduction in pressure, first the hydrant valves will be closed, then progressing in an orderly manner from the end opposite from the test pump, each main line valve will be closed and pressure released to determine if it is holding pressure (minimum 30 minutes).

- b. All butterfly valves will be tested to 150 psi (or 1.25 times system pressure, if higher) for a minimum of 30 minutes (each) after the pipeline has been successfully tested.
  - 2. Valves shall be tested on a schedule agreed upon by the Engineer/Owner. A representative of the Engineer/Owner is required during the tests with a minimum 48 hour notice (2 business days).
- D. Prepare reports of testing activities.

### 3.12 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for DIP underground water-distribution piping. Underground detectable warning tape shall be used for any piping that is not DIP. Locate below finished grade, directly over piping.

### 3.13 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
  - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 100 ppm of chlorine; isolate and allow to stand for 24 hours. City inspector will test the chlorinated water to verify a minimum of 100 ppm and again in 24 hours to verify that the chlorine residual is still above 24 ppm.
    - b. time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - c. City inspector will take water samples for biological testing. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

### 3.14 DISINFECTION

- A. Sampling Taps
  - 1. Sampling taps shall be provided every 1,000 feet and at the end of each branch (additional sampling taps may be required in subdivisions and apartment complexes).
  - 2. Taps shall be located and constructed so samples may be easily collected without danger to personnel or likelihood of sample contamination.
  - 3. Sampling taps may be used as blow-offs.
  - 4. The number and location of the taps/blow-offs are shown on the drawings (additional sampling taps may be required in subdivisions and apartment complexes).

B. Sterilization

1. Hydrants may not be used for bacteriological sampling.
2. All parts of a potable water system (including service lines) shall be sterilized in accordance with AWWA C601 and these specifications.
3. Preventive and corrective measures during construction (AWWA C601) should be adhered to during construction to ensure success of the sterilization process.
4. Lines shall be initially chlorinated to 100 mg/l.
5. Lines must have a minimum free chlorine residual of 24 mg/l after 24 hours.
6. The City laboratory must be used for this test, the contractor may not utilize a private outside laboratory.
7. When the Contractor has determined that the line has been chlorinated to the proper level, he shall contact the city inspector to schedule the City laboratory to conduct the sampling and analysis for confirmation of the free chlorine level. A 48-hour advance notice shall be given to the city inspector prior to conducting the test.
8. After the required contact time (24 hours), the Contractor shall have the chlorine residual tested by the city inspector and if the chlorine levels are at least 24 mg/l then the contractor can flush the line (when directed by the city inspector) and all appurtenances with Salisbury distribution water until completely purged.
9. No bacteriological samples will be collected at points where the free chlorine residual exceeds the ambient distribution system free residual by more than 0.5 mg/l.
10. Care must be taken to discharge the chlorinated water in a manner which will not endanger plant or animal life or be unsafe. Chlorinated water must be discharged in an environmentally safe manner and in accordance with all federal, state, and/or local laws and regulations. Chlorinated sterilization water shall not be discharged into the City's sewer or storm drain systems. Contractor must treat the chlorinated water to meet North Carolina Quality Discharge Standards.
11. Bacteriological testing/sampling shall be requested on the same day the line is flushed. Bacteriological testing will be performed by the City laboratory Monday through Thursday prior to 12:00 p.m. at least 48 hour notice shall be given the city inspector prior to sampling. The City's Utilities Inspector will collect and deliver the samples to the lab (testing fee applies). Each sample shall be marked legibly, identifying with letters or numbers each sampling point.

**END OF SECTION 339000**