



**SPECIAL PROVISIONS
FOR
WATER MAIN**

**Johnson County
BRM-3715(650)--8N-52**

**Effective Date
October 16, 2012**

THE STANDARD SPECIFICATIONS, SERIES 2012, 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 as indicated and specified.

1.02 REFERENCES:

- A. 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. One copy of all references marked with a *** shall be kept on the site, readily available and accessible to the Engineer during normal working hours. Copies may be obtained from the organizations or from the Iowa City Water Division at cost plus 15%.
 - B. City of Iowa City Water Division
 - 1. Reference Manual
 - 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 for Water
 - 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, 3-inch through 48-inch, for Water and Other Liquids
 - 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, for Water or Other Liquids
 - 7. ANSI/AWWA-C153/A21.53: Ductile-Iron Compact Fittings, 3-inch through 24-inch, and 54-inch through 64-inch for Water Service
 - 8. ANSI/AWWA C502: Dry-Barrel Fire Hydrants
 - 9. ANSI/AWWA C504: Rubber-Seated Butterfly Valves
 - 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 Principal Backflow-Prevention Assembly
 - 13. ANSI/AWWA C550: Protective Epoxy 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, 4-inch through 10-inch for Water 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 D2241
 2. ASTM B75-86 Seamless Copper Tubing
- 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 inch) complying with AWWA Standard C-900.

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. Shop and Working Drawings:
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

- C. Certificates: Sworn certificates of shop tests showing compliance with appropriate standard for all piping materials.
- D. Manufacturer's Literature:
 - 1. Catalog cuts of joints, couplings, harnesses, expansion joints, gaskets, fasteners and other accessories.
 - 2. Brochures and technical data and coatings and linings and proposed method of application.
- E. 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.

1.04 PERMITS:

- A. 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.
- B. The Contractor or their agent will be responsible for the tapping application forms and records.

1.04 QUALITY ASSURANCE:

- A. Engineer reserves the right to inspect and test by independent service at manufacturer's plant or elsewhere at Engineer's expense.
- B. Contractor shall conduct visual inspection before installation.

1.05 TIME:

- A. Time is of the essence for water main construction work. 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 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 48 hours notice.

PART 2 - PRODUCTS

- 2.01** All products used for this work shall be from the list of "Accepted Products for Water Distribution Materials" contained in the Iowa City Water Division Reference Manual and found in Part 5 of this document. If there is a discrepancy between the Iowa City Water Division Reference Manual and Part 5, the Iowa City Water Division Reference Manual prevails.

2.02 DUCTILE-IRON PIPE:

- A. Thickness design shall conform to ANSI/AWWA C150/A21.50.
- B. Manufacture shall conform to ANSI/AWWA C151/A21.51.
- C. Thickness for direct bury piping, unless otherwise indicated or specified, shall be class 52.
- D. Thickness for pipe suspended from structures and bolted or restrained joint pipe, unless otherwise indicated or specified, shall be class 53.
- E. Cement mortar lining shall conform to ANSI/AWWA C104/A21.4.

2.03 DUCTILE-IRON PIPE JOINTS:

- A. Single rubber-gasket push-on joints or mechanical joints conforming to ANSI/AWWA C111/A21.11. Furnish with all necessary hardware and gaskets.
- B. Bell-and-spigot pipe joints conforming to ANSI A21.6 or ANSI A21.8.
- C. For bolted/restrained mechanical joint, use Griffin Bolt-Lok restrained joint or approved equal. (Class 53)
- D. For unbolted/restrained mechanical joint, use Griffin Snap-Lok restrained joint or approved equal. (Class 53)
- E. Do not use drilled & tapped retainer glands.
- F. Plain end of push-on pipe factory machined to a true circle and chamfered to facilitate fitting gasket.

2.04 POLYVINYL CHLORIDE PIPE:

- A. Pipe shall conform to ANSI/AWWA C900 and shall be thickness class DR 18 (Class 150). All pipe shall have the same outside dimensions as ductile-iron pipe. PVC pipe materials are only allowed in sizes 4 to 10 inch diameter.
- B. PVC pipe materials shall not be used in any area where there is likelihood the pipe will be exposed to concentrations of pollutants comprised of low molecular weight petroleum products or organic solvents or vapors.
- C. PVC pipe shall not be installed under public roadways and shall not be used around cul-de-sacs or other small radius curves.

2.05 FITTINGS:

- A. All fittings shall conform to ANSI/AWWA C110/A21.10, with pressure rating of Class 350 for 3" to 24".
- B. Mechanical-joint fittings shall be ductile iron compact ANSI/AWWA C153/A21.53 or ductile standard ANSI/AWWA C110/A21.10. Large fittings, 12-inch through 20-inch shall be ductile iron standard ANSI/AWWA C110/A21.10. Swivel tees shall be ductile iron standard ANSI/AWWA C110.A21.10. Where ductile iron is not available (i.e., offsets), cast iron standard ANSI/AWWA C110/A21.10 shall be provided.

