



**SPECIAL PROVISIONS  
FOR  
PIPE AND FITTINGS**

**Linn County  
TAP-U-1187(799)--8I-57**

**Effective Date  
September 21, 2021**

**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.**

**157191.01 GENERAL REQUIREMENTS.**

**A. Section Includes.**

- Pipe
- Fittings
- Special Fittings
- Pipeline Accessories

**B. Description of Work.**

1. Water Mains – This item includes furnishing and installing water pipe in accordance with the Contract Documents.
2. Water Services – This item includes furnishing and installing water services, and obtaining a water service tap on an existing water main.

**C. Submittals.**

1. Submit product information for joint restraint system to be used.
2. Submit Certificate of Compliance indicating materials incorporated into the work comply with the contract documents.

**D. Delivery, Storage and Handling.**

1. Remove pipe and fittings contaminated with mud and surface water from the site; do not use in construction unless thoroughly cleaned, inspected, and approved by the Engineer.

2. Store material in accordance with the manufacturers' recommendations and in locations that will minimize the interference with operations, minimize environmental damage and protect adjacent areas from flooding, runoff and sediment deposition. PVC pipe must be protected from direct exposure to ultraviolet light.

**E. Scheduling and Conflicts.**

Discontinue work affected by any conflicts discovered or any changes needed to accommodate unknown or changed conditions and notify the Engineer.

**F. Special Requirements.**

1. A City of Cedar Rapids right-of-way permit is required for water main or service line installation or repair work within City street right-of-way. The Cedar Rapids Utilities Department – Water Division (herein after referred to as the “Water Division”) will pay the permit fee. The Contractor is required to complete the application.
2. The Water Division will not sell or loan materials from its pipe and fitting inventory except when water service to the public has been interrupted and repair parts are not readily available from other sources. A service charge will be added to the cost of the materials sold to the Contractor out of inventory.
3. **Coordination for Water Service Stubs.**
  - a. Water main to be in service and all tests passed prior to ordering taps.
  - b. Property corners are to be staked and visible prior to making tap.
  - c. Notify Cedar Rapids Water Engineering (319-286-5950) at least 24 hours ahead of need for all taps.
  - d. Taps 2 inches or smaller: Made by Cedar Rapids Meter Shop (319-286-5930).
    - 1) Confirming and/or cancellation: Notify the day of installation.
    - 2) To schedule taps for the morning, contact Meter Shop between 7:30 a.m. and 8:00 a.m.
    - 3) To schedule taps for the afternoon, contact Meter Shop between 11:30 a.m. and noon.
  - e. Taps larger than 2 inches and up to 12 inches: Made by Cedar Rapids Water Distribution (319-286-5960).
    - 1) Schedule with Water Engineering and Water Distribution at least 24 hours prior to when tap is needed.
    - 2) To cancel contact Water Distribution no later than 7:00 a.m. on the day of the scheduled tap.
  - f. Taps larger than 12 inches: Made by qualified Contractor.
    - 1) Submit Contractor qualifications and tapping plan detail to the Engineer for approval.
    - 2) Schedule with Water Engineering and Water Distribution at least 24 hours in advance of commencement of work. Taps are not allowed without authorized Water Division staff on site.
4. Equipment and Labor furnished by the City of Cedar Rapids:
  - a. The Water Division will furnish labor and tapping equipment necessary to make taps from 1 inch to 12 inches in diameter.
  - b. The Water Division will furnish all labor and equipment to operate water system valves and fire hydrants in conjunction with the work.
5. **Reuse of Water Service Lines.**

Water service lines must meet the following requirements when a new structure is proposed to replace a prior structure on a site.

  - a. Water service lines 2 inches or smaller must meet local and plumbing codes. 1) Water service lines installed prior to January 1, 2010 must be replaced. 2)

Water service lines and taps must be 1 inch minimum and utilize a tapping saddle.

- b. Water service lines larger than 2 inches must meet local and plumbing codes. 1) Gate valves installed prior to January 1, 2010 must be replaced.

