SP-150098
(New)

SPECIAL PROVISIONS
FOR
TRANSMISSION MAIN HOT-TAPS

Linn County
NHSX-100-1(105)--3H-57

Effective Date
May 17, 2016

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150098.01 DESCRIPTION.

A. Scope.

This work shall consist of the construction of proposed water transmission main connections between a relocated 24inch diameter ductile iron pipe water main and the existing 24inch water transmission main located south of E Avenue and west of 80th Street SW near Cedar Rapids in Linn County, Iowa. Transmission Main Connections shall be a Hot-Tap to allow interconnection of the new relocated 24inch main to the existing 24inch diameter ductile iron water transmission main with minimal interruption to water service.

The new Relocated Transmission main must be installed, tested and placed into service before the old main can be shut-down, cut and plugged. The shut-down cannot exceed 8-hours in duration. Service shut down shall not occur prior to 7 PM and service must be restored before 3 AM.

B. Other Work.

This specification is applicable to only construction of the Relocated Transmission Line connections to the existing water transmission main and connecting new flushing hydrants to existing water transmission mains. The following construction items related to the water main relocation work are covered elsewhere. These items will be measured and paid for separately from Transmission Main Hot-Taps.

1. Water Main Construction Trenched, Trenchless, and Trenched with Casing Pipe.

2. Ductile Iron Pipe (DIP) Fittings not associated with the proposed Hot Taps.

3. Air Release Valves, Permanent Tap near Morgan Creek, Valve Box Extensions, and Flushing Hydrant(s).

4. Site preparation including the stripping, stockpiling, and spreading of topsoil.

5. Temporary erosion control and seeding, fertilizing, and mulching disturbed areas.

C. Requirements.

The following are requirements for construction of the water transmission main Hot-Tap connections:

1. Components, equipment, materials, and treatment chemicals that come into contact with potable water shall be certified for conformance to ANSI/NSF Standard 60 or 61, as applicable.

2. Conform to requirements of Special Provisions for Water Mains as applicable, except in instances where differences between requirements of Standard Specifications and requirements of this specification arise, in which case this specification takes precedence.

3. Hot Tap Contractor shall have a minimum of 10 years of successful experience installing pressure hot tap and line-stop devices with bypass piping on similar sized pipelines of similar construction. Hot Tap Contractor shall have ISO 9001 and 9002 certifications.

4. On-site hot tap field technicians shall be factory certified and qualified under ISO 9002 quality control standards along with US DOT Operator Qualification procedures and have minimum of 5 years continuous employment history with hot tap Contractor. Furnish technician's employment history along with his/her operational training summary.

5. All Cedar Rapids Water Utility Valves are to be operated by only the City of Cedar Rapids Water Department Representative. Operation of Cedar Rapids Water Utility Valves by the Contractor is prohibited.

6. All materials shall meet Buy America specifications. Refer to Article 1107.06 of the Standard Specifications.

7. Designate delivery date for each product in Construction Schedule.

8. Receive and unload products at Project Site.

9. Promptly inspect products jointly with City of Cedar Rapids Water Department Representative, record shortages, damages, or defective items.

10. Handle products at Project Site, including uncrating and storage.

11. Protect products from exposure to elements, and from damage.

12. Assemble, install, connect, adjust, and finish products, as stipulated in the contract documents.

13. Repair or replace items damaged by Contractor.

D. Submittals.

The Contractor is to submit the following information to the Engineer for review and approval prior to constructing in the field:

1. Product Data: Manufacturer's catalog data for pipe, pipe joints, couplings, fittings, valves, and valve boxes.

2. Shop Drawings: Complete detailed working drawings and schedules of pipe, fittings, valves and appurtenances. Detailed thrust support systems as required for hot tap and line stop installations and connections to bypass piping. Excavation drawings (including dimensions) for the purpose of collecting physical pipe dimensions at the actual work site and prior to ordering any materials. Thrust support and excavation drawings shall be signed and sealed by a registered Professional Engineer in the State of Iowa qualified to perform such work.

3. Submit to City of Cedar Rapids Water Department Representative with notification of any discrepancies or problems anticipated in use of product.

4. Thrust Block Calculations: Thrust block and support design calculations as required for hot tap. Include lateral pipe thrust restraints required as a result of work including pipe supports based upon size and weight of equipment to be utilized. Use site soil conditions and actual operating pressures for design. Calculations shall be signed and sealed by a registered Professional Engineer in the State of Iowa qualified to perform such work.

