SPECIAL PROVISIONS
FOR
WATER MAIN AND APPURTENANCES

Johnson County
HDP-3715(652)--71-52

Effective Date
April 19, 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.

PART 1 GENERAL

1.01 SUMMARY

A. Furnish, install and test water distribution system and water services as indicated and specified.

B. Water Division maintains salvage rights to all fire hydrants designated as public. Samples of water main and its appurtenances may also be retained by the Water Division for testing or documentation purposes.

C. Reuse of materials is not allowed without prior permission. Reuse of materials previously attached to another system shall not be allowed.

D. All piping shall be isolated from the existing water system until it has passed all testing procedures and is approved for service.

E. In the event that field conditions prevent the isolation of the new piping from the existing water system, any existing main and valving, and any appurtenances that will be tested against, shall be well flushed and pass the pressure test per part 4.7 of this section before any new system installation is permitted. Any costs associated with testing the existing water main prior to connecting the new pipe will not be paid for separately, but shall be considered incidental to the water main disinfection and pressure testing for the new water main.

F. The approval of reusing any private service main, piping, valves, or appurtenances by the Water Division does not infer any guarantee that it will perform as required. The Water Division accepts no fault for any issues arising from, or possibly related to, the approved reuse of any material on a private service.

1.02 REFERENCES

A. Related Specification Sections:
   1. Special Provisions for Pre-Insulated Water Main and Appurtenances.
   2. Special Provisions for Cathodic Protection System.

B. This specification references the following documents. In their latest edition, the referenced documents form a part of this specification to the extent specified herein. In case of conflict, the requirements of this specification shall prevail.

C. American National Standards Institute and American Water Works Combined Standards:
   1. ANSI/AWWA C104/A21.4: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
   2. ANSI/AWWA C105/A21.5: Polyethylene Encasement for Ductile-Iron Pipe Systems
   3. ANSI/AWWA C110/A21.10: Ductile-Iron and Gray-Iron Fittings
   4. ANSI/AWWA C111/A21.11: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
   5. ANSI/AWWA C150/A21.50: Thickness Design of Ductile-Iron Pipe
   6. ANSI/AWWA C151/A21.51: Ductile-Iron Pipe, Centrifugally Cast
   7. ANSI/AWWA C153/A21.53: Ductile-Iron Compact Fittings
   8. ANSI/AWWA C502: Dry-Barrel Fire Hydrants
   9. ANSI/AWWA C504: Rubber-Seated Butterfly Valves, 3 In. through 72 In.
   10. AWWA C509: Resilient-Seated Gate Valves for Water Supply Service
   11. ANSI/AWWA C510: Double Check Valve Backflow Prevention Assembly
   12. ANSI/AWWA C511: Reduced-Pressure Principle Backflow Prevention Assembly
   13. ANSI/AWWA C550: Protective Interior Coatings for Valves and Hydrants
   14. ANSI/AWWA C600: Installation of Ductile Iron Water Mains and Their Appurtenances
   15. ANSI/AWWA C651: Disinfecting Water Mains
   16. ANSI/AWWA C800: Underground Service Line Valves and Fittings
   17. ANSI/AWWA C900: Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 12 In, for Water Transmission and Distribution

D. American Water Works Association:
   1. AWWA Manual M23: PVC Pipe-Design and Installation
   2. AWWA Manual M17: Installation, Field Testing, and Maintenance of Fire Hydrants

E. American Society for Testing Materials:
   1. ASTM A48: Gray Iron Castings
   2. ASTM B62: Composition Bronze or Ounce Metal Castings
   3. ASTM B75: Seamless Copper Tubing
   4. ASTM B88: Seamless Copper Water Tube
   5. ASTM B584: Copper Alloy Sand Castings for General Applications
   6. ASTM D2241: Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

F. Manufacturers Standardization Society:
   1. MSS-SP-58 Pipe Hangers and Supports, Materials Design and Manufacture
   2. MSS-SP-69 Pipe Hangers and Supports Selection and Application

G. Uni-Bell PVC Pipe Association:
   1. UNI-B-3-88 Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (nominal diameters 4-36") complying with AWWA Standard C-900

H. Occupational Safety and Health Administration (OSHA):
   1. Standard 1926, Subpart P-Excavations

1.03 SUBMITTALS

A. Submit to the Engineer the following drawings or details for approval prior to installation. One copy of each with the approval stamp shall be kept at the work site at all times.

B. Plans for initial operations and final operations: Special prepared drawings and typed list of sequences of steps are needed prior to any operation of water distribution system. Submit 2 weeks prior to date of planned operation.

C. Plans for all temporary water connections. Submit 2 weeks prior to planned installation of temporary connection.

D. Detailed plans for construction staging of water distribution system. Submit 2 weeks prior to beginning each construction stage.

E. Shop, Working Drawings, or Construction Plans showing:
   1. Pipe layout with valves, fittings and hydrants shown
   2. Valves
   3. Hydrants
   4. Fittings
   5. Bolts
   6. Joints
   7. Tapping sleeves, couplings, and special piping materials
   8. Polyethylene
   9. Thrust block designs and details
   10. Special backfill

F. Certificates: Sworn certificates of shop tests showing compliance with appropriate standard for all piping materials.

G. Certificates showing compliance with Buy America requirements for all products containing or composed of iron or steel.

1.04 QUALITY ASSURANCE

A. Products containing or composed of steel or iron shall be Buy America compliant.

B. Products used for this work shall be those as listed herein. Any special exception requests shall be submitted to the Contracting Authority in a timely manner for review.

C. Engineer reserves the right to inspect and test by independent service at manufacturer's plant or elsewhere at Engineer's expense.