- C. All fittings shall be bituminous coated inside and outside and shall be furnished complete with necessary accessories including plain rubber gaskets, ductile iron glands, NSS Cor-Blue bolts and nuts. Verify the gasket seats are not made irregular by improper application of the lining materials.

2.06 RESILIENT SEAT VALVES & VALVE BOXES:

- A. Gate valves shall conform to ANSI/AWWA C509.
 - 1. Valves shall be full line size gate valves with epoxy coating inside and outside and contain stainless steel nuts and bolts.
 - 2. Valve bodies shall be ductile iron or cast iron. Working pressure of the valve shall be at least 200 psi and gaskets rated at 250 psi.
 - 3. Valves shall have a standard 2-inch square operating nut and shall open left.
 - 4. Valves shall be capable of being repacked or replacing o-rings under pressure.
 - 5. Valves are to be non-rising stem with the stem, nut and thrust collar made of bronze.
- B. Butterfly valves shall conform to ANSI/AWWA C504, for buried service, Class 150B.
 - 1. Valve seat to be installed on disk or valve body.
 - 2. Butterfly valves shall not be utilized in sizes smaller than 16", unless so noted on the plans.
 - 3. Working pressure of the valve shall be at least 150 psi.
 - 4. Valves shall be short body pattern with mechanical joint ends.
 - 5. Shaft seals shall be o-ring type.
 - 6. Valve shall have manual operator with a 2" square operating nut for operation of the valve and shall open left.
 - 7. All interior and exterior cast iron, ductile iron or steel surfaces shall be painted with an epoxy coating and contain stainless steel bolts and nuts.
- C. Tapping Valves shall be as specified for resilient-seated gate valves with the exception that one end shall be mechanical joint and the other end shall be flanged to match the tapping sleeve and shall have oversize seat rings to permit entry of the tapping machine cutters.
 - 1. Tapping valves be 175 psi minimum working pressure.
 - 2. Valves shall be epoxy coated inside and outside with stainless nuts and bolts.
 - 3. Valves shall be furnished with all joint accessories.
- D. Valve Boxes shall be 2-piece or 3-piece slip type, range 51" to 71". Use lids marked "water".

2.07 HYDRANTS:

Specification standard:	ANSI/AWWA Standard C502
Type of shutoff:	Compression
Type of construction:	Break flange or break bolt above the ground line and a breakaway stem connection. All bolts to be stainless steel.
Main valve opening:	4½ inches for 12" water main and under 5¼ inches for 16" water main and above
Nozzle arrangement and size	3 nozzle, two 2½-inch hose nozzles and one 4½-inch pumper nozzle, with caps attached with chains
Nozzle thread:	National Standard Hose Threads
Type of inlet connection:	Mechanical Joint
Size of inlet connection:	6 inch
Depth of bury:	Depth of bury shall be 6 feet
Direction of opening:	Open to right (clockwise)
Packing:	Conventional or O-Ring
Size and shape of operating nut:	1½ inch, standard pentagon
Working pressure:	250 psi
Color:	Safety Red

2.08 SPECIAL FITTINGS:

- A. Special pipe fittings must be approved by the Engineer.
- B. Special fittings must be the same diameter, thickness and pressure class as standard fittings.
- C. Special fittings may be manufactured to meet requirements of same specifications as standard fittings except for laying length and types of end connection.
- D. Full Body Tapping Sleeves:
 1. Shall be mechanical joint, split construction with end gaskets, manufactured to fit cast iron or ductile iron pipe. Branch shall have a flange fitting to match the tapping valve.
 2. Shall meet the OD requirements for Class A, B, C, or D pit cast pipe.
 3. Shall be furnished complete with all accessories.

4. Required for 12" and larger pipe or under paving.
5. Shall have stainless steel or NSS Cor-Blue nuts and bolts.

E. Stainless Steel Tapping Sleeves:

1. Shall be epoxy coated with ductile-iron flange and stainless steel bolts.
2. Shall meet the OD requirements for class A, B, C, or D pit cast pipe.
3. Shall be furnished complete with all accessories.
4. Nitrile gaskets shall be used in L.U.S.T. areas (leaking underground storage tank areas).

