

SECTION 33 11 00 – WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water distribution system (domestic and fire protection) pipes, fittings, and appurtenances.
 - 2. Coordination with local authorities and utility providers.
 - 3. Pressure testing and sterilization.
- B. Related Sections:
 - 1. 31 22 00 "EARTHWORK" for trench excavation, backfill, and compaction.

1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS

- A. Comply with Oconee County Water Resources Water Main Standards for domestic water line systems, meters, and backflow prevention devices.
- B. Comply with Oconee County requirements and NFPA 24, Outside Protection, latest edition, for fire line systems, fire hydrants and related fire protection system

1.3 SUBMITTALS

- A. Product data: For each type of piping material, prefabricated structure, and casting. Indicate product descriptions and installation procedures.
- B. As-builts: Provide the Owner with one (1) copy of a reproducible "as-built" plan of all underground utilities showing the location of each with dimensions shown to the building and/or curb line from each underground utility.
- C. Certification(s) of pressure testing.
- D. Certification(s) of disinfection of all potable water piping.

1.4 QUALITY ASSURANCE

- A. Underground piping which is used for fire protection shall be installed by a Contractor which holds a current Georgia Certificate of Competency for Automatic Fire Sprinkler Systems.

1.5 SITE CONDITIONS

- A. Consult with the local governing authority prior to formulating bid to coordinate timing of on-site water improvements with off-site water line improvements.
- B. Obtain all necessary permits for work within public right-of-way.
- C. It is the Contractor's responsibility to determine all requirements of the local Water Department regarding new utility service to the site. The installation shall be in complete accordance with those requirements. Notify the local authority prior to backfilling any buried or concealed plumbing and allow inspection and observation of all Work.
- D. Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, Georgia, and federal authorities having jurisdiction.
- E. Coordinate water distribution system installation with grading and paving and other site operations.
- F. Install water mains when subgrade is within 6 inches of final grade, and prior to paving base installation.

1.6 WARRANTY

- A. Contractor shall warranty the construction and workmanship of water distribution system(s) for a period of one (1) year from the date of project Acceptance.

PART 2 - PRODUCTS

2.1 DOMESTIC PIPING MATERIAL

- A. Pipe material, unless otherwise provided shall conform to the following:
 - 1. 3" and smaller domestic water service pipe installed underground shall be Type "K" hard drawn copper tubing with wrought copper solder joint fittings conforming to ASTM B-88-72. Minimum depth of cover is 36" or as required by local authorities or utility provider.
 - 2. 4" and larger domestic water pipe installed underground shall be cement lined ductile iron pipe conforming to ANSI A21.51. Minimum depth of cover is 36".
 - 3. Install warning tapes with metallic cores 12" above all underground piping. Unless otherwise provided, warning tape shall be Brady 91603(blue) for water lines, 91604(green) for sanitary sewer lines and 91600(yellow) for gas lines or approved equal by Seton or T&B Westline. Warning tape shall rise out of the ground and be accessible at the building wall or other outside location.
- B. Pipe joints, unless otherwise provided shall conform to the following:

1. Joints in copper pipe shall be made with lead free solder containing tin-copper-silver or 95-5 tin antimony.
 2. In lieu of soldered fittings in copper pipe, the contractor may substitute Victaulic or Grinnell Gruvlok grooved mechanical couplings or T-Drill mechanically formed fittings with brazed connections. Each of these systems shall be used in accordance with the manufacturer's published instructions.
 3. Joints in ductile iron water and sewer pipe shall be Tyton joints except that joints at fittings in water lines shall be bolted mechanical joints.
 4. Connections of copper pipe to ferrous pipe and/or equipment shall be made with dielectric unions, Watts series 3000, Victaulic or Gruvlok Clearflow or approved equal.
- C. Valves, unless otherwise provided shall conform to the following:
1. Unless specifically indicated otherwise, the valves shall be designed for not less than 125 pounds working pressure. The valves shall be suitable for the service for which they are installed.
 2. Gate valves for copper water lines shall be Milwaukee Fig. 115 bronze valve with non-rising stem (nut and valve key) and sweat ends or approved equal by Crane, Hammond, Mueller, Nibco, Stockham or Watts.
 3. Gate valves for ductile iron water lines shall be Watts model 406-NRS-RW flanged gate valve with non rising stem (nut and valve key) or approved equal by Crane, Hammond, Kitz, Milwaukee, Mueller, Nibco, or Stockham.
 4. Double check valves shall be Watts No. 709-RW or 007-QT as indicated, epoxy coated double check valve with two gate valves and four test cocks. The valve assembly shall be U. L. listed. Approved equal valves by Ames, Febco, Hersey or Wilkins are acceptable.