D. Contractor shall conduct visual inspection before installation.

1.05 RECEIVING, STORAGE AND HANDLING

A. The City may mark materials which are found on the job site and which are determined to be defective or not approved. The marking may be done with spray paint. The Contractor shall promptly remove defective or unapproved materials from the site.

B. While unloading all piping materials:
   1. Do not allow the pipe units to strike anything.
   2. Do not handle pipe units with individual chains or single cables, even if padded.
   3. Do not attach cables to pipe unit frames or banding for lifting.

C. Within the "Storage" language of AWWA M23, change "should" to "shall."

D. Within the "Handling" language of AWWA M23, change "should" to "shall."

E. Follow AWWA C600 for proper storage, handling, and installation of DIP.

1.06 TIME

A. All work which requires shutdown of active water mains must be completed as quickly as

possible to minimize inconvenience to the consumers and risk to the community.

B. Amount of advance notice required to the Iowa City Water Division when materials or services are supplied by the Division are listed below. Serve notice to the Water Division at 319-356-5160.
   1. For tapping service, provide 24 hours' notice.
   2. For notice to customers of disruption of water service, provide 48 hours' notice. This work will be completed with the assistance of Water Division personnel.
   3. For review, comments, and approval of plans of operation, provide 3 days' notice.
   4. For locations of underground facilities, provide notice as required by Iowa One-Call system.

1.07 LICENSES AND APPLICATIONS

A. City of Iowa City:
   1. Contractor's superintendent on the job must have a license as a sewer and water service installer issued by the City to construct water and sewer mains and services in Iowa City.
   2. The Contractor or their agent will be responsible for submitting tapping application forms and record drawings.

PART 2 PRODUCTS

2.01 PIPE

A. Polyvinyl Chloride (PVC) Pipe: Comply with AWWA C900 or AWWA C905 with gray iron pipe equivalent outside diameters.
   1. Minimum Wall Thickness:
      a. 4 inch through 24 inch sizes: DR 18.
      b. Sizes over 24 inches: As specified in the contract documents.
   2. Joint Type: Use restrained push-on joint type, except as otherwise specified in the contract documents or as authorized by the Engineer.
      a. Push-on: According to AWWA C900 or AWWA C905.
      b. Integral Restrained Joint: AWWA C900 or AWWA C905 pipe with restraining system manufactured integrally into pipe end.
   3. Markings on Pipe:
      a. Name of manufacturer.
      b. Size and class.
      c. Spigot insertion depth gauge.
      d. National Sanitation Foundation (NSF) seal.

B. Ductile Iron Pipe (DIP):
   1. Manufacture shall conform to AWWA C151.
   2. Minimum Thickness Class:
      a. 4 inch through 24 inch sizes: Pipe shall be special thickness Class 53.
      b. Sizes over 24 inches: As specified in the contract documents.
      c. Thickness design shall conform to AWWA C150.
   3. Cement-mortar Lined: According to AWWA C104 with asphalt seal coat.
   4. External Coating: Asphalt according to AWWA C151.
   5. Joint Type: Use restrained push-on type joints for new piping, unless otherwise specified in the contract documents or as authorized by the Engineer. Use flange type joints where connecting new ductile iron pipe to existing ductile or cast iron pipe.
      a. Push-on: According to AWWA C111.
      b. Restrained, Buried: Pipe manufacturer's standard field removable system.
      c. Restrained, in Structures: Restraining gland or flanged or.
      d. Flanged: According to AWWA C111.
      e. Gaskets: According to AWWA C111.
   6. Markings on Pipe:
      a. Name of manufacturer.

b. Size and class.
c. Spigot insertion depth gauge.

7. Manufacturer: American, Clow, Griffin, McWane, US Pipe, or equal

C. Casing Pipe:
1. Pipe.

a. Use only new, steel pipe meeting the requirements of ASTM A139/A139M, Grade B; ASTM A252, Grade 2; or ASTM A53/A53M, Grade B. Pipe may be welded or seamless.
b. Casing pipe 18 inch or less in diameter shall have a wall thickness of 0.250 inch. Casing pipe 20 or 24 inch in diameter shall have a wall thickness of 0.312 inch in diameter. Casing pipe 30 inch in diameter shall have a wall thickness of 0.375 inch.

2. Joints.
a. Comply with American Welding Society Code D1.1M/D1.1. Weld joints with full penetrating weld. Welders shall be qualified according to Materials I.M. 560. Welds shall comply with Materials I.M. 558.
b. Upon approval of the Engineer, interlocking casing pipe connection system may be used instead of field welding sections of casing pipe.

3. Pipe Diameter. Minimum inside diameter as specified in the contract documents. If diameter is not specified, use a minimum inside casing diameter of at least 4 inches greater than the largest outside diameter of the carrier pipe, including pipe bells.
4. Spacers and End Seals. See Special Provisions for Cathodic Protection.

2.02 BOLTS FOR WATER MAIN AND FITTINGS

A. Use stainless steel bolts and nuts.

2.03 FITTINGS

A. For DIP and PVC Pipe: Comply with AWWA C110 (ductile iron or gray iron) or AWWA C153 (ductile iron).
1. Joint Type:
a. For pipe sizes 16 inches and less, use restrained push-on joint complying with AWWA C111.
1) Minimum pressure rating same as connecting pipe.
2) Suitable for buried service.
3) Joint restraint system to be field installable, field removable, and re-installable.
b. Use flanged outlet tees where connecting new ductile iron pipe to new PVC pipe.
c. Use of alternate restraint systems must be approved by the Engineer.

2. Lined: Cement mortar lined according to AWWA C104 with asphalt coating.
3. Wall Thickness: Comply with AWWA C153.
4. Gaskets: Comply with AWWA C111.
5. Manufacturer: Clow, Romac, Sigma, Tyler/Union, U.S. Pipe, or equal.