F. 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.

2.09 GASKETS, BOLTS, AND NUTS:

A. Mechanical joints made with:

1. Bolts: 3/4 inch NSS Cor-BLUE.
2. Stainless steel bold studs with stainless steel nuts on each end.

B. All thread rod used to restrain fittings shall be stainless steel with stainless steel nuts and 3/4" diameter.

2.10 LOCATION WIRE:

A. Location wire shall be #12 solid copper, THHN insulation in yellow, orange or blue color.

2.11 LUMBER:

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

2.12 WATER SERVICE:

- A. Service lines shall be new type K copper in coils for sizes 3/4-inch thru 1 1/2-inch and in coils or straight pipe for 2-inch size.
- B. No couplings or connections will be permitted under the paving.

2.13 SERVICE SADDLES:

- A. Service saddles shall meet or exceed current ANSI/AWWA C800 specifications and shall be made in accordance with ASTM B-62.
- B. Saddles shall be equal to but not exceed up to 200 PSIG.
- C. Body shall be 85-5-5-5 cast brass.
- D. Strap shall be wide band, 304L stainless steel with 304L stainless steel studs.
- E. Nuts and washers shall be 304 stainless steel. Nuts are supplied with fluorocarbon coating.
- F. Saddles shall be AWWA tap thread (CC thread).
- G. Saddles with nitrile gaskets shall be used in L.U.S.T. areas (Leaking underground storage tank areas).

2.14 CORPORATION VALVES:

- A. Corporation valves shall meet or exceed current ANSI/AWWA C800 specifications and shall be made in accordance with ASTM B-62.
- B. Valves shall be 300 PSIG maximum working pressure.
- C. Body shall be 85-5-5-5 cast brass.
- D. Valves shall be inlet: AWWA taper thread, outlet: conductive compression connection for CTS O.D. tubing.
- E. Valves shall be compression ball type valves.

2.15 BALL CURB VALVES:

- A. Ball curb valves shall meet or exceed current ANSI/AWWA C800 specifications and shall be made in accordance with ASTM B-62.
- B. Valves shall be 300 PSIF maximum working pressure.
- C. Body shall be 85-5-5-5 cast brass.
- D. Valves shall be compression connection for CTS O.D. tubing, both ends.
- E. Valves shall have a quarter turn check with fluorocarbon coated ball and stainless steel reinforced seat.
- F. Valve shall have end pieces o-ring sealed with double o-ring seals.

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- A. Ball curb valves shall meet or exceed current ANSI/AWWA C800 specifications and shall be made in accordance with ASTM B-62.
- B. Valves shall be 300 PSIF maximum working pressure.

- C. Body shall be 85-5-5-5 cast brass.
- D. Valves shall be compression connection for CTS O.D. tubing, both ends.
- E. Valves shall have a quarter turn check with fluorocarbon coated ball and stainless steel reinforced seat.
- F. Valve shall have end pieces o-ring sealed with double o-ring seals.

2.16 CURB BOX – ARCH PATTERN:

- A. Curb box shall meet or exceed current ANSI/AWWA C800 specifications.
- B. Curb box lid shall be Erie Pattern – 5601L – 2-hole.
- C. Curb box shall be 5-foot box (telescope 1-foot) and shall telescope up and down inside the base casing.
- D. Curb box shall be slide style.
- E. Curb box and accessories shall be black dip coated inside and out.
- F. Curb box rod length shall be a 5/8" rod, 42-inches long, small key-clamp welded to rod with stainless steel rod and cotter pin.

2.17 STRAIGHT THREE PART UNIONS:

- A. Unions shall meet or exceed current ANSI/AWWA C800 specifications and shall be made in accordance with ASTM B-62.
- B. Union shall be conductive compression connection for CTS O.D. tubing both ends.
- C. Body and nut shall be corrosion resistant cast bronze 85-5-5-5.
- D. Gripper band shall be stainless steel and overlap itself so no gasket material can get underneath.
- E. Conductor spring shall provide metal to metal contact between copper tubing and the fitting for electrical conductivity.
- F. Entire gasket shall be closed.
- G. Fluorocarbon coating shall be on inside surface of nut.
- H. Union pressure rating shall be greater than the valve or fitting with which it is used.

2.18 COPPER TUBING:

- A. Copper tubing shall meet or exceed current ANSI/AWWA C800 specifications.

2.19 YARD HYDRANTS:

- A. Yard hydrants shall be freezeless style.

2.20 WATER:

- A. Reasonable amounts of water will be provided for use in the final operations of water main flushing, disinfection 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.

PART 3 - EXECUTION**3.01 REFERENCES AND DOCUMENTS:**

- A. Contractor must have all required documents on the site before commencing with the work.
- 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 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. Examples of special buried features would be:
 - 1. Offsets in alignment.
 - 2. Changes in depth, depth greater than 8 feet or less than 5 feet.
 - 3. Special fittings or construction materials.

3.02 RECEIVING, STORAGE AND HANDLING:

- A. The Engineer 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 PVC 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."