2.2 FIRE PROTECTION PIPING MATERIAL

- A. Valves
1. OS & Y valves, post indicator valves and check valves shall be listed by U. L. for use in fire mains. Gate valves: Iron-Body Bronze - Mounted Gate Valves, Sizes 3" - 12", inclusive: Order Specification: Double-Disc, Parallel Seats, Non-rising stem (IS), Rated at 200-psi WWP, O-ring seals, Std 2" square wrench nut, and conforming to AWWA Specifications C500 in all respects. Check with Water Department for direction of opening.
 2. Post indicator valve: include a compatible supervisory control switch with tamper proof cover per manufacturer recommendations. Route all necessary conductors in approved conduit.
- B. Underground Piping – Ductile Iron
1. Underground piping shall be cement lined ductile iron pipe manufactured in accordance with ANSI 21.51.
 2. Joints in ductile iron water pipe shall be Tyton joints except that joints at fittings shall be bolted mechanical joints.
- C. Fittings And Couplings (Underground Piping)

1. Fitting for underground piping shall be ductile iron manufactured in accordance with ANSI A21-10. All ductile iron pipe fittings shall be in accordance with AWWA C151/ANSI A21.51.
- D. Backflow Prevention Valves
 1. Double check detector valve assembly shall be Watts 709 DCDA double check valve with detector CFM meter, two OS & Y gate valves and four test cocks.
 2. Valves shall have epoxy coated cast iron bodies. The valve assembly shall be U. L. listed.
 3. Valves shall be as manufactured by Watts or approved equal by Ames, Febco or Hersey.
- E. Fire Hydrants
 1. Fire hydrants shall be an AWWA listed type having two 2-1/2" hose outlets and a 4-1/2" pumper outlet with threads compatible with Local Fire Department equipment.
- F. Fire Department Connection
 1. Unless otherwise shown on the Plans, the fire department connection shall be U.L. listed sidewalk siamese type, having a rough brass finish and mounted on a schedule 40 galvanized steel standpipe.
 2. Unless otherwise shown on the Plans, provide a red plastic sign, 18"x12" with white letters "FDC" and install the sign above the fire department connection or standpipe.

PART 3 - EXECUTION

3.1 GENERAL

- A. Permits: Obtain the necessary permits from local governing authorities having jurisdiction and from related utility providers prior to performing any water work on site.
- B. Line and Grade: Layout water systems to the required lines and grades; with fittings, valves and hydrants at the required locations; and with joints centered and spigots home; and with all valve and hydrant stems plumb.
- C. Protecting underground and surface structures: Provide temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers and other obstructions encountered in the progress of the work.
- D. Sub-surface exploration: Examine all available records and make explorations and excavations necessary to determine the location of existing pipes, valves, or other underground structures.

- E. Detectable wire: Install tracing wire with all non-metallic piping.

3.2 LAYING PIPE

- A. Install underground fire protection piping in accordance with NFPA 24-8-1 through 8-7. Anchor all tees, plugs, caps and bends with clamps, tie rods and concrete thrust blocks in accordance with NFPA 24-8-6. Underground fire protection piping shall have a minimum of 48 inches of cover above the top of the pipe.
- B. General: Before lowering pipe into trenches, grade the bottom of the ditch so that will have a bearing for its entire length. Carefully examine the pipe for defects and clean the inside. After placing pipe in ditch, clean the bell gasket, and spigot of all dirt, sand and foreign material. Apply a thin film of lubricant to the gasket and spigot. Insert the plain ends of the pipe into the socket after until it makes contact with the bottom of the socket.
- C. Trench water: Close the open end of pipe by approved means at all times when pipe laying is not in progress such that no trench water is permitted to enter the pipe.
- D. Cutting pipe: Cut pipe in a neat and workmanlike manner for inserting valves, fittings or closure pieces.
- E. Direction of laying: Unless otherwise recommended by the manufacturer or local authorities having jurisdiction, lay pipe with bell ends facing in the direction of laying. For lines on an appreciable slope, bells shall face upgrade.
- F. Permissible deflection: Wherever necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions, to plumb stems, or where long radius curves are permitted, the degree of deflection is the lesser as recommended by the manufacturer of the pipe and the maximum allowed by local authorities having jurisdiction.
- G. Unsuitable conditions: Do not lay pipe in water or when the trench conditions or weather is unsuitable for such work, except by written permission of the Design Professional.

3.3 DUCTILE IRON PIPE - PUSH ON JOINTS

- A. Joints shall be made by means of a compression-type, push-on resilient gasket. Lubricate gaskets before installation using as recommended by the pipe manufacturer. Identify the seated joint by the visible mark on the spigot of the installed pipe section. When the temperature is above 60 degrees F., force the spigot end of each cast iron pipe lead tightly on the bell of the preceding pipe. When the temperature is below 60 degrees F., maintain 1/16 inch clearance from the spigot end of pipe to face of the bell for expansion.

- B. Assemble, handle and install flexible joint pipe in accordance with the printed manufacturer recommendations.

