SP-096007
(NEW)

Iowa Department of Transportation

SPECIAL PROVISIONS

FOR

WATER MAINS

Linn County

ESL-4775(621)--7S-57

Effective Date:

November 17, 2009

THE IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water mains, force mains, and appurtenances, including submittals, materials, material tests, product delivery, storage and handling, installation of pipe and appurtenances, polywrap, joint restraint, removal and replacement of fire hydrant, removal and replacement of thrust blocks, and water main disinfection and testing.

1.02 SUBMITTALS

A. Submit shop drawings, project data, and manufacturer's installation instruction.

B. Manufacturer's specifications and/or catalog data listing for pipe, valves, and other special items.

C. Shop drawings showing reinforcing steel details, structural steel, supports, and mechanics defined for structures and specialty items.

D. Material and pressure test certifications.

E. Such other information as Engineer may request.

F. Locations of connections to existing water lines, service lines, valves, and water main appurtenances shall be submitted as a drawing with measurements to Engineer for construction record purposes.

1.03 JOB CONDITIONS

A. Interrupting Water Service:

1. Approval required by the Contracting Authority in advance of any interruption.

2. A 24-hour notice to affected occupants and a 48-hour notice to the fire department of the time and duration of interruption will be provided by hand-delivered notice.

3. Stand-by Service will be provided as required by Engineer. Outages not to exceed 4 hours. All arrangements to be made by the Contractor.

4. Existing valve operation by operating of existing valves shall be by employees of the Contracting Authority.

5. Prevent contamination of existing water lines.

B. Scheduling:

1. Install connecting lines after successful testing of the main.

2. Backfill, grading, and material clean-up shall be no more than 200 feet behind the location of the pipe placement.

1.04 QUALITY ASSURANCE

A. Incorporate no materials in work until mill and/or factory test certifications, which show that materials comply with Specifications, have been furnished and approved by the Engineer.

B. Field tests for water mains and force mains shall be in accordance with this Special Provision.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During loading, transporting, unloading, and storage, the Contractor shall exercise care to prevent damage to materials.

B. Do not telescope small pipe inside larger pipe for shipment or storage.

C. Handle by use of slings, hoist, skids, or other approved means. Dropping or rolling of pipe and fittings is not permitted.

D. Pipe with damage to cement mortar lining will be rejected; field patching not permitted.

E. Materials are to be stored on site or at a location subject to the approval of the Engineer. Materials may not be stored directly on the ground. Materials shall be stored in enclosures or under protective coverings to assure they are kept clean and dry.

1.06 PAYMENT

A. All work under this contract shall be paid for in accordance with the contract unit prices for relocate fire hydrant, ductile iron water main, and water main removal. The Contractor shall consider this payment full compensation for furnishing all labor, materials, tools, and equipment necessary to construct, flush, test, and make ready for operation the improvements specified in the contract documents including furnishing all materials, labor, and equipment to install water main; including pipe and polyethylene wrap, blow off assemblies, handling, transporting, bends, tees, pipe restraint, installation, excavation of trench and pipe envelope, exploration and excavation for obstacles, temporary sheeting and shoring, dewatering of the trench including sumps and pumping, bedding, special granular backfill material, disposal of excess excavated material or unsuitable material removed from the trench, compaction of backfill, and restoration of surface contours. Work also includes connection to existing main. All other items noted in the contract documents, or necessary to provide a complete and operational system and not specifically included in a bid item, shall be considered incidental.

PART 2 PRODUCTS

2.01 GENERAL

A. Lead joints are not permitted.

B. 8 mil poly wrap shall conform to ANSI A21.5.

2.02 RESTRAINED JOINT DUCTILE IRON PIPE (RJ-DIP)

A. Pipe shall conform to ANSI A21.51/AWWA C151.

1. Minimum Thickness: Pressure Class 350, as shown on the plans, shall conform to AWWA C150. Thickness class shall be Class 52.

2. Standard Cement Linings: Coat the inside of the pipe with standard thickness cement lining and provide seal coat inside and out, all in conformance to AWWA C104.

B. Acceptable Products

1. Griffin Pipe Products Company: Bolt-Loc Restrained Joint Pipe

C. Isolated Restrained Joints shall conform to one of the following:

1. MJ DIP: EBAA Iron Megalug Series 100

2. DIP (Push-on): EBAA Iron Megalug Series 800

3. Approved equivalent.

2.03 FITTINGS FOR DIP PIPE

A. Fittings (Tees, Bends, etc.)

1. ANSI A21.10 mechanical joint, ANSI A21.11, Class 250 for underground piping. Mechanical joint fittings shall be ductile iron standard C110/A21.10.

B. Rubber Gaskets, Lubricant, Glands, Bolts, and Nuts: ANSI A21.11.

C. All underground fittings shall be poly-wrapped.

2.04 JOINT RESTRAINING DEVICE

A. Tie Rods

1. Tie rods shall be 5/8" (15.0 mm) or 3/4" (19 mm) and shall be U.S. Steel Corten conforming to ASTM A-588, stainless steel conforming to ASTM, A-564 or approved equivalent.