5. Valve: Results of required factory valve testing.

6. Quality assurance data: Certificates from manufacturer evidencing compliance with AWWA standards listed herein for pipe, pipe joints, fittings, valves, and valve boxes. Certification by nationally recognized, independent organization that components, materials, and treatment chemicals in contact with potable water conform to ANSI/NSF Standard 60 or 61, as applicable.

150098.02 MATERIALS.

A. Cement-Lined Ductile Iron Pipe.

1. **Pipe.**
   - **a.** Design: AWWA C150.
   - **b.** Manufacture: AWWA C151.
   - **c.** Pressure class: Minimum 350 psi.
   - **d.** Minimum buried thickness: Class 52.

2. **Fittings.**
   - **a.** Mechanical joints: AWWA C110; rated working pressure, 150 psi.
   - **b.** Flanged joints: AWWA C110; rated working pressure, 150 psi.
   - **c.** Gasket: Nitrile or Viton.
   - **d.** Joints shall be restrained with restraint devices conforming to AWWA C110.

3. **Pipe Joints.**
   - **a.** Buried: Push-on conforming to AWWA C111 or mechanical or flanged conforming to AWWA C110.
   - **b.** Gasket: Nitrile.
   - **c.** Joints shall be restrained with restraint devices conforming to AWWA C110.

4. **Standard Cement Lining for Pipes and Fittings, AWWA C104.**
   - **a.** Thickness: Standard thickness.
   - **b.** Seal coat: Asphaltic material.

5. Include gaskets, glands, bolts, and nuts required for complete installation. Bolts and nuts shall be stainless steel 18-8 Type 304 or 316.

6. Mark each length of pipe with manufacturer's name and class.

7. Exterior coating for pipe and fittings: Asphaltic coating; AWWA C151.

8. Polyethylene encasement: Linear, low-density with 8-mil thickness or high-density, cross-laminated with 4 mil thickness, tube-type, polyethylene film; AWWA C105.

B. Hot Tap Fittings.

1. Fabricated Top Seal Hot Tap Fitting.
- **a.** Back (bottom) section shall be full encirclement type and conform to measured pipe outside diameter.
- **b.** Front (top) section shall be full encirclement type with factory-installed nozzle and flange outlet.
- **c.** Fabricate from approved carbon steel materials coated; ASTM A283 grade steel as a minimum.
- **d.** Coat steel with epoxy.
- **e.** Steel run sections shall conform to and reinforce existing pipe.
- **f.** Fittings shall have minimum 7/8inch wide recess for installation of Buna-N rubber gasket around hot tapping outlet.
- **g.** Bolts and nuts: 3/4 inch stainless steel 18-8 Type 304.

2. Pressure rating: 150 psi.

3. Body: ASTM A283 Grade C, ASTM A285 or ASTM A36.
- **a.** Saddle plate thickness: In accordance with design criteria for entire fitting. Minimum wall thickness for saddle plates shall be 0.375 inches.
- **b.** Welding of materials: In accordance with applicable code standards and welds shall be stress relieved when code standards so specify.
- **c.** Design saddle plates to permit longitudinal bolting of top and bottom halves around pipe.

4. Hot Tap Nozzle.
- **a.** Nozzles attached to saddle plates and used for hot tapping shall be constructed of A 106 Grade B steel or ASTM A234 or A283 steel.
- **b.** All weldments will be suitably stressed relieved when required by code or by common practice.
- **c.** Nozzle thickness: As minimum standard steel pipe wall thickness (0.250 inch minimum in sizes 6 inches and above) and in compliance with maximum working pressure of water system.

5. Nozzle to Pipe Sealing Gasket.
Mold gasket from Nitrile or Viton rubber elastomer compound suitable for resisting compression set and compatible with potable water in temperature range of 32°F to 100°F.

6. Blind Flanges.
- **a.** Provide flanges in ASTM A 181 or ASTM A 105 grade steel and to mate with line plugging flanges listed above.
- **b.** Minimum blind flange thickness shall comply with AWWA C207.

7. Flange Gaskets.
- **a.** Provide gaskets with non-asbestos composition and designed to mate to inner bore and inner bolt circle of line plugging flange.
- **b.** Thickness: At least 0.125 inch minimum.
- **c.** Material: Nitrile or Viton.