3.4 SETTING APPURTENANCES

- A. Valves and fittings: Set and join gate valves and pipe fittings to new pipe in the manner previously specified for cleaning, laying and jointing pipe and as recommended by the manufacturer.
- B. Valve boxes: Firmly support cast iron valve boxes, positioned centered and plumb over the wrench nut of the gate valve, with box cover flush with the surface of the finished pavement or at such other level as may be directed.

3.5 SETTING HYDRANTS

- A. General locations: locate hydrants to provide complete accessibility and minimize possibility of damage from vehicles or injury to pedestrians.
- B. Cleaning: Thoroughly clean hydrants of dirt or foreign matter before setting.
- C. Position of nozzles: Install hydrants plumb with nozzles at an angle of 45 degrees with respect to the curb with nozzles at least 18 inches above the ground.
- D. Drainage at hydrant: Wherever hydrants are set in impervious soil, excavate a drainage pit below each hydrant and filled and compacted with coarse gravel or broken stone mixed with coarse sand, under and around the bowl of the hydrant and to a level 6 inches above the waste opening.

3.6 ANCHORAGE OF BENDS, TEES, AND PLUGS

- A. Limiting pipe diameter and degree of bend: Apply reaction or thrust blocking/backing on all pipe lines at all tees, plugs caps and at bends deflecting eleven degrees or more. If approved, in lieu of blocking, movement may be prevented by attaching suitable metal rods or straps.
- B. Reaction backing: Reaction, or thrust backing shall be of concrete. Place between solid, unexcavated ground and the fitting to be anchored; the area of bearing on pipe and on ground in each instance shall be as shown on the drawings. Place the backing, unless otherwise shown, so that the pipe and fittings' joints will be accessible for repairs.

3.7 TESTING- QUALITY ACCEPTANCE

- A. FLUSHING OF SYSTEM
 - 1. Thoroughly flush underground piping in accordance with NFPA 24-8-8 prior to the connection of inside piping.

B. HYDROSTATIC TESTS

1. Pressure during test: After the pipe has been laid and partially backfilled as specified, all newly laid pipe, or any valved section of it, shall, unless otherwise specified, be subjected to hydrostatic pressure of 200 psi for at least 3 hours in accordance with NFPA 24-9.2.
2. Procedure: Test shall conform with AWWA C600. Fill each section of pipe slowly with water. Apply the specified test pressure, measured at the lowest point of elevation, by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection gauges and all necessary apparatus shall be furnished by the Contractor. Perform the test separately to each valved section in order to check leakage through all valves. Contractor shall notify and request Fire Marshal to monitor all pressure test and leakage test procedures.
3. Expelling air before test: Before applying the specified test pressure, expel all air from the pipe. To accomplish this, tap if necessary, at points of highest elevation, and afterwards plug tightly.
4. Leakage defined: Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled. Fire Marshal to monitor leakage test.
5. Permissible leakage: Suitable means shall be provided by the Contractor for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless this leakage is less than 10 U.S. Gal. per 24 hours per mile per inch nominal diameter. In calculating leakage, the Fire Marshal will make allowance for added joints in the pipeline above those incidental to normal unit lengths of pipe.
6. Variation from permissible leakage: Should any test of combined sections of pipe laid disclosed leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.
7. Time for making test: Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time to Contractor, Design Professional and Fire Marshal after partial completion of backfill. Provide water as necessary to make the tests when each section is ready.
8. Certification: Complete and submit the joint Owner-Contractor inspection and test certificates in accordance with NFPA -24-A-9-2.1 to the Fire Marshall, Owner, Design Professional, and water system authority.

C. STERILIZATION

1. Before being placed in service, chlorinate all new water main pipe lines and accessories. Furnish all chlorinating equipment and materials, labor and supplies. Prior to chlorination, remove all dirt and foreign matter by a thorough flushing through the hydrants or by other approved means. Flush each valved section of new laid pipe independently prior to the pressure test and before the trench has been backfilled. All

- flushing, chlorinating and testing of water main pipe lines shall be in strict compliance with the Utility Owner.
2. Sterilize in accordance with AWWA C601. Sterilize by applying clear water containing a minimum of 50 ppm of available chlorine. The chlorine bearing water shall remain in contact with the surfaces being sterilized for a period of not less than 24 hours. At the end of the contact period, the chlorine residual in all units and at extremities of pipelines shall be at least 25 ppm. The Contractor to coordinate and schedule the testing of treated water through the Owner's Representative and Water Utility.
 3. Chlorinating valves and hydrants: Operate all valves or other appurtenances while the pipeline is filled with the chlorinated agent.
 4. Final flushing and test: Following chlorination, thoroughly flush all treated water from the newly laid pipeline at its extremities until the replacement water throughout its length shall, upon test, be approved by the water utility owner.
 5. Repetition of procedure: Should the initial treatment prove ineffective, repeat the chlorination procedure until confirmed tests shown that water sample conforms to the requirements previously stated.

END OF SECTION 33 11 00