B. Flange Adapter:
1. Use where connecting PVC pipe to ductile iron fittings or valves and where connecting new ductile iron pipe to existing cast or ductile iron pipe.
2. Body: Ductile iron complying with ASTM A536.
3. End Rings (Follower Rings): Ductile iron complying with ASTM A536.
4. Gaskets: New rubber compounded for water service and resistant to permanent set.
5. Bolts and Nuts: High strength, low alloy corrosion resistant steel or carbon steel bolts complying with ASTM A307.
6. Manufacturer: Clow, Romac, Sigma, Tyler/Union, U.S. Pipe, or equal.

C. Pipe Coupling:
1. Use where connecting new PVC pipe to existing PVC pipe.

2. Center Sleeve (Center Ring): Steel pipe or tubing complying with ASTM A53 or ASTM A512, or formed carbon steel with a minimum yield of 30,000 psi.
3. End Ring (Follower Ring): Ductile iron complying with ASTM A536, or steel meeting or exceeding the requirements of ASTM A576, grade 1010 - 1020.
4. Gaskets: New rubber compounded for water service and resistant top permanent set.
5. Bolts and Nuts: Stainless steel.
6. Manufacturer:
   a. Standard solid black sleeve: Griffin, Tyler/Union 5-1442, or equal.
   b. Bolted straight coupling: Romac Style 501, Romac Alpha Wide Range Restrained Coupling, Romac Macro HP Two-Bolt Coupling, Smith-Blair 441, or equal.

2.04 CONCRETE THRUST BLOCKS

A. Use where shown on drawings.

B. Use Class C concrete.

C. Comply with the contract documents for dimensions and installation of thrust blocks. Comply with Standard Road Plan WM-101.

2.05 PIPELINE ACCESSORIES

A. Polyethylene Wrap:
   1. Comply with AWWAC105.
   2. Provide tubes or sheets with 8 mil minimum thickness.

B. Tracer System: Comply with drawings.
   1. Tracer Wire:
      a. Solid Single Copper Conductor:
         1) Size: No.12 AWG
         2) Insulation Material: Linear low-density polyethylene (LLDPE) installation suitable for direct burial applications.
         3) Insulation Thickness: 0.045 inch, minimum.
      b. Bimetallic Copper Clad Steel Conductor:
         1) Size: No.12 AWG.
         2) Rating: Direct burial.
         3) Operating Voltage: 30 volts.
         4) Conductivity: 21%.
         5) Copper Cladding: 3% of conductor diameter, minimum.
         6) Insulation Material: High density polyethylene.
         7) Insulation Thickness: 0.030 inch, minimum.
      c. Color: Blue.
      d. Manufacturer: Copperhead, Kris Tech, or equal.
   2. Ground Rod: 3/8 inch diameter minimum, 60 inch steel rod uniformly coated with metallically bonded electrolytic copper.
   3. Ground-rod Clamp: High-strength, corrosion-resistant copper alloy.
   4. Splice Kit:
      a. Color: Blue.
      b. Manufacturer: Copperhead Industries Snake Bite Corrosion Proof Wire Connector LSC1230B, Twister DB Plus Wire Connector, or equal.
   5. Tracer Wire Station: See drawings.
   6. Tracer Wire Terminal Box:
      a. Manufacturer: DWS (Valco) 95E, or equal.

2.06 SPECIAL GASKETS

A. For soils contaminated with gasoline, use nitrile gaskets.

B. For other soil contaminants, contact the Engineer for the required gasket.

2.07 SMALL WATER SERVICE PIPE AND APPURTENANCES

A. Copper Tubing: No couplings or connections are permitted under paving.
   1. Comply with ASTM B75 and ASTM B88.
   2. Wall Thickness: Type K.
   3. Packaging: Shall be in coils for sizes ¾ inch through 11/2 inches, and in coils or straight pipe for size 2 inches.

B. Service Saddles:
   1. Comply with ANSI/AWWA C800 and ASTM B62.
   2. Pressure Rating: Equal, but not to exceed, 200 PSIG.
   3. Body Composition: 85-5-5-5 cast brass.
   4. Strap: Wide band, Type 304L stainless steel with 304L stainless steel studs.
   5. Nuts and Washers: Type 304 stainless steel, nuts supplied with fluorocarbon coating.
   6. Threading: AWWA tap thread (CC thread).
   7. Gaskets: Nitrile gaskets within leaking underground storage tank (LUST) areas.
   8. Manufacturer: AY McDonald 3845, Ford 202BS, Smith Blair 325, or equal.

C. Corporation Valves:
   1. Comply with ANSI/AWWA C800 and ASTM B62.
   2. Pressure Rating: 300 PSIG maximum working pressure.
   3. Body: "No lead brass" alloy, meeting ASTM B584.
   4. Connections: Inlet shall be AWWA taper thread, outlet shall be conductive compression connection for CTS OD tubing.
   5. Valve: Compression ball type.
   6. See drawings for special cathodic protection requirements.
   7. Manufacturer: AY McDonald 74701BQ, Mueller B-25008N, or equal.

D. Ball Curb Valves:
   1. Comply with ANSI/AWWA C800 and ASTM B62.
   2. Pressure Rating: 300 PSIG maximum working pressure.
   3. Body: "No lead brass" alloy, meeting ASTM B584.
   4. Connections: Inlet and outlet shall be compression connection for CTS OD tubing.
   5. Valve: Shall have a quarter turn check with fluorocarbon coated ball and stainless steel reinforced seat, and end pieces shall have O-ring sealed with double O-ring seals.
   6. Manufacturer: AY McDonald 76100Q, Mueller B25209N, or equal.