8. Fasteners.
Manufacture permanent bolts, studs and nuts from stainless steel 18-8 Type 304.

9. **Test Plug.**
   Furnish fittings with factory-supplied 3/4inch threaded test outlet and plug attached to hot tap nozzle to facilitate field testing of installed fitting.

10. **Coating.**
    a. Coat fittings both internally and externally with fusion bonded epoxy coating in accordance with AWWA C213.
    b. Coatings shall be applied to 10-20 mils thickness minimum.

11. Hot tap equipment and machinery: T. D. Williamson, Team Services, Municipal Pipe Services, or equal.

C. Tapping Valves: Resilient-Seated Gate Valves.

1. Design and manufacture: AWWA C515.

2. Use valves of one manufacturer insofar as practicable.

3. Pressure rating: Minimum 200 psi.

4. Body and gate material: Ductile iron.

5. Bonnet: Bolted.

6. Stem and trim: Bronze.

7. Use type permitting repacking under pressure when wide open.

8. Packing: O-ring.

9. Stem arrangement: Non-rising stem with 2 inch wrench nut.

10. Resilient seat: Applied to gate.

11. Direction of opening: Turn left to open.

12. Installation: Either vertical or horizontal placement of disc shaft dependent on depth of cover.

13. Actuator: If horizontal, bevel gear actuator equipped with 2 inch square operating nut. If vertical, spur gear actuator equipped with 2 inch square operating nut.

14. Valve body by-pass: Provide valve body by-pass and valve.

15. Joints: Mechanical joint outlet and machined face flanged inlet.

16. Gaskets: Nitrile or Viton.

17. Interior coating: Epoxy; AWWA C550.

18. Manufacturer: American Flow Control Series 2500 Resilient Seat, valve, or equal.

D. Hot Taps.

1. Provide hot tap fittings, tapping equipment, valves and appurtenances for use on ductile iron pipe.

2. Pressure rating: 150 psi.

3. Body.
- **a.** ASTM A283 grade C, A285 or ASTM A36.
- **b.** Saddle plate thickness: In accordance with design criteria for entire fitting. Minimum wall thickness for saddle plates: 0.375inches.
- **c.** Welding of materials: In accordance with applicable code standards and all welds shall be stress relieved when code standards so specify.
- **d.** Design saddle plates to permit longitudinal bolting of top and bottom halves around pipe.

E. Joint Restraint Devices.

1. Provide restraint devices consisting of multiple gripping wedges incorporated into a follower gland meeting applicable requirements of ANSI/AWWA C110/A21.10.
- **a.** Working pressure: 250 psi.
- **b.** Gland body, wedges, and wedge actuating components shall be cast from Grade 65-45-12 ductile iron material in accordance with ASTM A536.
- **c.** An identification number consisting of year, day, plant and shift (YYDDD) (plant designation) (Shift number), shall be cast into each gland body.
- **d.** Mechanical joint restraint shall require conventional tools and installation procedures in accordance with AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.
- **e.** Proper actuation of gripping wedges shall be ensured with torque limiting twist off nuts.

2. Manufacturer: EBAA Iron Inc. Megalug Series 1100, or equal.

F. Valve Boxes.

1. Provide valve box for each buried valve.

2. Complete, assembled unit consisting of adjustable box.

3. Valve Boxes to comply with specification included in Water Main Special Provision.

150098.03 CONSTRUCTION.

A. Verification of Measurements.

1. Before installation, excavate pipe and verify measurements at Hot Tap locations including:
- **a.** Actual location and depth of existing water mains.
- **b.** Actual location of connections to existing water mains.
- **c.** Type of joints on existing lines at point of connection.
- **d.** Outside diameter of existing pipe: At each location circumferentially tape measure and caliper existing pipe at a minimum of four points.

2. Make necessary field measurements to determine accurate pipe laying lengths to permit installation without forcing or springing.

3. Verify depth of cover at Transmission Main Connection tapping valves. If depth of cover exceeds 9 feet, install tapping valve vertically. Depth of cover should be measured to proposed finished grade per contract documents.

B. Verification of Conditions.

1. Verify condition of exterior coatings, corrosion deposits, thrust blocks, or other issues that may interfere with proper seating and sealing of fittings against each main.

