SECTION 02620 – PIPE INSTALLATION AND TESTING

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes:

1. Handling, installation and testing of pipe, fittings, specials and appurtenances as indicated or specified.

2. Concrete anchor and thrust blocks.

3. Water service connections.

B. Related Work Specified Elsewhere:

1. Pressure Pipe: SECTION 02615.

2. Valves, Hydrants and Accessories: SECTION 02640.

3. Concrete: SECTIONS 03200 and 03300.

C. See Standard Details for Thrust Block and Water Service Connection at the end of this Section.

1.02 REFERENCES:

A. Applicable Standards:

1. American Water Works Association (AWWA):

a. C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.03 DELIVERY, STORAGE AND HANDLING:

A. Handle in a manner to ensure installation in sound and undamaged condition.

1. Do not drop or bump.

2. Use slings, lifting lugs, hooks, and other devices designed to protect pipe, joint elements, linings and coatings.

B. Ship, move, and store with provisions to prevent movement or shock contact with adjacent units.

C. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

PART 2 - PRODUCTS - Specified in respective Sections, this Division.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL:

A. Utilize equipment, methods, and materials ensuring installation to lines and grades indicated.

1. Maintain within tolerances specified or acceptable laying schedule.

   a. Alignment: ±1 inch per 100 feet in open cut or tunnel.

   b. Grade: ±1 inch per 100 feet.

2. Do not lay on blocks unless pipe is to receive total concrete encasement.

3. Accomplish horizontal and vertical curve alignments with bends, bevels, and joint deflections.

   a. Limit joint deflection to one-half of manufacturer's recommended maximum.

   b. Use short specials preceding curves as required.

4. Obtain acceptance of method proposed for transfer of line and grade from control to the work.

B. Install pipe of size, materials, strength class, and joint type with embedment indicated or specified for plan location.

C. Commence laying at downstream end of line and install pipe with bell ends in direction of laying. Obtain approval for deviations therefrom.

D. Clean interior of all pipe, fittings, and joints prior to installation. Exclude entrance of foreign matter during installation and at discontinuance of installation.

1. Close open ends of pipe with snug-fitting closures.

2. Do not let water control measures prove inadequate.

3. Remove water, sand, mud and other undesirable materials from trench before removal of end cap.

E. Brace or anchor as required to prevent displacement after establishing final position.

F. Perform only when weather and trench conditions are suitable. Do not lay in water.

G. Observe extra precaution when hazardous atmospheres might be encountered. H.

3.02 JOINTING:

A. General Requirements:

1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks and structures.

2. Perform conforming to manufacturer's recommendations.

3. Clean and lubricate all joint and gasket surfaces with lubricant recommended.

4. Utilize methods and equipment capable of fully homing or making up joints without damage.

5. Check joint opening and deflection for specification limits.

B. Special Provisions for Jointing Ductile-Iron Pipe:

1. Conform to AWWA C600.

2. Visually examine while suspended and before lowering into trench.

a. Paint bell, spigot, or other suspected portions with turpentine and dust with cement to check for cracks invisible to the eye.

b. Remove turpentine and cement by washing when test is satisfactorily completed.

3.03 CUTTING:

A. Cut in neat manner without damage to pipe.

B. Observe Specifications regarding joint locations.

C. Cut cast-iron, ductile-iron, and steel pipe with carborundum saw or other acceptable method per manufacturer's instructions.

1. Smooth cut by power grinding to remove burrs and sharp edges.

2. Repair lining as required and approved.

D. Cut PVC pipe with a fine toothed saw and miter box or tube cutter. After cutting the end of the pipe shall be dressed to remove all roughness and sharp corners and beveled in accordance with the manufacturer's instructions.

3.04 CLOSURE PIECES:

A. Connect two segments of pipeline or a pipeline segment and existing structures with short sections of pipe fabricated for the purpose.

B. Observe Specifications regarding location of joints, type of joints, and pipe materials and strength classifications.

C. Field-fabricated closures, where required, shall be concrete encased between adjacent flexible joints.

D. May be accomplished with solid sleeve.

3.05 TEMPORARY PLUGS:

A. Furnish and install temporary plugs at each end of work for removal by others when completed ahead of adjacent contract.

B. Plugs:

1. Test plugs as manufactured by pipe supplier.

2. Fabricated by Contractor of substantial construction.

3. Watertight against heads up to 20 feet of water, or 150% of test pressure, whichever is greater.

4. Secured in place in a manner to facilitate removal when required to connect pipe.

3.06 WATER SERVICE LINE:

A. Meter Installation:

1. DUAL METER SET INSTALLATION: Developer shall install 2-inch Copper Tube Size (CTS) 200 psi, SDR-9 polyethylene pipe or ASTM D1785 SCH 80 PVC pipe service line from main line to 7 feet beyond roadway right-of-way. The 2-inch line shall terminate with a 2-inch curb stop valve, 2" x 1" reducer and transition to a 1" U-branch fitting for dual meter set installations. Meter pit and piping shall be installed as indicated on Figure 02620-2. Developer shall provide a 10-foot wide x 10-foot long easement at each front property corner for water meter location. End of line shall be marked with a 2x4 or 1-inch PVC pipe extending from end of line to 12" above finish grade.