E. Curb Box:
   1. Comply with ANSI/AWWA C800.
   2. Style: Arch pattern, slide style.
   3. Length: 5-foot box, 1-foot telescope, shall telescope up and down inside the base casting.
   4. Coating: Black dip inside and out.
   5. Rod: 5/8 inch diameter with small key-clamp welded to rod; stainless steel road and cotter pin; 42 inch long.
   6. Manufacturer: AY McDonald 5601 and 5603 with 5660SS, or equal.

F. Curb Box Lids:
   1. All lids:
      a. Brass components shall conform to ASTM B62 and ASTM B584, UNS C83600-85-5- 5-5 (latest revision).
      b. Lids shall be made of cast iron per ASTM A48, Class 25.
      c. Lid shall be coated with black dip.
   2. Regular applications:

a. Shall be tapped 1 inch with brass insert.
b. Shall be two hole Erie pattern with the "W" in a raised letter.
c. Manufacturer: AY McDonald 5601L, or equal.

3. Cement applications:
a. Shall be tapped with 1 inch brass pentagon plug with word "Water" in raised letters.
b. All pentagon brass plugs shall have a 27/32 inch point to flat side.
c. Manufacturer: AY McDonald 5607L, or equal.

G. Straight Three-Part Unions:
1. Comply with ANSI/AWWA C800 and ASTM B62.
2. Body: "No lead brass" alloy, meeting ASTM B584.
3. Connections: Conductive compression connection for CTS OD on both ends.
4. Gripper band shall be stainless steel and overlap itself so no gasket material can get underneath.
5. Conductor spring shall provide metal-to-metal contact between copper tubing and the fitting for electrical conductivity.
6. Entire gasket shall be enclosed.
7. Fluorocarbon coating shall be on inside surface of nut.
8. Union pressure rating shall be greater than the valve or fitting with which it is used.
9. Manufacturer: AY McDonald4758Q, Mueller H15403N, Universal Cambridge Coupler, or equal.

2.08 NON-SHRINK GROUT

A. Comply with Materials I.M. 491.13.

2.09 VALVES

A. Valve Body: Manufacturer's name and pressure rating cast on valve body.

B. Direction of Opening: The opening direction is counterclockwise as viewed from the top.

C. Joints: For use with ductile iron pipe, use restrained push-on joint valves conforming to AWWA C111. For use with PVC pipe, use flanged with dimensions and drillings according to AWWA C110 or ANSI B16.1 class 125.

D. Valve shall have been manufactured within 5 years of installation date.

E. Gate Valves:
1. Use gate valves where pipe diameter is 12 inch or less.
~~1~~ 2. Standards: Comply with AWWA C509 (gray iron or ductile iron) or AWWA C515 (ductile iron) and NSF 61.
~~2~~ 3. Stem Seals: Double O-rings permanently lubricated between seals. Lubricant certified for use in potable water.
~~3~~ 4. External Bolts and Hex Nuts: Stainless steel according to ASTM A240, Type 304.
~~4~~ 5. Manufacturer: Clow F-2640, Kennedy 8571 SS, Mueller A-2362-20, U.S. Pipe USPO-20, or equal.

F. Butterfly Valves:
1. Use butterfly valves where pipe diameter is 16 inch or greater.
2. Standards: Comply with AWWA C504 class 150B or class 250B (gray iron or ductile iron) and NSF 61.
3. Stem: Stainless steel according to ASTM A 240, Type 304, turned, ground, and polished.
4. For Seat on Body Valves
a. Disc: Ductile iron or gray iron with plasma applied nickel-chromium edge or stainless steel edge according to ASTM A 240, Type 316, and mechanically fixed stainless steel pins.

b. Seat: Synthetic rubber compound mechanically retained to the body.

5. For Seat on Disc Valves
   a. Disc: Ductile iron according to ASTM A 536 with synthetic rubber compound seat mechanically retained to the disc.
   b. Seat: Continuous Type 316 stainless steel seat.
6. External Bolts and Hex Nuts: Stainless steel according to ASTM A 240, Type 304.
7. Manufacturer: Clow, DeZurik, GAV 800 Series, Kennedy, M & H, Mueller, Pratt, Val-Matic, or equal.

~~F~~ G.Tapping Valve Assemblies:

1. Tapping Valve: Gate valve complying with AWWA C509.
2. Sleeve:
   a. Minimum 14 gauge.
   b. Stainless steel according to ASTM A240, Type 304.
   c. Minimum working pressure 150 psi.
   d. Must fully surround pipe.
   e. Flanged with dimensions and drillings according to AWWA C110 or ANSI B16.1 class 125.
   f. Manufacturer: Clow F-2640, Kennedy 8950 SS, Mueller T-2362-16, U.S. Pipe A-USPO-16, or equal.

~~G~~ H.Combination Air Valves:

3. Provide combination air valve assembly in vault where shown on Drawings.
4. Manufacturer: Val-matic 201C.2, APCO 143C, Cla-val 361-CAV564.3, or equal.

2.10 FIRE HYDRANT ASSEMBLY

A. Material: Comply with AWWA C502.

B. Manufacturers: American Darling Mark 73-5, American Darling B-84-B-5, Clow F-2545 Medallion with all stainless steel shaft, Mueller Super Centurion, or equal.

C. Fire hydrant assembly shall have been manufactured within 5 years of installation date.

D. Features:
   1. Breakaway Items: Stem coupling and flange.
   2. Inlet Nominal Size: 6 inch diameter.
   3. Inlet Connection Type: Flange joint.
   4. Hose Nozzles: Two, each 2 ½ inches in diameter, with caps attached with chains.
   5. Direction of Opening: Clockwise.
   6. Items to be specified:
      a. Operating nut: 1½ inch, standard pentagon.
      b. Pumper nozzle: one 4½ inch pumper nozzle.
      c. Nozzle threads: National Standard Hose Threads.
      d. Main valve nominal opening size: 4½ inches on main smaller than 12 inches in diameter, 5¼ inches on main 12 inches and larger.