2. Report any condition that could interfere with installation work immediately to the Engineer.

3. If conditions interfere with installation and operation of line stops, valves, fittings or support and thrust restraint systems, move work location up or downstream to structurally sound pipe.

4. Conform to hot tap/line stop contractor's recommendations regarding determination of inside pipe diameter and condition of mortar pipe liner.

5. Cedar Rapids Water Department Representative will test existing valves that must be operated in conjunction with Work.

C. Installation Work in Excavations.

1. Install temporary construction limit fencing to control access to construction areas.

2. Excavations shall include necessary sheeting and shoring, gravel or concrete base, and site dewatering. Excavate area of size recommended by hot tap/line stop contractor. Install proper pipe support and thrust anchors. Clean pipe exterior down to factory-supplied outside diameter. Carefully inspect pipe especially at point where fitting "O" ring must seal to pipe surface. Fill any surface pitting with Engineer-approved epoxy or move work to acceptable location.

3. Properly support excavated pipe. Provide wood blocking or concrete piers as required.

4. Provide proper working base in each excavation.
   a. Water Main Connection excavations shall have either 4 inch thick course gravel base or 4 inch thick unreinforced concrete base.
   b. Top of gravel base or concrete slabs: 2 feet below bottom of water main in all cases.

5. Store, handle, join, lay, and otherwise install pipe and fittings in accordance with manufacturer's recommendations.

6. Trench excavation and backfill: Conform to applicable requirements of the Special Provisions for Water Mains and federal, state, and local safety requirements.

7. At completion of work, backfill excavation leaving shoring and bracing in place. Remove shoring and bracing within 2 feet of finished surface. Finish trench with 6inches of compacted crushed limestone.

8. Minimum earth cover over pipe: 4.5 feet.

9. Clean pipe interior of foreign material before lowering into trench; keep clean at all times by securely closing open ends of pipe and fittings.

10. Lay pipe and fittings in the dry.

11. Handle pipe and accessories in manner to ensure delivery to trench in sound, undamaged condition; take particular care not to injure pipe coating or cement lining.

12. Cut pipe in neat and workmanlike manner without damage to pipe.

13. Carefully protect pipe joints from injury while handling and storing pipe; keep weight off joints; use no pipe with joints deformed, gouged, or otherwise impaired.

14. Pipe which is damaged or unsound will be rejected.

15. Use suitable fittings where grade or alignment requires offsets greater than manufacturer's recommended joint deflections.

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

17. Uncover existing mains, to which connections are to be made, a sufficient time ahead of pipe laying operations to determine fittings required.

18. Make connections between existing and new water mains with specials and fittings to suit actual conditions.

19. Restrain all pipe and fitting joints.

20. Install polyethylene encasement on all exposed cast and ductile iron pipe and fittings in accordance with AWWA C105.

D. Hot Tap Installation Work.

1. Install hot taps, valves and fittings in accordance with manufacturer recommendations.

2. Connect hot tap gate valve to hot tap nozzle with flange connection.

3. After fitting installation and initial testing, provide sufficient concrete support under and around each fitting based upon existing soil conditions, size and weight of equipment to be mounted to fitting, and anticipated lateral thrust that will be placed on fittings and pipe sections at time of pipe plugging operations and main line alterations. Lateral thrust restraint is required including lateral thrust that will be placed on pipe and plugging fitting at time work is to be performed downstream of line stops.

4. Allow concrete to reach minimum cure strength as specified by Contractor's engineer prior to mounting of any tapping-plugging machinery. Use of concrete additives to speed cure time is subject to approval of the Engineer.

5. Field disinfect all equipment in contact with potable water.

6. Furnish the Engineer a written calculation for hot tap and pipe plugging operation including pilot drill travel, location of pilot drill keeper wires in relation to severed coupon, hot tap shell cutter travel, plugging head sealing element sizing data, and plugging head travel calculations.