3.03 LOCATION, ALIGNMENT, SEPARATION & GRADE:

- A. Water mains, valves, hydrants, and special fittings shall be installed in the locations shown on the plans or as directed by the Engineer.
- B. Contractor shall have all buried utilities located by the 1-800-ONE-CALL service and shall do exploratory excavation as necessary to determine specific conflicts between existing utilities and new water main. No extra compensation will be allowed for the exploratory excavations.

- C. Water main shall be installed a minimum depth of cover of 5½ feet. Generally, the maximum depth shall not exceed 7 feet.
- D. Water mains crossing sewer services, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer. Where local conditions prevent this vertical separation, the water main shall not be placed closer than 6 inches above a sewer or 18 inches below a sewer under any circumstances. Additionally, one full length of water pipe crossing the sewer shall be centered at the point of crossing so that the water pipe joints will be equal distance as far as possible from the sewer. The water and sewer pipes must be adequately supported and have pressure tight joints. A low permeability soil shall be used for backfill material within 10 feet of the point of crossing.
- E. No water pipe shall pass through or come in contact with any part of a sewer manhole. A minimum horizontal separation of 3 feet shall be maintained.
- F. All PVC water main and ductile iron water main with greater than 400 feet between features that extend to the surface (such as hydrants or valve boxes) shall be marked with a wire for the entire length to make electronic location possible.
 - 1. The wire shall be installed continuously as the pipe is backfilled. The wire shall be fixed to the side of the pipe at a position of 2 o'clock or 10 o'clock and attached with duct tape every 5 feet.
 - 2. The insulation shall be protected to prevent accidental grounding. Make few splices and splice the wire together using a Twister DB Plus Wire Connector.
 - 3. Bring the wire to the ground surface at each fire hydrant and loop wire in a Valvco tracer wire terminal box. These boxes shall be located between the hydrant and the hydrant valve with at least two feet of extra wire inside the box. Install the terminal box perpendicular from the hydrant and parallel with the valve box, one-foot from the hydrant base. The tracer wire terminal box must be installed flush with the finished grade. If there is no fire hydrant within 500 feet, bring the wire to the surface in a "daylight box" which is a full-size valve box and mark the drawings appropriately.

3.04 PIPE BEDDING 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 stomping 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.

3.05 PIPE RESTRAINT:

- A. Thrust Restraint:
 - 1. For pipe smaller than 10" diameter, concrete block shall be used, placing the concrete block next to the fitting and undisturbed soil. For 10" 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 lumber to prevent shifting before placing concrete.
 - 2. Do not pour excess concrete on top of pipe and fittings.
- B. Socket Pipe Clamps, Tie Rods, and Bridles:
 - 1. 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 in. 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.

3.06 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. Griffin Snap-Lok shall be used in casing with locking rubbers.
- B. Mechanical Joints:
 - 1. The range of torque for tightening bolts which is indicated in ANSI/AWWA C600 may be somewhat affected by the temperature. On cold days, more torque may be required.
 - 2. Use extreme caution when tightening cast iron fittings to avoid breaking the ears of the flanges. An average worker should not use a wrench longer than 18 inches.
 - 3. On PVC pipe connections to MJ joints, cut the bevel off the end of the PVC pipe to get full pipe diameter in the joint.
 - 4. Do not deflect pipe at joint.

- C. 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.

3.07 TAPPED CONNECTIONS UNDER PRESSURE:

- A. Follow manufacturer's installation instructions.
- B. Tapping mains for new connections 1-inch to 12-inch in diameter shall be done by the Water Division.
- 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.

3.08 POLYETHYLENE ENCASEMENT:

- A. All open cut installed ductile iron pipe and fittings shall be wrapped with an 8 mil polyethylene encasement in accordance with ANSI/AWWA C205/A21.5 installation methods. This includes any ductile iron laid in cul-de-sacs or other small radius areas where PVC main could not be used.

3.09 HYDRANT INSTALLATION:

- A. Handle carefully to avoid breakage and damage to flanges. Keep hydrants closed until they are installed. Protect stored hydrants from dirt, water, ice, animals and vandals.
- B. Before installation, clean piping and elbow of any foreign matter.
- C. Install hydrants away from the curb line a sufficient distance to avoid damage from or to vehicles. A set-back of 4 feet from the curb line is recommended.
- D. Orient the hydrant so the pumper nozzle faces the street. Outlet nozzles shall be at least 18 inches above finished ground. The break-off flange should be no more than 6 inches above ground. There shall be no obstructions to fire hose connections.
- E. The base elbow shall be placed on solid precast concrete blocks on firm, undisturbed soil. The barrel of the hydrant shall be firmly braced against the back of the trench wall with pre-cast cement blocks to resist thrust at the pipe connection.
- F. The base and lower barrel shall be backfilled with 5 cubic feet of washed gravel or 1 inch crushed rock to allow water to release from the hydrant drain.
- G. Install the hydrant plumb. Drainage stone and soil backfill around the barrel shall be firmly compacted to provide good lateral support for the hydrant. This is essential to the performance of the break-off flange.