## 157191.02 MATERIALS.

### A. Ductile Iron Pipe (DIP) Water Main.

#### 1. Minimum Thickness Class.

- a. 4 inch through 24 inch: Thickness Class 52 per AWWA C151.
- b. 30 inch through 48 inch: As specified in the contract documents.

#### 2. Joint Type.

Use push-on type, unless otherwise specified in the contract documents or as authorized by the Engineer.

- a. Push-on: According to AWWA C111.
- b. Mechanical: According to AWWA C111.
- c. Restrained, Buried: Pipe manufacturer's standard field removable system.
- d. Restrained, in Structures: Restraining gland, flanged or grooved.
- e. Restrained, in Casing: Pipe manufacturer's standard field removable system. No gripper gaskets shall be allowed within the casing.
- f. Gaskets: According to AWWA C111. All gaskets shall be Nitrile, unless otherwise specified.
- g. Lining: Cement-mortar lined, per ANSI/AWWA C104/A21.4.
- h. Exterior Coating: Asphaltic.
- i. Markings on Pipe: Name of manufacturer, size and class, spigot insertion depth gauge.

### B. Bolts for Water Main and Fittings.

- 1. Use corrosion resistant bolts.
- 2. **Tee-bolts and Hexagonal Nuts for Mechanical Joints.**
  - a. High-strength, low-alloy steel manufactured according to AWWA C111.
  - b. Include ceramic-filled, baked-on, fluorocarbon resin coating for bolts and nuts.
  - c. Include factory-applied lubricant that produces low coefficient of friction for ease of installation.
- 3. **Other Bolts and Nuts:** 304 or 316 stainless steel for clamps, sleeves, saddles, etc. Includes factory-applied lubricant that produces low coefficient of friction to prevent galling and for ease of installation.

### C. Fittings.

- 1. For DIP and PVC: Comply with AWWA C110 (ductile iron or gray iron) or AWWA C153 (ductile iron). Fittings shall be smooth and pit free. Coatings shall be uniform and undamaged. Fittings shall be designed by the pipe manufacturer, conforming to DIPRA "Thrust Restraint Design for Ductile Iron Pipe" current editions.
  - a. **Joint Type.**
    - 1) For pipe sizes 16 inches and less, use mechanical joint complying with AWWA C111.
    - 2) For pipe sizes greater than 16 inches, use restrained mechanical joint system. Provide follower gland using breakaway torque bolts to engage thrust restraint.
      - a) Minimum pressure rating same as connecting pipe. For fittings between dissimilar pipes, the minimum pressure rating is the lesser of the two pipes.
      - b) Suitable for buried service.
      - c) Joint restraint system to be field installable, field removable, and re-installable.

- 3) Use of alternate restraint systems must be approved by the Engineer. Restraint systems must be designed for the pipe material on which they are used. d. Manufacturers:
  - a) EBAA Iron, Inc. Eastland, TX. "Megalug".
  - b) Star Pipe Products, Inc. Houston, TX. "StarGrip".
  - c) Romac Industries, Inc. Bothel, WA. "Grip Ring".
- b. **Lined:** Cement-mortar lined according to AWWA C104 with asphalt coating.
- c. **Wall Thickness:** Comply with AWWA C153.
- d. **Gaskets:** Per ANSI/AWWA A21.11 / C111, match pipe joint gaskets.
- e. **Long Body Sleeves:** Required.

**2. Flange Adapter.**

- a. **Body:** Ductile iron complying with ASTM A 536.
- b. **End Rings (Follower Rings):** Ductile iron complying with ASTM A 536.
- c. **Gaskets:** New rubber compounded for water service and resistant to permanent set. Material shall be the same as pipe joint gaskets.
- d. **Bolts and Nuts:** High strength, low alloy corrosion resistant steel or carbon steel bolts complying with ASTM A 307.
- e. **Model.**
  - 1) Dresser Manufacturing Division, Bradford, PA. Style 127.
  - 2) Smith-Blair, Texarkana, AK. Style 912.
  - 3) Substitutions require engineering approval.