E. Painting:
   1. Shop coating according to AWWA C502.
   2. Color: Safety Red, unless otherwise indicated by the Water Division.

F. External Bolts and Hex Nuts: Stainless steel according to ASTM A193, Grade B8.

G. Gate Valve: Comply with this section.

H. Pipe and Fittings: Comply with this section.

2.11 APPURTENANCES

A. Valve Box:
   1. Applicability: For all buried valves.
   2. Manufacturer: Tyler – Series 6855 & Item 666A, or equal.
   3. Type: Slip (slide) type.
   4. Material: Gray iron.
   5. Cover: Gray iron, labeled "WATER"
   6. Wall Thickness: 3/16 inch, minimum.
   7. Inside Diameter: 5 inch, minimum.
   8. Length: Adequate to bring top to finished grade, including valve box extensions, if necessary.
   9. Factory Finish: Asphalt coating.
   10. Valve Box Centering Ring:
      a. Include in installation.
      b. Manufacturer: Adaptor, Inc Valve Box Adaptor II.

B. Valve Stem Extension: For all buried valves, provide as necessary to raise 2 inch operating nut to within 3 feet of the finished grade. Stem diameter according to valve manufacturer's recommendations, but not less than 1 inch. Shall be stainless steel.

C. Stainless Steel Repair Clamps:
   1. All stainless steel, single section, double section, or triple section, depending upon size of main.
   2. Shall have stainless steel bolts and nuts.
   3. Manufacturer: Ford FS1, Romac SS1, Smith-Blair 261, or equal.

2.12 LUMBER

A. Lumber for bracing or supports shall be hardwood. (i.e. oak, maple). Do not use creosoted lumber in contact with piping materials.

2.13 WATER

A. Reasonable amounts of water will be provided for use in the final operations of water main flushing, disinfecting and testing. Prior notice must be given to the Water Division.

B. Contractor will not be charged for the water used as long as there is reasonable care to control and conserve the rate and volume used. If there is waste or carelessness, Contractor will be charged for water.

2.14 DISINFECTION AGENT - CHLORINE

A. Liquid Chlorine complying with AWWA B300 and AWWA B301.

B. Sodium Hypochlorite complying with AWWA B300.

C. Calcium Hypochlorite complying with AWWA B300.

D. All disinfecting agents to be NSF 60 certified. Supply and store in the original container.

PART 3 EXECUTION

3.01 REFERENCES AND DOCUMENTS

A. Contractor must have all required documents on the site before commencing with the work. Water mains, valves, hydrants, and special fittings shall be installed in the locations shown on

the plans or as directed by the Engineer.

B. Valves, fittings, hydrants and ductile-iron pipe shall be installed in accordance with ANSI/AWWA C600 except as noted herein.

C. PVC pipe must be furnished and installed in accordance with AWWA M23, ANSI/AWWA-C605 and Uni-Bell PVC Pipe Association UNI-B-3-88 except as noted herein.

D. Contractor must prepare and retain a set of "as-built" drawings on the job site with accurate and current information on the location of all valves, pipe and special construction features. Survey or GPS points are accepted, but not in lieu of written as-built information. Minimum information required for submittal to the Water Division:
   1. Pipe size and material; length of pipe between fittings (center-to-center).
   2. Fitting type, size, restraint type, note if installed vertically or horizontally.
   3. Tracer wire box locations.
   4. Any changes in pipe depth, and where the main is buried greater than 7 feet or less than 5 feet.
   5. Any special fittings or construction materials.

E. Contractor shall have all buried utilities located by the Iowa One-Call Utility Location service and shall do exploratory excavation as necessary to determine specific conflicts between existing utilities and new water main.

3.02 PIPE INSTALLATION

A. General:
   1. Do not use deformed, defective, gouged, or otherwise damaged pipes or fittings.
   2. Keep trench free of water. Clean pipe interior prior to placement in the trench.
   3. Clean joint surfaces thoroughly and apply lubricant approved for use with potable water and recommended by the manufacturer.
   4. Push pipe joint to the indication line on the spigot end of the pipe before making any joint deflections.
   5. Limit joint deflections to one degree less than pipe manufacturer's recommended maximum limit.
   6. Tighten bolts in a joint evenly around the pipe.
   7. Install concrete thrust blocks where indicated on drawings.
   8. Keep exposed pipe ends closed with rodent-proof end gates at all times when pipe installation is not occurring.
   9. Close the ends of the installed pipe with watertight plugs during nights and non-working days.
   10. Do not allow any water from the new pipeline to enter the existing distribution system piping until testing and disinfection are successfully completed.

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.
   4. Provide pre-insulated pipe and fittings where indicated on drawings.

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.

3.03 POLYETHYLENE ENCASEMENT INSTALLATION

A. Apply polyethylene encasement to buried ductile iron pipe and to buried fittings, fire hydrants, and appurtenances. The polyethylene encasement is used to prevent contact between the pipe and the bedding material, but need not be airtight or watertight.

B. Install polyethylene encasement according to AWWA C105, using tubes or flat sheets, and pipe manufacturer's recommendations.