3.10 WATER SERVICE INSTALLATION:

- A. Tapping mains for new connections 1-inch to 12-inch in diameter shall be done by the Water Division. This includes connections made on public and private mains.
- B. The City Water Division will provide, at Contractor cost, labor to tap the water main for services. Each water service pipe shall be connected to the water main through a brass corporation stop. A tapping saddle is required on all water main materials. The plastic plug from PVC main shall be recovered. The main shall be tapped at an angle of forty-five degrees with the vertical, if possible. The stop must be turned so that the T-handle will be on top.
- C. The old water service under the street right-of-way will be shut off and removed. The old stop box will be removed.
- D. The Contractor shall install the new copper service line from the new corporation stop to the new curb stop and from the curb stop to the customer service line near the property line. The size will be determined by the Water Division. The minimum size will be 1-inch to the stop box. The service pipe shall be laid in the trench with sufficient weaving to allow not less than one foot extra length for each 50 feet of straight line distance.
- E. Underground water service pipe shall be laid not less than ten (10) feet horizontally from the building drain, and shall be separated by undisturbed or compacted earth. Where the horizontal separation cannot be met, the water service pipe shall be installed so the bottom of the water service pipe is at least eighteen (18) inches above the top of the building drain line at its highest point.
- F. A curb stop shall be furnished and installed for each service at the location shown on the plans, or as directed by the Engineer. Place a brick or masonry block under each stop box valve. A cast iron stop box shall be furnished and installed over the curb stop and held in a truly vertical position, until sufficient backfill has been placed to ensure permanent vertical alignment of the box. The top of the box shall be adjusted and set flush with the finished surface grade. The stop box shall be located between the curb and the property line and visible from the sidewalk. Stop box shall not be located with sidewalk or driveway paving unless approved by the Engineer.
- G. The Contractor shall make a clean cut on the existing service line and connect the new service line at the location as directed by the Engineer.
- H. The Contractor shall be responsible for visual inspection of all water service materials used on the project. If water pressure is available or will be available within 24 hours of make the new service connection, the new service shall be subjected to normal system pressure and visually inspected for leaks. If any leaks appear, the Contractor shall make repairs. Each water service shall be turned on and observed by the Contractor within the premises to verify adequate pressure and flow.

3.11 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 the 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.

3.11 DISINFECTION FOR POTABLE WATER SYSTEMS:

A. General

- 1. 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.

B. Special Disinfection Requirements

- 1. Exercise cleanliness during construction. Protect pipe interiors, fittings and valves against contamination.
- 2. Water main 16-inch and larger in diameter must be swabbed with a soft pig prior to flushing if flow in the system is not adequate to maintain scouring velocity (2 fps) during flushing.
- 3. The minimum uniform concentration of available chlorine used for disinfection shall be 50 mg/L. Use either the granulated/tablet or continuous feed method with modifications as described in 3.11 C or D below.
- 4. The chlorinated water shall be retained in the main at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24 hour period, the treated water shall contain no less than 25 mg/L chlorine throughout the length of main.
- 5. After the retention period, flush the heavily chlorinated water from the main until the chlorine concentration in the water leaving the main is no higher than 3 mg/L and the water appears clean. Flush at a minimum velocity of 2.5 feet per second in the main through an opening not less than $\frac{1}{4}$ of the main diameter. For 6-inch through 12-inch water mains, a single 2½-inch fire hydrant opening is adequate. Water entering storm sewer system shall be dechlorinated by a method approved by the Engineer to prevent downstream environmental damage (i.e. fish kills).
- 6. Collect a bacterial sample from the end of each line or 800-1,000 feet and deliver the sample to the University Hygienic Laboratory at Oakdale for analysis. Allow approximately 5 days for the results. If the bacterial sample shows the absence of coliform organisms, the hydrostatic test may proceed.

C. Tablet Method of Chlorine Application

- 1. Use ANSI/AWWA C651, however slowly fill the main (less than 1 cubic foot per second) with system water, pushing out as much air as possible. Do not wash out the tablets.

D. Continuous Feed Method of Chlorine Application

1. Prior to applying chlorine, do a preliminary flush at a minimum velocity of 2.5 feet per second in the main through an opening not less than $\frac{1}{4}$ of the main diameter. For 6-inch through 12-inch water mains, a single 2½-inch fire hydrant opening is adequate.
2. Add the water and chlorine solution with the required concentration to fill the main completely.