**3. Pipe Coupling.**

- a. **Center Sleeve (Center Ring):** Steel pipe or tubing complying with ASTM A 53 or ASTM A 512, or formed carbon steel with a minimum yield of 30,000 psi.
- b. **End Ring (Follower Ring):** Ductile iron complying with ASTM A 536, or steel meeting or exceeding the requirements of ASTM A 576, grade 1010-1020.
- c. **Gaskets:** New rubber compounded for water service and resistant to permanent set. Material shall be same as pipe joint gaskets.
- d. **Bolts and Nuts:** High strength, low alloy corrosion resistant steel or 304 or 316 stainless steel.
- e. Use ductile iron couplings for pipe sizes up to and including 12 inch.
- f. Use carbon steel couplings for pipe sizes greater than 12 inches.
- g. Minimum laying length 14 inches; Minimum yield strength 30,000 psi.
- h. Bodies of couplings are to be Epoxy Coated inside and out, per AWWA C231.

**D. Concrete Thrust Block.**

1. Use Iowa DOT Class C Concrete (minimum compressive strength 3000 psi).
2. Comply with the contract documents for dimensions and installation of thrust blocks. Comply with Standard Road Plan WM-101.
3. Use for all pipe sizes 16 inches in diameter and smaller or when specified. For pipe sizes greater than 16 inches in diameter use approved restraining glands or manufacturers standard restraint system.

**E. Pipeline Accessories.**

**1. Polyethylene Wrap.**

- a. Comply with AWWA C105.
- b. Provide tubes or sheets with 8 mil minimum thickness.

**2. Tracer System: Comply with Figure 157191.102.**

- a. **Tracer Wire.**

- 1) **Open Cut:** Solid Single Copper Conductor.
  - a) **Size:** No. 12 AWG.
  - b) **Insulation Material:** Linear low-density polyethylene (LLDPE) installation suitable for direct burial applications.
  - c) **Insulation Thickness:** 0.045 inches, minimum.
  - d) **Tensile Strength:** 150 pounds, minimum.
  - e) **Operating Voltage:** Rated for 30 volts.
- 2) **Directional Drilling/Boring or Open Cut:** Bimetallic Copper Clad Steel Conductor:
  - a) **Size:** No. 12 AWG.
  - b) **Rating:** Direct burial.
  - c) **Operating Voltage:** Rated for 30 volts.
  - d) **Conductivity:** 21%.
  - e) **Copper Cladding:** 3% of conductor diameter, minimum.
  - f) **Insulation Material:** High density, high molecular weight polyethylene.
  - g) **Insulation Thickness:** 0.045 inches, minimum.
  - h) **Tensile Strength:** 1100 pounds, minimum.
- b. **Ground Rod:** 3/8 inch diameter, 60 inch steel rod uniformly coated with metallically bonded electrolytic copper.
- c. **Ground-rod Clamp:** High-strength, corrosion-resistant copper alloy.
- d. **Splice Kit:** Inline resin splice kit with split bolt (1 kV and 5 kV) for use with single conductor and unshielded cable splices in direct bury and submersible applications.
- e. **Tracer Wire Attachment Strap:** Install stainless steel hydrant strap.
- f. **Receptacle Post:** 1 pound per foot channel post 4 feet long. Grimco, Inc. UP-1 or equal.
- g. **Terminations:** Scotchcast Terminating Kit or equal.
3. **Pipe Insulation:** Install where shown or as directed by the Engineer. Rigid foam board, minimum 4 inches in thickness.
4. **Restraining Rods:** Steel. Minimum yield strength of 36,000 psi.

**F. Special Gaskets.**

1. For soils contaminated with gasoline, use neoprene or nitrile gaskets.
2. For soils contaminated with volatile organic compounds, use nitrile or fluorocarbon gaskets.
3. For other soil contaminants, contact the Engineer for the required gasket.