C. Do not expose the polyethylene encasement to sunlight for long periods before installation.

D. 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.

E. Lift polyethylene-encased pipe with a fabric-type sling or padded cable.

F. Secure and repair encasement material using polyethylene tape, or replace as necessary.

3.04 TRACER SYSTEM INSTALLATION

A. Install with all buried water main piping. Comply with Figures CIC-5010.100 through 104 for tracer wire installation.

B. Begin and terminate the system at all connections to existing mains.

C. Install wire continuously along the ten or two position of the pipe. Do not install wire along the bottom of the pipe. Attach wire to the pipe at the midpoint of each pipe length; use 2 inch wide, 10 mil thickness polyethylene pressure sensitive tape.

D. Install splices only as authorized by the Engineer. Allow the Engineer to inspect all below grade splices of tracer wire prior to placing the backfill material.

E. Install ground rods adjacent to connections to existing piping and at locations specified in Figures CIC-5010.100 through 103 and Figures CIC-4C.1 and CIC- 4C.2.

F. Bring two wires to the surface at each fire hydrant location and terminate with a tracer wire station (comply with Figure CIC-5010.100 and CIC-5010.101).

G. Final inspection of the tracer system will be conducted by the Water Division at the completion of the project and prior to acceptance by the owner. Verify the electrical continuity of the system. Repair discontinuities.

H. A minimum of 18 inch of wire slack at every tracer wire terminal box lid shall be installed.

I. Every splice along the tracer wire shall have a minimum of 18 inch of wire slack added to the line.

J. No uninsulated wire shall be installed along any length of run or at splice points. All exposed wire shall be mended as directed by Water Division personnel, and all splices shall include dielectric grease.

K. Ground rods should be placed 6 inch to 10 inch from the pipe and not make contact with any part of the water system or any other utility.

3.05 LOCATION, ALIGNMENT, SEPARATION AND GRADE

A. Water main shall be installed with a minimum depth of cover of 5½ feet, except where otherwise indicated on drawings. Generally, the maximum depth shall not exceed 7 feet, except where otherwise indicated on drawings.

B. No water pipe shall pass through or come in contact with any part of a sewer manhole.

C. Should physical conditions exist such that exceptions to this standard are necessary, the design engineer must detail how the sewer and water main are to be engineered to provide protection equal to that required by these sections.

D. Sewers constructed of standard sewer materials shall not be laid within 75 feet of a public well or 50 feet of a private well. Sewers constructed of water main materials may be laid within 75 feet of a public well and within 50 feet of a private well but no closer than 25 feet of either.

E. Horizontal Separation of Gravity Sewers from Water Mains:
   1. Separate gravity sewer mains from water mains by a horizontal distance of at least 10 feet unless:
      a. The top of a sewer main is at least 18 inch below the bottom of the water main, and
      b. 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.
   2. When it is impossible to obtain the required horizontal clearance of 3 feet and a vertical clearance of 18 inch between sewers and water mains, the sewers must be constructed of water main materials meeting the requirements set forth in this section. However, provide a linear separation of at least 2 feet.

F. 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:
   1. The force main is constructed of water main materials meeting a minimum pressure rating of 150 psi and the requirements of Section 2.01 A or B of this special provision and
   2. The sewer force main is laid at least 4 linear feet from the water main.

G. Separation of Sewer and Water Main Crossovers:
   1. Vertical separation of sanitary and storm sewers crossing under any water main should be at least 18 inch when measured from the top of the sewer to the bottom of the water main. If physical conditions prohibit the separation, the sewer may be placed not closer than 6 inch below a water main or 18 inch above a water main. Maintain the maximum feasible separation distance in all cases. The sewer and water 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.
   2. Where the sanitary sewer crosses over or less than 18 inches below a water main, locate one full length of sewer pipe of water main material so both joints are as far as possible from the water main.
   3. Where the storm sewer crosses over or less than 18 inches below a water main, locate one full length of sewer pipe of water main material or reinforced concrete pipe (RCP) with flexible O-ring gasket joints so both joints are as far as possible from the water main.

H. Surface Water Crossings: Comply with the Recommended Standards for Water Works, 2012 Edition.
   1. Above-water Crossings: Ensure the pipe is adequately supported and anchored; protected from vandalism, damage, and freezing; and accessible for repair or replacement.
   2. 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:
      a. pipe with flexible, restrained, or welded watertight joints,
      b. 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
      c. 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.

I. Separation to Other Utilities: Maintain minimum 18 inch clearance around water mains and appurtenances.

3.06 PIPE BEDDING, EXCAVATION, AND BACKFILLING

A. Ductile-iron pipe bedding shall conform to the project plan details or as otherwise specified or directed by the Engineer.

B. PVC pipe bedding shall conform to UNI-B-3-88 laying condition Type 2 including hand excavation for the bell holes. The bedding shall be loose, natural, fine soil which is compacted by hand tamping on the soil along the sides of the pipe to the top of the pipe.

C. Trench width within the pipe envelope shall conform to the plans or as directed by the Engineer.

D. Set valves and hydrants on precast concrete bases.

E. All excavations shall comply with the requirements of OSHA Standard 1926, Subpart P-Excavations.

3.07 PIPE RESTRAINT

A. Thrust Restraint:
1. Where indicated on the drawings: For pipe smaller than 10 inch diameter, concrete block shall be used, placing the concrete block next to the fitting and undisturbed soil. For 10 inch and larger diameter pipe, blocking shall be by cast-in-place concrete. Cover fittings and joints with 8 mil polyethylene before placing concrete. Brace fittings with hardwood to prevent shifting before placing concrete. Do not pour excess concrete on top of pipe and fittings.
2. All pipe and fittings shall have restrained joints. Install restrained joints in accordance with manufacturer's recommendations.

B. Socket Pipe Clamps, Tie Rods, and Bridles: Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, provide suitable socket pipe clamps, tie rods, and bridles. Bridles and tie rod diameter shall be at least 3/4 inch. except where they replace flange bolts of smaller size with nut on each side of flange.