3.12 TESTING:

A. General

1. All Water main testing shall be completed within a 4-day window. This means that testing will need to commence on a Monday or Tuesday in order to complete all of the items as required. Depending upon the Hygienic Lab schedule, Wednesday is possible if everything proceeds in a timely manner.
2. Utilize only the specified amount of granular chlorine to disinfect the main.

B. Filling the water main:

1. Fill the newly constructed water main system slowly using treated public water under low pressure and low flow. The objective is to displace air with water while avoiding damage to new construction, customer services, and adjoining property due to the release of air and water. Public Works staff must be on site to assist with operation of the system valves and hydrants during this operation.
2. Open one hydrant (completely) at the end of the main or at a high point on the main which is to be filled. Open a filling valve (the smallest one available) slightly. Allow the water main to fill and slowly release the air. When the main being filled has released nearly all air, surging should diminish. The line shall be filled until a trickle of water is discharged from the hydrant. Monitor and control the released water to minimize damage.

B. Bacterial Tests:

3. No sooner than 24 hours and no later than 48 hours after filling the main, the first bacterial test should be taken.
4. Bacterial tests shall be taken at all locations as determined by the Project Engineer. Tests will be taken after water has been flushed to normal residual levels. Contractor shall be responsible for dechlorinating all discharged water. The Iowa City Water Division is available for professional guidance if the contractor is not experienced in current dechlorination procedures.
5. Within 24 hours a 2nd bacterial test must be taken for each of the initial tests taken. Verbal or written verification from the University of Iowa Hygienic Lab must be provided for the entire initial series of tests prior to the commencement of 2nd series of tests. Verification must be provided for all bacteria tests prior to pressure testing. This verification may be in the form of a call, email, or fax from the Hygienic Lab.

C. Pressure and Leakage Tests:

1. Pressure testing shall be performed on all newly installed water mains. Tests shall be for 2 hours at 150 psi. Pressurize the line no greater than 155 psi. A gauge owned the City of Iowa City must be placed on the line in addition to the contractor's gauge.
2. Pressure test off the hydrants or furnish and install temporary testing plugs or caps. Furnish pressure pumps, pipe connections, meters, gauges, equipment, potable water and labor. Use only potable water for testing.
3. The Project Engineer will give notice to the Iowa City Water Division to locate the water main via all of the tracer wire boxes installed by the contractor. Wire boxes must be fully installed and placed in their final locations before locates shall be performed. The main must trace as it will when it is placed in service.
4. Keep the water main full of water for 24 hours before conducting combined pressure and leakage test.
5. Pressure and leakage test consists of first raising water pressure at the lowest point of section being tested to 150 psi internal pressure.
6. Failure to achieve and maintain the specified pressure for two hours with no additional pumping means the water main has failed to pass the test.
7. If the water main fails the pressure and leakage test, locate, uncover, and repair or replace defective pipe, fitting or joints. Conduct additional tests and repairs until water main passes the test.
8. Once the newly constructed water main passes the pressure and leak test as described above, the Contractor shall perform final flushing. At this time, as-builts, hard copies of all bacterial tests and a completed material list (certified by the Contractor) must be provided to the Project Engineer. The materials list form may be found at the end of this document.
9. Upon the completion of final flushing, the Project Engineer shall notify the Iowa City Water Division that the water main has successfully passed all testing and tapping permits may be issued. Prior to final acceptance of the project, all outstanding water main punch list items (plumbing valve boxes, setting final box elevations, turning hydrants, etc.) shall be completed.

C. Valve Operations:

1. 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.

D. 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. Remove a nozzle cap and open the hydrant slowly and fully. Check the direction of opening as marked on the top. Do not force the hydrant in the opening direction beyond full open as indicated by sudden resistance to turning.

3. After hydrant has been flushed, close it and check for drainage. This is done by placing the hand over the nozzle opening and checking for a vacuum. Then check the hose thread for proper fit.
 4. Replace nozzle cap, then open hydrant again and inspect all joints for leaks.
- E. Flow Test:
1. Flow tests shall be conducted to verify all components of the water system are fully open and operational and to determine the fire flow capacity.
 2. Public Works staff personnel must be on the site to operate the system valves and hydrants during this test.
 3. A hydrant flow test shall be conducted on the hydrant at the extreme locations for distance or highest elevation to determine the fire flow capability of the system. Static and flowing pressures and flow rates shall be recorded, and a copy forwarded to the Water Division.