**G. Water Service Pipe and Appurtenances.**

1. **Controlling Standards.**  
Municipal Code "CHAPTER 12, WATER SERVICE", plus local plumbing and fire codes.
2. **Materials.**
  - a. **Copper Pipe.**
    - 1) Comply with ASTM B 88.
    - 2) Wall Thickness: Type K.
  - b. **DIP:** As specified in Article 157191.02, A of this specification. Polyethylene wrap and tracer wire are required.
  - c. **PVC:** As specified in Article 157191.02, A of this specification. Polyethylene wrap is required around all fittings. Tracer wire is required.
3. **Corporation Stops, Curb Stops and Curb Stop Boxes.**
  - a. **Corporation Stop.**
    - 1) 1 inch minimum ball valve with 300 psi rating.

- 2) Stop inlet with AWWA threads.
  - 3) Manufacturer and Model:
    - a) Mueller B-25000.
    - b) AY McDonald 74701B.
    - c) Ford FB600.
  - b. Electrically Isolating Corporation Stops.**
    - 1) 1 inch minimum ball valve with molded EPDM seat.
    - 2) Stop inlet with AWWA threads.
    - 3) Solid one-piece tee-head and stem with EPDM O-ring in stem.
    - 4) Factory-assembled nylon insulator between the body assembly and flared copper/nut service line. Individual or field-installed threaded nylon or plastic components are not acceptable.
    - 5) Metal threaded components. All assembly threads secured with adhesive to prevent unintentional disassembly and to render unit leak resistant to 300 psi working pressure. f. Manufacturer and Model:
      - a) Mueller N35000N.
      - b) AY McDonald 74701B with 74755DB.
  - c. Curb Stop.**
    - 1) 1 inch minimum ball valve with 300 psi rating.
    - 2) Valve size same as service size.
    - 3) Quarter-turn check.
    - 4) Manufacturer and Model:
      - a) Mueller H-15154 or H-25154.
      - b) AY McDonald 76104.
      - c) Ford B22-M.
  - d. Curb Stop Box.**
    - 1) 1 1/2 inch diameter upper half, Minneapolis pattern.
    - 2) Adjustable height from 5 feet to 6 feet.
    - 3) All lids to be equipped with 1-1/2 inch cast iron pentagon plug.
    - 4) Manufacturer and Model:
      - a) Mueller H-10302.
      - b) AY McDonald 5622.
  - e. Lids for Stop Boxes in Sidewalk Pavement.**
    - 1) Meter box cover with inset 8 inch locking lid utilizing bronze pentagon bolt.
    - 2) Cast iron frame, 4 inch deep.
    - 3) Manufacturer and Model:
      - a) Ford Type A1 meter box cover.
      - b) AY McDonald 74M1A.
  - f. Lids for Stop Boxes in Driveway Pavement.**
    - 1) Cast iron valve box extension.
    - 2) 5 1/4 inch locking lid utilizing bronze pentagon bolt.
    - 3) Manufacturer and Model:
      - a) Trumbull 367-5036 (extension), 367-5045 (locking lid).
      - b) Bingham & Taylor Fig. 6016-B 4 inch (extension), Fig. 4904-L (cover).
      - c) SIP Model 6306 (extension), Model 6355 (locking lid).
- 4. Tapping Saddle.**
- a. Body: Brass or ductile iron with fusion bonded epoxy coating.
  - b. Single or double stainless steel strap with four fasteners and nitrile gasket seal.
  - c. Manufacturer and Model:
    - 1) AY McDonald – 3845 series.
    - 2) Smith Blair – 317, 325 or 397 series.
    - 3) Romac 202NS.
    - 4) Mueller – DR2S series.