C. Dead Ends:
1. Pipe ends or fittings left for future connections shall be plugged or capped using materials supplied by the pipe manufacturer.
2. All pipe ends or fittings left for future connections shall be blocked against thrust or restrained plugs shall be provided.

3.08 JOINTS AND COUPLINGS

A. Push-on Joints:
1. Inspect bell grooves and clean to assure complete gasket seating.
2. Use extreme care to prevent separation of joints already installed.
3. Do not use push-on joints when boring. Snap-Lok shall be used in casing with locking rubbers.
4. Install push-on restrained joint pipe in accordance with manufacturer's recommendations.

B. Sleeve-Type Coupling:
1. Clean pipe ends for distance of 12 inches.

2. Use soapy water as gasket lubricant.
3. Carefully mark and place the sleeve coupling in the center of the joint.

3.09 VALVES

A. Valve boxes should be centered over valve operating nut and run straight and true (not angled).

B. Valve boxes set in paving shall not be installed with an expansion joint.

C. Install combination air valve in accordance with manufacturer's recommendations.

3.10 FIRE HYDRANT

D. Install according to Figure CIC-5020.201.

E. If the fire hydrant valve is positioned adjacent to the water main, attach it to an anchor tee.

F. If the fire hydrant valve is positioned away from the water main, restrain all joints between the valve and water main.

G. Fire Hydrant Depth Setting:
   1. Use adjacent finished grade to determine setting depth.
   2. Set bottom of breakaway flange between 2 inches and 5 inches above finished grade.
   3. If finished grade is not to be completed during the current project, consult with the Engineer for proper setting depth.

H. Coordinate installation with tracer wire installation.

I. Orient fire hydrant nozzles as directed by the Engineer or Inspector.

3.11 TAPPED CONNECTIONS UNDER PRESSURE

A. Follow manufacturer's installation instructions.

B. Tapping mains for new connections 1 inch to 12 inches in diameter shall be done by the Water Division. This includes connections made on public and private mains.

C. A new and site specific tapping application must be prepared for each tap regardless of size, and submitted to the Water Division. The tapping application must be completed and include location, name, and address of water customer, schematic drawing, and materials of construction.

3.12 WATER MAIN OPERATIONS

A. All work which involves operating the active public water distribution system will require the notice, consent, approval and assistance of the Water Division.

B. An accurate and legible copy of the "as-built" drawings must be on file in the Water Division office prior to using the water supply.

C. If requested by the City, the contractor will work with Water Division personnel to submit a plan for initial operations and a plan for final operations to the Water Division for approval. The plans shall include a drawing and typed list of actions which show all the significant steps necessary to connect to the existing water distribution system or conduct the filling, flushing and testing operations. The purpose of both plans is to minimize the impact of service interruptions and pressure and flow variations on the water distribution system and existing

customers.

3.13 FILLING EXISTING WATER PIPE

A. Water mains and services 4 inch in diameter and larger that are abandoned in place shall be plugged and filled.

B. Prior to plugging and filling the water line, Engineer will verify the water line is not in use and will be abandoned.

C. Construct water line plug by completely filling the end of the pipe with concrete. Force concrete into the end of the pipe for a distance of 12 inches.

D. Fill the line to be abandoned with flowable mortar or CLSM, according to Article 2552.02 G, by gravity flow or pumping.

PART 4 DISINFECTION AND TESTING FOR POTABLE WATER SYSTEMS

4.01 GENERAL

A. Upon completion of a newly installed water main or when repairs to an existing water system are made, the main shall be disinfected according to instructions listed in ANSI/AWWA C651 and the following specifications.

4.02 SCHEDULING AND CONFLICTS

A. Notify the City Inspector or Water Division 2 working days in advance of testing or disinfection operations to coordinate the operations.

B. The Engineer or his/her representative is required to be in attendance during testing or disinfection.

C. Entire testing sequence for a segment shall be completed within an appropriate time frame. If testing sequence for a segment, including tracing, is not satisfactorily completed within 2 weeks from initial disinfection, testing sequence for segment shall start over from initial disinfection. Testing schedules for other segments may be affected.

4.03 SEQUENCE OF TESTING AND DISINFECTION

A. Perform operations according to AWWA C651 in the sequence below. Successfully complete each operation before continuing to the next operation. All mains shall pass two bacteriological tests before pressure testing is allowed. Testing segments shall be no longer than 1200 feet along one main. All legs/lateral mains shall be tested as separate segments. Long main lines over 1200 feet in length shall be tested in discrete testing segments, and adjoining in-line testing segments shall not be tested together in any manner. Water mains must pass all testing before any main or service taps are allowed.

B. Tablet Method (Concurrent with Water Main Installation):
   1. Perform disinfection.
   2. Flush after disinfection.
   3. Perform bacteria tests.
   4. Perform pressure and leak testing.

C. Continuous-Feed or Slug Method (After Water Main Installation): Use this method only if approved by the Engineer. The sequence of testing and disinfection may be modified with approval of the Engineer.
   1. Perform initial flush.

2. Perform disinfection.
3. Flush after disinfection.
4. Perform bacteria tests.
5. Perform pressure and leak testing.

4.04 DISINFECTION

A. General:
   1. Disinfect according to AWWA C651.
   2. Keep piping to be chlorinated isolated from lines in service and from points of use.
   3. Coordinate disinfection and testing with the Engineer.
   4. Obtain and test water samples, unless otherwise provided by the Engineer.