2. SINGLE METER SET INSTALLATION: Developer shall install 1-inch Copper Tube Size (CTS) 200 psi, SDR-9 polyethylene pipe service line from main line to 7 feet beyond roadway right-of-way. The 1-inch line shall include a 1-inch curb stop valve prior to entering the meter pit. Meter pit and piping shall be installed as indicated on Figure 02620-2-A. Developer shall provide a 10-foot wide x 10-foot long easement at each front property corner for water meter location. End of line shall be marked with a 2x4 or 1-inch PVC pipe extending from end of line to 12" above finish grade.

B. Connect water service line to main line with brass saddle.

C. Connect water line to saddle with female iron pipe thread corporation stop valve.

D. Water service line shall not be laid in same trench as water main.

E. It shall be the responsibility of the developer to eliminate water service line and other utilities interfering with each other. Adequate separation from other utilities shall be provided around water service line. A minimum of ten (10)feet horizontal separation shall be provided from sanitary sewer service lines.

F. Minimum cover depth for service lines is 36 inches.

3.07 CONNECTIONS TO EXISTING STRUCTURES:

A. Connect pipe to existing structures and pipelines where indicated.

B. Prepare structure by making an opening with at least 3 inches clearance all around fitting to be inserted or as indicated.

C. Observe pertinent articles of Specifications pertaining to joint locations and closures.

D. Repair wall opening with concrete or as indicated.

3.08. CONCRETE ANCHOR AND THRUST BLOCKS:

A. Install at tees, elbows, bends, and dead ends where indicated

B. Place against undisturbed earth or rock.

C. Of design indicated or specified.

1. Removable thrust blocks shall be constructed by utilizing a sheet of 1/4-inch plywood to prevent concrete adherence to pipe, fittings or accessories.

2. Apply two coats of coal tar coating to minimum 20 mils dry film thickness on anchor bars, straps and hardware.

3.09. SEPARATION OF WATER MAINS WITH SANITARY, STORM SEWERS AND DRY UTILITIES:

A. Horizontal Separation:

1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer,force main, or storm sewer pipe and storm sewer manhole. The distance shall be measured edge to edge and includes sanitary sewer manhole.

2. Water mains shall be installed with a minimum horizontal separation of three (3) feet from all dry utilities, including underground electric, communications, and gas lines. This distance shall be measured from edge-of-pipe to edge-of-pipe. Dry utility contractors are required to coordinate with District staff prior to the installation of new utilities located in the vicinity of existing water mains.

3. If local conditions prevent a horizontal separation of 10 feet, a waterline may be laid closer than 10 feet to a sanitary sewer provided that the waterline is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer line. The 10-foot horizontal deviation allowance does not apply to force mains. In areas where the recommended separation cannot be obtained, the waterline shall be constructed of ductile iron pipe (DIP) or the sewer line cased in a continuous casing.

B. Vertical Separation:

1. Where waterlines cross sanitary sewers or force mains, the waterline shall be laid to provide a minimum vertical separation of 18 inches between the outside of the waterline and the outside of the sanitary sewer force main or storm sewer pipe line. This shall apply whether the water main is above or below.

2. At crossings, the full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than 10 feet. In areas where the recommended separation cannot be obtained, the waterline shall be constructed of ductile iron pipe (DIP) or the sewer line cased in a continuous casing.

C. Special Conditions:

1. No waterline shall be located closer than 25 feet to any on-site disposal facility, agricultural waste facility or landfill.

2. Waterlines which cross surface waterways shall meet the requirements of Section 8.7 of Missouri Department of Natural Resources “Design Guide for Community Water Systems”. All appropriate construction parameters shall be included on the construction drawings.

3.10 FIELD TESTING:

A. Acceptance Tests for Pressure Pipelines:

1. Perform hydrostatic pressure and leakage tests.

a. Conform to AWWA C600 procedures.

(1) As modified herein.

(2) Shall apply to all pipe materials specified.

b. Perform after backfilling.

2. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.

a. Select test segments such that adjustable seated valves are isolated for individual checking.

b. Contractor shall furnish and install test plugs.

(1) Including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Bracing against structure walls is not allowed.

(2) Be responsible for any damage to public or private property caused by failure of plugs.

3. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 1 fps.

4. Contractor shall make arrangements with the Water District for water required for testing at lowest rate step.

5. Pressure and Leakage Test:

a. Test pressure shall not be less than 150 psi at the highest point along the test section.

b. Be at least 2-hour duration. Maintain pressure throughout test ±5 psi of test pressure.

c. Leakage test shall be conducted concurrently with the pressure test.

d. Acceptable when leakage does not exceed that determined by the following formula:

Q = 0.0075 DLN

Q = maximum permissible leakage in gallons per hour

L = length of pipe tested in thousand feet

D = nominal internal diameter of pipe being tested in inches

N = square root of the average test pressure in psig

e. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in of nominal valve size shall be allowed.

f. When hydrants are in the test section, the test shall be made against the closed hydrant.

g. Repeat test as necessary.

(1) After location of leaks and repair or replacement of defective joints, pipe, fittings, valves or hydrants. All visible leaks are to be repaired regardless of the amount of leakage.

(2) Until satisfactory performance of test.

h. Engineer and/or Water District shall witness pressure and leakage test.

END OF SECTION 02620