PART 4 – METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 – Water main

- A. Payment by the lineal foot of pipe laid in the trench as measured for each diameter, type, and class in the Bid Schedule. The Contractor will be paid the contract unit price per lineal foot of each size of water main pipe installed. Deductions will be made from the measured length for valves and other appurtenances. The unit prices as bid shall include the furnishing of all labor, equipment and materials necessary to install the water main in accordance with the contract documents. This price also includes MJ glands, gaskets, nitrile gaskets, bolts, polyethylene wrap and the installation of these items. This work shall include all excavation, installing and joining of pipe and fittings, removal and disposal of water, backfilling, sheeting, shoring, disposal of excess excavated material, protection of existing structures and utilities, clean-up and all other operations unless specifically covered by other pay-items specified under this contract.

4.02 – Fittings

- A. Each fitting will be measured by the pound. The Contractor will be paid the unit price per pound of fitting. Weight of a fitting is defined by the specified body weight of the AWWA C153 fitting or manufacturers equivalent standard. Gaskets, gland rings and bolts are not included in the weight and are considered incidental to the fitting. For fittings that are not available in AWWA C153 compact size, then weight will be determined by weight of AWWA C110 fitting. Mainline line tee(s) to the hydrants, including the piping from the tee to the hydrant, are to be considered incidental to the hydrant assemblies. This shall be considered full payment for materials, equipment, excavation, installation and all associated work.

4.03 – Special Fittings and Couplings

- A. Includes couplings, cutting-in sleeves, retainer glands, anchoring pipe and couplings, repair sleeves and clamps, etc. Includes accessories and installation for special fittings and couplings. Payment shall be considered incidental to the installation of the water main pipe.

4.04 –Valves

- A. Each valve will be measured as a single unit. The contractor will be paid the contract unit price for each valve installed. This shall be considered full payment for equipment, excavation, installation and materials including concrete blocking, crushed stone, bolts, gland rings, gaskets, valve box and lid, and extension if required.

4.05 –Hydrant Assemblies

- A. Each hydrant assembly will be measured as a single unit. The contractor will be paid the contract unit price for each hydrant assembly installed. This shall be considered full payment for equipment, excavation, installation and materials including hydrant, isolation valve, mainline tee and piping from the main to the hydrant.

4.06 –Thrust Restraint

- A. Concrete thrust blocking and other restraint accessories including threaded rods, nuts, eyebolts and mechanical joints shall be considered incidental to the installation of water main.

4.07 –Disinfection and Hydrostatic Testing

- A. Disinfection and hydrostatic testing water mains will not be paid for separately but shall be considered incidental to the water main installation. Includes furnishing all materials, labor and equipment to disinfect the water main and redisinfect if required, and perform hydrostatic testing of the completed water main system; including corporation stops, copper tubing, hoses, pumps, gauges and other equipment required for disinfection and hydrostatic testing. Also included are hoses, piping and accessories necessary to conduct the chlorinated water to a proper disposal point.

4.08 –Tracer Wire

- A. Tracer wire shall be considered incidental to the installation of water main pipe and fittings.

4.09 –Polyethylene Wrap

- A. Polyethylene wrap shall be considered incidental to the installation of pipe, fittings, valves, and hydrants.

4.10 –Services

- A. Water services shall be measured and paid on a count basis for each type and size as set forth in the Contract Documents. Payment for this item shall be considered full compensation for furnishing all tools, equipment, labor and materials (including all required piping, hardware and fittings – corporations, curb stop & box and tapping saddles) necessary for the installation and reconnection of water service in accordance with the contract documents.

4.11 –Removal of Existing Water main

- A. Payment by the lineal foot of existing water main removed as measured. The contractor will be paid the contract unit price per lineal foot of water main pipe removed. The unit price as bid shall include the furnishing of all labor, equipment and materials necessary to remove the pipe in accordance with the contract documents. This work shall include all cutting, removal and disposal of pipe, excavation, plugging, backfill, sheeting and shoring, disposal of excess excavated material, protection of existing structures and utilities, clean-up and all other operations unless specifically covered by other pay-items specified under this contract.

4.12 –Abandonment of Existing Water main

- A. Paid on a volume basis of flowable mortar, as measured by the Engineer. The unit price as bid shall include the furnishing of all labor, equipment and materials necessary to fill the pipe and plug pipe ends. Brick, concrete and all other block inserts used to back the flowable mortar are incidental. Completely fill with flowable mortar and allow mortar to cure completely and no less than 72 hours before backfilling.