2. Washers shall conform to ANSI B27.2, Plain Steel.

3. Nuts shall be hexagonal and shall conform to ASTM A-563.

4. The number of tie rods for bends, plugs, caps, tees, end valves, and fire hydrant valves shall conform to the following:

	8" (200mm)
5/8" (15.9 mm) Rods	4
3/4" (19 mm) Rods	2

B. Joint Restraints shall be EBAA Iron Megalug or approved equivalent.

1. PVC Pipe: Megalug Series 2000 PV or Series PV or Series 6500.

2. C900 Pipe: Megalug Series 2000 PV or Series 1500.

3. MJ-DIP: Megalug Series 100.

4. DIP (Push-On): Megalug Series 800.

PART 3 EXECUTION

3.01 PREPARATION

A. Alignment:

1. Deviations: Notify Engineer and obtain instruction to proceed where there is an alignment discrepancy or an obstruction not shown on the plans.

2. Depth of Pipe: Finished grade to top of pipe shall be a minimum of 5'-6".

3. Before installation of new facilities, verify sizes, measurements, type, and location of existing piping and appurtenances at points of connection to existing system.

4. Before installation, visually inspect for cracks or defect; damages or unsound pipe will be rejected.

5. High Points in Pipe Line: Locate at services and air vents.

6. Separation from Storm or Sanitary Sewer Lines: Water line shall be minimum of 10' from sewer line when running parallel with the sewer line. At sewer line crossings, there shall be a minimum of 18" between both pipes and a full length of pipe shall be centered over or under the crossing sewer line. Separation may be waived only with the approval of the Engineer.

B. Bedding

1. Method: See construction details.

2. Bearing: Support entire length of pipe barrel evenly.

C. Cleaning Pipe and Fittings

1. General: Interior of the pipe shall be free of all foreign materials and the joint surfaces shall be free of lumps and blisters.

3.02 INSTALLATION

A. Laying Pipe

1. General

a. Clean pipe interior of foreign material before lowering into trench; keep clean at all times by securely closing open ends of pipe and fittings with watertight plug to prevent ingress of foreign material at all times when pipe jointing operation is not in progress. If water is in the trench, the seal shall remain in place until the trench is pumped dry.

b. Place in trench in sound, undamaged condition; do not injure pipe coating or lining; do not use end hooks to install or move pipe.

c. Make necessary field measurements to determine piping-laying lengths; work pipe into place without forcing or springing.

d. Lay pipe in the dry, frost-free trench, and install a minimum of 5' of cover over the top of the main or as shown on the plans.

2. Deflection: Pipe may be deflected at joints by an amount less than or equivalent to the manufacturer's maximum recommendation.

B. Cutting Pipe

1. Pipe shall be cut in a neat and workmanlike manner to provide an even surface, perpendicular to the pipe centerline.

2. All burrs and irregularities shall be removed prior to pipe fitting.

3. Bevel ends of push-on type pipe.

C. Jointing

1. Perform mechanical joint installation per manufacturer's instructions.

2. Junctions with other materials shall require the use of adapter type and technique recommended by pipe manufacturer.

3. Restrained joint pipe shall be joined in accordance with the

manufacturer's instructions including pulling the piping to engage the restraining system.

D. Pipe Laying / Connections

1. Uncover existing mains a sufficient time ahead of pipe-laying operations to determine fittings required to make connections; make connections between existing and new water mains with specials and fittings as required.

2. Install pipe in accordance with best construction practices as specified in AWWA Standard C600 and manufacturer's recommendations.

3. Plug or cap and block all pipe ends or fittings left for future connections.

4. Connection Condition:

   a. No Pressure Condition: Install solid or cutting in sleeve.

   b. For a Line Under Pressure: Install tapping sleeve or saddle and valve.

   c. Anchor piping laid on grade prior to embedment in concrete.

5. All ductile or cast iron pipe and fittings shall be poly-wrapped.

E. Setting Valves, Fittings, and Fire Hydrants

1. General: See plans for location.

2. Valves shall be set plumb.

3. Valve Boxes

   a. Base Section: Center and plumb over operating nut and 2" above bonnet joint.

   b. Upper Section: Set cover flush with finished grade.

   c. Witnesses shall be provided by the contractor on his record drawings.

   d. The contractor shall protect valve boxes after installation.

4. Hydrants

   a. Connection between hydrant and auxiliary valve shall be RJ ductile iron pipe.

   b. Hydrants shall be set plumb with pumper nozzle facing street and nozzle centerline 20" above finished grade.

c. Hydrant shall be set with 4 cubic feet of 3/4" or 1" clean rock for the hydrant weephole.

3.03 INSTALLATION OF POLYWRAP

A. Clean pipe and cut polyethylene tube so that it is approximately two feet longer than the pipe section. Slip tube on the pipe and allow about one foot of the tube to overhang at each end.