**A. Pipe Installation.**

**1. General.**

- a. Stake right-of-way in new subdivisions prior to water main construction.
- b. Install only approved materials.
- c. Do not use deformed, defective, gouged, or otherwise damaged pipes, fittings or materials.
- d. Keep trench free of water. Clean pipe interior prior to placement in the trench.
- e. Install pipe with fittings and valves to the lines and grades specified in the contract documents, with a maximum allowable variation of 3 inches.
- f. Clean joint surfaces thoroughly and apply lubricant approved for use with potable water and recommended by the manufacturer.
- g. Push pipe joint to the indication line on the spigot end of the pipe before making any joint deflections.
- h. **Pipe & Joint Deflection.**
  - 1) DIP: Limit joint deflections to one degree less than pipe manufacturer's recommended maximum limit.
  - 2) PVC: Limit joint deflections to 4 inches maximum offset per joint, or less per manufacturer's recommended maximum limit. Excavation equipment shall not be used to obtain offset. No deflection of the pipe is allowed.
- i. Tighten bolts in a joint evenly around the pipe.
- j. Install concrete thrust blocks on all fittings 16 inches in diameter or smaller (comply with Standard Road Plan WM-101. For fittings larger than 16 inches install restraining rods, restrained joints, and when specified in the contract documents install concrete thrust blocks.
- k. Keep exposed pipe ends closed with rodent-proof end gates at all times when pipe installation is not occurring.
- l. Close the ends of the installed pipe with watertight plugs during nights and non-working days.
- m. Do not allow any water from the new pipeline to enter the existing distribution system piping until testing and disinfection are successfully completed.
- n. As much as is practical, do not locate water service lines under proposed driveways or sidewalks.
- o. Install water stops in the trench at locations identified in the plans or contract documents. Construct of excavated clay material compacted to 95% of optimum density (ASTM D698).
- p. Install pipe with minimum cover per size as follows:

10 inch and smaller water main	5' 6" Minimum cover over pipe
12 inch to 20 inch water main	5' 0" Minimum cover over pipe
24 inch to 30 inch water main	4' 6" Minimum cover over pipe
36 inch to 54 inch water main	4' 0" Minimum cover over pipe

**2. Trenched.**

- a. Excavate trench and place pipe bedding and backfill material as specified in Section 2552 of the Standard Specifications.
- b. Provide uniform bearing along the full length of the pipe barrel. Provide bell holes.

**3. Trenchless:** Comply with Section 2553 of the Standard Specifications.

**B. Additional Requirements for DIP Installation.**

1. Utilize full-length gauged pipe for field cuts. Alternatively, field-gauge pipe selected for cutting to verify the outside diameter is within allowable tolerances.
2. Cut the pipe perpendicular to the pipe barrel. Do not damage the cement lining. Bevel cut the ends for push-on joints according to the manufacturer's recommendations.
3. Encase all pipe, valves, and fittings with polyethylene wrap according to Article 157191.03, D of these specifications.

**C. Additional Requirements for PVC Pipe Installation.**

1. Cut the pipe perpendicular to the pipe barrel. Deburr and bevel cut spigot end of the pipe barrel to match factory bevel. Re-mark the insertion line.
2. When connecting to shallow-depth bells, such as on some cast iron fittings or valves, cut the spigot end square to remove factory bevel. Deburr the end and form a partial bevel on the end.

**D. Polyethylene Encasement Installation.**

1. Apply polyethylene encasement to buried ductile iron pipe and to buried fittings, fire hydrants, appurtenances, and on copper service lines from the main to a distance 4 feet from the main. The polyethylene encasement is used to prevent contact between the pipe and the bedding material, but need not be airtight or watertight. Repair all cuts and tears.
2. Install polyethylene encasement according to AWWA C105, using tubes or flat sheets, and pipe manufacturer's recommendations.
3. Do not expose the polyethylene encasement to sunlight for long periods before installation.
4. Remove all lumps of clay, mud, cinders, etc. on the pipe surface before encasing the pipe. Take care to prevent soil or bedding material from becoming trapped between the pipe and polyethylene.
5. Lift polyethylene-encased pipe with a fabric-type sling or padded cable.
6. Secure and repair encasement material using polyethylene tape, or replace as necessary.
7. In cases where the water main is to be installed using a "push" or Horizontal Directional Drilling (HDD) technique, install polyethylene wrap in two layers with each layer being separately secured and taped. As an alternative to double layer polyethylene wrap, the Contractor may choose to utilize a single layer of Sigma Corporation "Valeron" 4 mil cross laminate high density polyethylene wrap.