E. Thrust Blocks.

1. Provide thrust blocks for hot taps.

2. Install thrust blocks in accordance with approved shop drawings.

3. Concrete shall conform to the requirements of Section 2403 of the Standard Specifications.

4. Proper installation of thrust blocks shall be confirmed by Contractor's engineer prior to backfilling.

F. Setting Valves and Valve Boxes.

1. **Valves.**
   - **a.** Pressure test valves prior to installation.
   - **b.** Install gate valves with stems vertical, except where shown or noted otherwise.

c. Install butterfly valves with stems horizontal, except where shown otherwise.
d. Tighten valve glands as work is installed; replace O-rings if required, and retighten glands after valves are placed in operation and brought up to operating pressure.
e. Replace any O-ring which is deteriorated or in unsatisfactory condition.
f. Set buried valves on concrete thrust block extending to undisturbed earth.
g. Do not support the weight of attached pipe with valve body.

2. Valve Boxes.
a. Provide for each buried valve.
b. Center on valve operator.
c. Carefully tamp backfill around each valve box to distance of 4 feet on all sides of box or to undisturbed trench face, if less than 4 feet.

G. Tests for Water Mains.

1. Test piping after installation in accordance with AWWA C600.

2. Test piping with water.

3. Pressure/Leakage Test for Water Main.
a. Conduct visual test at all sites. Do not cover joints until test is completed.
b. Use system pressure.
c. Duration of test: 2 hours.
d. Flush out main before test to remove air; insert taps as necessary to blow off trapped air.
e. Maximum allowable leakage: No visible leakage for any joint allowed.

4. Carefully examine joints during time pressure is on pipe.

5. Refit piping showing visible leakage as needed to eliminate leakage.

6. Locate and repair or replace defective pipe or fittings until leakage is eliminated.

7. Furnish labor, material and equipment associated with construction dewatering.

H. Disinfection.

1. Flush thoroughly and disinfect in accordance with AWWA C651 before pressure/leakage testing and backfilling have been completed. Provide pipe taps and blow-off piping as needed to complete the disinfection work.

2. Connections to Existing Mains.
a. Using tapping sleeve and valve:
1) Thoroughly clean outside of existing main and inside of sleeve and valve by swabbing or spraying with 1% hypochlorite solution.
2) After installing tapping sleeve and valve and before tapping existing main, place calcium hypochlorite inside sleeve and valve.
3) Place calcium hypochlorite around outside of valve and inside of fittings when making connections.
b. Connecting to existing fitting:
1) Follow procedure outlined above.
2) When existing main has been opened, place calcium hypochlorite inside existing fitting.

3. Engineer will take samples and submit two for bacteriological analysis by an Iowa certified laboratory on 2 successive days after disinfection of each section of new installation. Contractor shall assist Engineer in collecting samples as required. If initial disinfection fails to

produce satisfactory bacteriological results, main shall be re-chlorinated at no additional cost until satisfactory results are obtained. Do not place system into operation until test results of water samples are satisfactory.

4. Furnish labor and material for dechlorination of water prior to discharge.

5. Obtain permits for disinfection water discharge at no additional cost to the Contracting Authority.

I. Record Documents.
The Contractor shall be responsible to maintain a record copy (As-Built) of the construction plan set with concise, legible notes regarding the length, location , size, depth, orientation of water main pipe, fittings and connections. Record Documents shall be submitted to the Engineer. Record Documents will be considered complete once they meet the satisfaction of the Engineer.

J. Miscellaneous Removals.
Removal existing water main pipe, fittings, and valves required for the installation of new water transmission main connections via a Hot-Tap. Removed pipe, fittings, valves, and other appurtenances as needed will become the property of the Contractor and removed from the project site at no additional cost to the Contracting Authority.

K. Granular Backfill.
Granular trench backfill shall be used.

150098.04 METHOD OF MEASUREMENT.
Transmission Main Hot-Taps will be measured per EACH.

150098.05 BASIS OF PAYMENT.

A. Payment will be on the basis of unit Price for Transmission Main Hot-Taps.

B. Payment will be full compensation for all material, equipment, labor, and operations necessary to construct water main connections with a hot-tap. Work includes excavation for live tap construction and operations, dewatering as required, line stops, trust blocks, backfilling, gravel or concrete base, safety fence, temporary sheeting/shoring, miscellaneous removals, and all other equipment, supplies, materials, and labor required for a complete and proper installation.

C. Preparation of a record copy of construction (As-Built) is considered incidental to Transmission Main Hot-Taps.

D. Cedar Rapids Water Department cannot guarantee that a valve shut-down will be complete without leak-through or occur within a specified time frame. Contractor's cost for personnel, equipment or working days while waiting for a shut-down by the City of Cedar Rapids Water Department is considered incidental.