B. Procedure:
   1. Induce a flow of potable water through the pipe.
   2. Introduce highly chlorinated water to the pipe at a point within 5 pipe diameters of the pipe's connection to an existing potable system, or within 5 pipe diameters of a closed end, if there is no connection to an existing system.
   3. Introduce water containing a minimum of 25 mg/L free chlorine until the entire new pipe contains a minimum of 25 mg/L free chlorine.
   4. Retain chlorinated water in the pipe for at least 24 hours and no more than 48 hours.

4.05 FLUSHING

A. Flush pipe using potable water until chlorine residual equals that of the existing potable water system.

B. Dispose of chlorinated water to prevent damage to the environment. Dechlorinate highly chlorinated water from testing before releasing into the ground or sewers. Obtain Jurisdiction approval prior to flushing activities.
   1. Check with the local sewer department for the conditions of disposal to the sanitary sewer.
   2. Chlorine residual of water being disposed will be neutralized by treating with one of the chemicals listed in the following table.

Table 5030.02: Amounts of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 Gallons of Water

Residual Chlorine Concentration mg/L	Sulfur Dioxide (SO2) lb	Sodium Bisulfite (NaHSO3) lb	Sodium Sulfite (Na2SO3) lb	Sodium Thiosulfate (Na2S2O3 + 5H2O) lb	Ascorbic Acid (C6O8H6) lb
1	0.8	1.2	1.4	1.2	2.1
2	1.7	2.5	2.9	2.4	4.2
10	8.3	12.5	14.6	12.0	20.9
50	41.7	62.6	73.0	60.0	104

4.06 BACTERIA SAMPLING

A. Test water mains according to AWWA C651, including collection of two consecutive sets of acceptable bacteria samples 24 hours apart. If the initial disinfection procedure fails to produce satisfactory bacteriological results or if other water quality is affected, repeat the disinfection procedure.

4.07 PRESSURE AND LEAK TESTING

A. Secure unrestrained pipe ends against uncontrolled movement.

B. Isolate new piping from the existing water system.

C. Fill and flush all new piping with potable water. Ensure all trapped air is removed.

D. Pressurize the new pipe to the test pressure at the highest point in the isolated system. Do not pressurize to more than 5 psi over the test pressure at the highest point in the isolated system.

E. Test and monitor the completed piping system at 1.5 times the system working pressure or 150 psi, whichever is greater, for 2 continuous hours.

F. If the measured pressure loss does not exceed 5 psi, the test will be considered acceptable.

G. Repair all visible leaks regardless of test.

H. Addition of makeup water is not allowed.

4.08 SYSTEMS CHECK

A. Valve Operations: All valves shall be located and tested to verify operation. Remove the valve box lid, insert the valve key and open and close each valve. Count the turns and record the results.

B. Hydrant Operations:
1. After the hydrant has been installed and the main and hydrant have been pressure tested, each hydrant shall be flushed and checked for proper operation.
2. After hydrant has been flushed, close it and check for drainage. This is done by placing a hand over the nozzle opening and checking for a vacuum. Then check the hose thread for proper fit.
3. Replace nozzle cap, then open hydrant again and inspect all joints for leaks.

C. Final Trace: All tracer wire terminal boxes shall be to grade, located appropriate distance from hydrant/valve, and with tracer wire correctly attached. A Water Division locator shall complete a trace of the new pipe(s), including connections to existing main. Any tracing deficiencies noted by the locator shall be corrected before the water pipe is accepted and opened for service.

4.09 PUTTING WATER MAIN IN SERVICE

A. The Water Division shall put the completed water system in service only after system has satisfactorily passed all testing and documentation requirements.

PART 5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

5.1 METHOD OF MEASUREMENT

A. Water Service Stubs: Each type and size of water service and stub from the water main to the stop box or connection to existing water service will be counted.

B. Combination Air Valve Vault: Each combination air valve vault will be counted.

C. Filling Existing Water Pipe: Measurement for each size of pipe filled and plugged will be in linear feet from end of pipe to end of pipe.

D. Removal of Water Pipe: Measurement for each type and size of pipe removed will be in linear feet from end to end.

E. Removal of Fire Hydrant: Each fire hydrant removed will be counted.

F. Connection to existing: Each permanent connection of new water main to existing water main or new water service to existing water service will be counted. Temporary connections between new and existing pipe will not be counted.

5.2 BASIS OF PAYMENT

A. Water Service Stubs:
   1. Payment will be made at the contract unit price for each type and size of water service stub.
   2. For ¾ inch to 2 inches water service stubs payment is full compensation for service saddle, corporation, service pipe, stop valve, and stop box.
   3. For water service stubs larger than 2 inches payment is full compensation for flange adapter and service pipe.

B. Combination Air Valve Vault.
   1. Payment will be made at the contract unit price for each combination air valve vault.
   2. Payment is full compensation for structure, casting, and combination air valve assembly, including associated piping and valves.

C. Filling Existing Water Pipe:
   1. Payment will be at the contract unit price per linear foot for each size of pipe filled and plugged.
   2. Payment is full compensation for plugging pipe, filling pipe, and any additional excavation and backfilling required for accessing the pipe to plug or fill it.

D. Removal of Water Pipe:
   1. Payment will be at the contract unit price per linear foot for each type and size of pipe.
   2. Payment is full compensation for removal, disposal, and capping (if specified) of pipe.

E. Removal of Fire Hydrant:
   1. Payment will be made at the contract unit price for each fire hydrant removed.
   2. Payment is full compensation for removal of hydrant, auxiliary valve with valve box, and all components in between; associated excavation and backfilling; and disposal of non-public fire hydrants.

F. Connection to Existing:
   1. Payment will be made at the contract unit price for each connection to existing.
   2. Payment is full compensation for locating existing pipe at connection point, cutting existing pipe as needed, connecting new pipe to existing pipe, and all associated appurtenances.