**E. Tracer System Installation.**

1. Install tracer wire on all publicly and privately owned water mains and fire service lines irrespective of water main material. Comply with Figure 157191.102 for tracer wire installation.
2. Install tracer wire continuously along top center of pipe. Do not install wire along bottom of pipe. Attach wire to pipe at midpoint of each pipe length; use 2 inch wide, 10 mil thickness polyethylene pressure-sensitive tape.



3. Bring double run of wire to surface at each mainline and hydrant valve location; strip ends and connect together with split bolt. Holes in valve boxes for tracer wire are to be drilled and not sawn.
4. Terminate exposed tracer wire at hydrants. Secure to traffic flange with stainless steel straps and hardware. Install the tracer wire and stainless steel straps on property side of hydrant (away from street).
5. Install ground rods adjacent to connections to existing piping and at locations specified in the contract documents or as directed by the Engineer.
6. Bring two wires to the surface at each fire hydrant location and terminate with a tracer wire station (comply with Figure 157191.102).
7. Final inspection of the tracer system will be conducted at the completion of the project and prior to acceptance by the Engineer. Verify the electrical continuity of the system. Repair discontinuities.

#### F. Conflicts.

##### 1. Horizontal Separation of Gravity Sewers from Water Mains.

- a. Separate gravity sewer mains from water mains by a horizontal distance of at least 10 feet unless:
  - The top of a sewer main is at least 18 inches below the bottom of the water main, and,
  - The sewer is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the water main.
- b. When it is impossible to obtain the required horizontal clearance of 3 feet and a vertical clearance of 18 inches between sewers and water mains, the sewers must be constructed of materials meeting the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications. However, provide a linear separation of at least 2 feet.

##### 2. Separation of Sewer Force Mains from Water Mains.

- Separate sewer force mains and water mains by a horizontal distance of at least 10 feet unless:
- a. The force main is constructed of materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications, and,
  - b. The sewer force main is laid at least 4 linear feet from the water main.

##### 3. Separation of Sewer and Water Main Crossovers.

- a. Vertical separation of sanitary and storm sewers crossing under any water main should be at least 18 inches when measured from the top of the sewer to the bottom of the water main. If physical conditions prohibit the separation, the sewer main may be placed not closer than 6 inches below a water main or 6 inches above a water main. Maintain the maximum feasible separation distance in all cases. The sewer and water main pipes must be adequately supported and have watertight joints. Use a low permeability soil for backfill material within 10 feet of the point of crossing.
- b. Where the sanitary sewer crosses over or less than 18 inches below a water main, locate one full length of sewer pipe constructed of materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.
- c. Where the storm sewer crosses over or less than 18 inch below a water main, locate one full length of sewer pipe constructed of reinforced concrete pipe with gaskets rated for 13 psi (O-ring or profile gaskets) meeting ASTM C443 or materials meeting a minimum

pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.

**4. Separation of Storm Sewer and Water Main Crossovers.**

- a. Water main above storm sewer with 6 to 18 inches of separation, or water main below storm sewer with 18+ inches of separation. Construct water main of ductile iron pipe with nitrile gaskets, or construct storm sewer of reinforced concrete pipe with gaskets rated for 13 psi (O-ring or profile gaskets) meeting ASTM C443 or materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.
- b. Water main below storm sewer with 6 to 18 inches of separation. Construct water main of ductile iron pipe with nitrile gaskets, and construct storm sewer of reinforced concrete pipe with gaskets rated for 13 psi (O-ring or profile gaskets) meeting ASTM C443 or materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.