B. Push back the overhanging tube ends until they clear the pipe ends.

C. Take up slack in the tube to make a snug, but not tight, fit. Fold excess back over the top of the pipe.

D. Secure the fold with polyethylene compatible adhesive tape at several locations along the pipe barrel.

E. Dig a shallow bell-hole in the trench bottom at the joint location.

F. Place the pipe into the trench.

G. Assemble the joint.

H. Pull the polyethylene tube end of the previously installed pipe over the new pipe and secure with the tie strap from the preceding pipe bell.

I. Overlap the secured tube end of the new pipe section. Secure the new tube end in place with the spigot end tie strap.

J. Repair all rips, tears, or other tube damage with suitable adhesive tape. Experience has shown that very small pinpoint sized punctures need not be repaired.

3.04 JOINT RESTRAINT

A. Restraining Fittings:

1. Provide restrained or securely jointed pipe joints to prevent joint separation where piping changes direction or dead-ends.

2. Restrained pipe joints shall include use of either retainer glands or locked mechanical joints.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspection

1. General:

a. Testing will be observed by the Engineer.

b. Testing will be completed prior to connection to existing lines.

c. Pretest line first, then arrange with Engineer for inspection and observation of test.

d. The Contractor shall make arrangements for supply of water required for test.

2. Electrical Continuity: Test ductile iron pipe for continuity and repair breaks.

B. Disinfection / Chlorination

1. Conditions:

a. To be performed in accordance with AWWA C651. A copy of this standard can be obtained from the Architect/Engineer upon Contractor's request.

b. Observation: By the Engineer.

c. Required Water: By the Contracting Authority where available from Contracting Authority's system.

d. Equipment and Assistance: Provide.

e. Chlorine Gas: Not permitted on job site.

2. Sequence: Prior to pressure tests.

3. Method of Disinfection: In accordance with AWWA C651.

4. Sampling: By the Engineer.

5. Sampling Taps: To be provided by Contractor at a minimum of one at each end of the line. Sampling tap to be as shown in Figure 1 of AWWA C651 or a corporation-cock with copper-tube gooseneck assembly. After samples have been obtained, the gooseneck assembly shall not be removed. Use of hose or fire hydrant for collection of samples will not be permitted.

6. Corrections: Re-chlorinate to be performed by the Contractor in accordance with Section 8 of AWWA C651 for sections not meeting Department of Natural Resources bacteriological requirements.

C. Flushing

1. Conditions:

a. Required Water: By Contracting Authority, limited to 1,000 gpm, where and when available from municipal system.

2. Sequence: Following pressure testing and chlorination if continuous feed or slug methods are used. If table method is used, flushing shall follow chlorination.

3. Minimum Velocity: 2½ feet per second at pipe wall.

4. Procedure: Submittal required to include method, materials, equipment, and time schedule.

D. Pressure Testing (to be completed after disinfection and flushing in accordance with AWWA C600)

1. Condition: Air or air water methods of applying pressure prohibited.

2. Range: 140 to 150 psi at lowest elevation.

3. Duration: 1 hour and until completion of inspection.

4. Procedure: Fill system slowly, expel air through corporation stop at high points and apply pressure.

5. Inspection: Examine line and appurtenances for leaks and movement.

6. Corrections: Repair defects, visible leaks, and repeat test until acceptable.

E. Leakage (in accordance with ANSI/AWWA C600):

1. Check for leakage as soon as practical after pressure test.

2. Pressure will be maintained within the pressure test range.

3. Test will be for a period not less than 2 hours.

4. Procedure:

a. Filling: As in pressure test.

b. Supplying Make-Up Water: Measurable source.

c. Leakage: Quantity of water supplied to maintain test pressure.

5. Allowable Leakage: Less than:

$$L = \frac{ND\,(P)^{1/2}}{3{,}700}$$ where,

L = Leakage (Gallons per hour)
N = Number of Joints
D = Nominal Pipe Diameter of Pipe (inches)
P = Average Test Pressure (pounds per square inch gauge)

NOTE: This formula equals 1.0 gallons per hour per mile per inch

diameter at 140 psi for 18 foot lengths.

**Source: AWWA C-600 and Des Moines Metro Area Urban Design Standards*

6. Testing Valves Only: Maintain pressure on main and check all valves as follows:

   a. Vent extreme ends of main and briefly check each valve progressively back towards test point.

   b. Allowable: Pressure drop less than 10 psi in five minutes with test pump off.

7. Correction: Repair defect and repeat test until acceptable.

3.06 ADJUST AND CLEAN

A. Flushing

1. Conditions:

   a. Required Water: By Contracting Authority, limited to 1,000 gpm where and when available from Contracting Authority's system.

2. Sequence: Following pressure testing and chlorination if continuous feed or slug methods are used. If table method is used, flushing shall follow chlorination.

3. Minimum Velocity: 2½" per second at pipe wall.

4. Procedure: Submittal required to include method, materials, equipment, and time schedule.