**5. Separation of Sanitary Sewer and Water Main Crossovers.**

- a. Water main above sanitary sewer with 6 to 18 inches of separation, or water main below sanitary sewer with 18+ inches of separation. Place water main centrally in casing pipe with end seals and supported with casing spacers or construct sanitary sewer of materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.
- b. Water main below sanitary sewer with 6 to 18 inches of separation. Place water main centrally in casing pipe with end seals and supported with casing spacers, and construct sanitary sewer of materials meeting a minimum pressure rating of 150 psi and the requirements of Article 157191.02, A of this specification or Article 2504.03, K of the Standard Specifications.

**6. Surface Water Crossings.**

Comply with the Recommended Standards for Water Works, 2007 Edition.

- a. Above-water Crossings: Ensure the pipe is adequately supported and anchored; protected from vandalism, damage, and freezing; and accessible for repair or replacement.
- b. Underwater Crossings: Provide a minimum cover of 5 feet over the pipe unless otherwise specified in the contract documents. When crossing water courses that are greater than 15 feet in width, provide the following:
  - 1) pipe with flexible, restrained, or welded watertight joints,
  - 2) valves at both ends of water crossings so the section can be isolated for testing or repair; ensure the valves are easily accessible and not subject to flooding, and
  - 3) permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source.

**G. Transitions in Piping Systems.**

Where the specified material of a piping system entering or exiting a structure changes, make the change at the outside of the structure wall, beyond any wall pipe or wall fitting required, unless otherwise specified.

**H. Structure Penetrations.**

**1. Wall Pipes.**

- a. Install where pipes penetrate and terminate at a wall or floor surface of a concrete structure, or where the pipe protrudes through the concrete wall or floor and the protrusion is otherwise unsupported.
- b. Provide a waterstop flange near the center of the embedment length. The waterstop is to be cast integrally with the wall pipe, or fully welded to it around the pipe circumference.

**2. Wall Sleeves.**

- a. Install where a pipe passes through a structure wall.
- b. Sleeves in concrete walls are to be supplied with a waterstop collar, fully welded, and cast-in-place in the concrete.

**I. Water Service Stub.**

1. Coordination – See Article 157191.01, F, 3 of this specification. Municipal Code “CHAPTER 12, WATER SERVICE” applies to water services.
2. Provide service tap and connection for each lot or property or as otherwise shown on the plans.
3. Prepare the site and make preparatory excavation at the location for the tap. Make taps at ten o'clock or two o'clock position unless corporation would have less than five feet of cover. When five feet of cover is not available, tap may be rotated downward no farther than the midpoint of the pipe.
4. Taps shall be no closer than 18 inches from the bell and spaced no closer than 18 inches apart. Tapping saddle is required for all taps.
5. Wrap copper service lines with polyethylene to a point 4 feet from tap. Close the tap site excavation in accordance with Section 2552 of the Standard Specifications.
6. Copper service lines are to be continuous between the corporation stop and curb stop. If a joint is required, connect using a silver soldering method.

**J. Testing and Disinfection.**

Test and disinfect according to Special Provision for Water Main Testing and Disinfection.

**K. Water Main Abandonment.**

1. Water mains to be abandoned in place must use mechanical devices specifically devised for such purposes to seal the ends of the pipe.
2. Mechanical joint plugs or mechanical joint caps with watertight gaskets must be installed at the termination points of the abandoned water main.
3. Specially fabricated, watertight gaskets are required, as directed by the Engineer, where water main exists in contaminated soil areas.
4. Oversized mechanical joint caps or plugs may be required depending upon the outside diameter of the existing water pipe.
5. The Engineer may require the existing water main to be removed from the ground in lieu of abandonment “in place”. Unless such removal is called for on the drawings or in the contract documents, a change order to the contract price will be negotiated.

**L. Water Service Line Abandonment.**

1. Municipal Code “CHAPTER 12, WATER SERVICE” applies to water services.
2. Disconnect water service at the main. The location of mains, where known, will be provided by the City. The Contractor may be required to schedule excavations in certain streets in accordance with the requirements of the City. Methods of work on mains and services will be subject to prior approval and inspection by the Engineer.

3. Those water services controlled by a corporation stop on the main shall be disconnected at the main by closing the corporation stop and disconnecting the service line. Install a cap or corporation nut on the corporation stop. Upon completion of a water service disconnect, and inspection of the same, backfill the excavation in accordance with Section 2552 of the Standard Specifications.
4. Curb stops and risers must be completely removed from all abandoned service lines. The remaining service line, running toward the property, must be terminated in the following fashion:
  - a. Copper: Install a copper cap using a silver soldering method.
  - b. Lead: Flatten a minimum of 8 inches of lead pipe end, fold a minimum of 2 inches of flattened end back 180 degrees, then re-flatten forming a folded seal on the tail of the lead service line material.
5. All service lines larger than 2 inch, or manufactured from materials other than copper or lead, must be terminated at a point closest to the water main. Remove tapping valves from their associated tapping sleeves. Install a blind flange on the tapping sleeve, where possible, after the tapping valve is removed.
6. If a blind flange cannot be installed, then one of the following methods of abandonment must be used at the direction of the Engineer:
  - a. Cut the tapping sleeve out of the water main and insert a new spigot piece of water pipe in its place.
  - b. Install a cast iron split repair sleeve on the water main to seal the tapped opening in the pipe.
  - c. Install a full body cast iron tapping sleeve with blind flange on the water main to seal the tapped opening in the pipe.
  - d. Unless one of these approaches is called for on the drawings or in the contract documents, a change order to the contract price will be negotiated.
7. Service lines that are terminated at a tee must be sealed by installing a mechanical plug, cap, or flange at the outlet of the tee. If this method of abandonment is not possible, at the direction of the Engineer, the tee must be cut out of the water main and a new spigot piece of pipe be inserted in its place. Unless this approach is called for on the drawings or in the contract documents, a change order to the contract price will be negotiated.

**157191.04 METHOD OF MEASUREMENT.**

**A. Water Main.**

**1. Trenched.**

Each type and size of pipe installed in an open trench will be measured in linear feet along the centerline of the pipe, including the length through the fittings.

**2. Removal.**

Each type and size of pipe removed will be measured in linear feet from end to end along the centerline of the pipe.

**B. Fittings.**

Each type and size of fitting installed as specified in the contract documents or as required for proper installation of the water main will be counted. Determine the total weight of fittings counted, in pounds, based on the standard fitting weights published in AWWA C153 for Ductile Iron Compact Fittings.

**C. Water Service Stubs by Each.**

Each type and size of water service stub from the water main to the stop box will be counted.

**157191.05 BASIS OF PAYMENT.**

**A. Water Main.**

**1. Trenched.**

Payment will be made at the unit price per linear foot for each type and size of pipe. Unit price includes, but is not limited to, trench excavation, dewatering, furnishing and installing pipe, furnishing, placing, and compacting bedding and backfill material, tracer system, and polyethylene wrap for ductile iron pipe and fittings.

**2. Removal.**

Payment will be made at the unit price per linear foot for each type and size of pipe. Unit price includes, but is not limited to, removal, disposal, capping of pipe, furnishing, placing, and compacting bedding and backfill material.

**B. Fittings.**

Payment will be made at the unit price per pound for the total weight of all fittings counted. Unit price includes, but is not limited to, restrained joints, and thrust blocks.

**C. Water Service Stubs by Each.**

Payment will be made at the unit price for each type and size of water service stub. Unit price includes, but is not limited to, tapping saddle, corporation stop, service pipe, curb stop, stop box, connection to customer side service pipe, abandonment of existing service pipe, trench excavation, dewatering, tracer system, polyethylene wrap, furnishing, placing, and compacting bedding and backfill material.