PART 5 – ACCEPTED PRODUCTS FOR WATER DISTRIBUTION MATERIALS**WATER PIPE: (Ductile) ANSI/AWWA – A21.51/C151**

American, Clow, Griffin, McWane, Tyler, US Pipe, or approved equal
 Class 52 for direct bury piping unless other wise indicated or specified.
 Class 53 for suspended from structures and bolted or restrained joint pipe

WATER PIPE: (PVC) (Class 150) – C900

C900 thickness class DR18 (6" thru 10")

FITTINGS: (Ductile Iron Standard) ANSI/AWWA – A21.10/C110, 3" to 24" - 350 psi

(Ductile Iron Compact) AWWA C153, 350 psi
 Clow, Tyler/Union, U.S. Pipe, Sigma, or approved equal

TAPPING SLEEVES: (Full Body Ductile Iron with Stainless Steel and/or NSS Cor-Blue Nuts and Bolts) for 12" and larger or under pavement

Clow - F-5205, Mueller - H615, Kennedy, Tyler/Union, Kennedy, American Flow Control - Series 2800,
 U.S. Pipe - T-9, or approved equal

TAPPING SLEEVES: (Stainless Steel)

Smith Blair - 662 or 663, Ford FAST, Mueller-H304, Romac SST, JCM-432 or approved equal
 Smith Blair – 665 or Cascade CST-EX 3655 w/ nitrile gaskets to be used in L.U.S.T. areas.

MECHANICAL JOINT RESTRAINT DEVICE: (Megalug)

Ebaa Iron Sales Inc. – 1100 series for ductile iron
 2000 PV for PVC

STAINLESS STEEL REPAIR CLAMPS (With Stainless Steel Nuts & Bolts):

Smith-Blair-261, Ford FS1, Romac SS1 or approved equal

VALVES: (Resilient Seated Gate Valves) ANSI/AWWA – C509

Clow F-2640, Kennedy 1571-X, Mueller Resilient Seat - A-2360-20, U.S. Pipe – A-USPO-20 or approved equal

VALVES: (Butterfly) ANSI/AWWA C504, Class 150B

Clow, Pratt, Mueller, American Darling, Kennedy, M & H, DeZurik, Val-Matic, or approved equal

VALVES: (Tapping)

Clow – F-2640, Mueller – T-2360-16, Kennedy 4950, U.S. Pipe – A-USPO-16 or approved equal

VALVE BOXES:

Tyler – (Series 6855 & Item 666A, Range 51" to 71")
 East Jordan Series 8555 & Item 666A – Range 51" to 71"

HYDRANTS (4 ½" for 12" and under) (5 ¼" for 16" and above) AWWA C502

Clow F-2545 Medallion, Mueller Super Centurion 250

SLEEVE TYPE COUPLING (with Stainless Steel Nuts & Bolts):

Standard solid black sleeve – Tyler/Union 5-1442, Griffin
 Bolted Straight Coupling with stainless steel bolts and nuts – Smith-Blair 441, Romac Style 501 or approved equal

TRACER WIRE TERMINAL BOX (DAYLIGHT BOX):

U.S. Filter WaterPro, Utility Equipment or approved equal - Valvco –95E –2 ½" ID with lockable cast-iron lid – minimum 18" long, telescoping

TRACER WIRE CONNECTORS:

Twister DB Plus Wire Connector

POLYWRAP:

8 mil polyethylene encasement

WIRE:

#12 solid copper, THHN insulation in yellow or orange

FREEZELESS YARD HYDRANT:

Woodford Mfg. Iowa Model Y34 and YI

SERVICE SADDLES (ANSI/AWWA – C800/C900):

AY McDonald 3845, Ford 202BS, Smith Blair 325 (w/ nitrile gasket to be used in L.U.S.T. areas) or approved equal

CORPORATION VALVES (ANSI/AWWA – C800):

Mueller B-25008, AY McDonald 4701 BQ

BALL CURB VALVES (ANSI/AWWA – C800):

Mueller B-25209, AY McDonald 6100Q

CURB BOX ARCH PATTERN (ANSI/AWWA – C800 w/ stainless steel rod and cotter pin):

AY McDonald 5601 and 5603 with 5660SS-5' shut off rod



Last Updated: March 30, 2010

CITY PROJECT - WATER MATERIALS LIST

PROJECT NAME:

YEAR:

INSPECTOR:

PIPE (Ductile) ANSI/AWWA – A21.51/C151

Accepted Types: American, Clow, Griffin, McWane, Tyler and US Pipe

Make: _____ **Model:** _____ **Year:** _____

PIPE (PVC) Class 150 – C900

Accepted Types: C900 thickness class DR18 (6"-10")

Make: _____ **Model:** _____ **Year:** _____

FITTINGS (Ductile Iron Standard) ANSI/AWWA – A21.10/C110, 3"-24" (350psi)

Accepted Types: Ductile Iron Compact AWWA C153 350psi, Clow, Tyler/Union, US Pipe, Sigma

Make: _____ **Model:** _____ **Year:** _____

TAPPING SLEEVES (Full Body DIP w/ SS or Blue Bolts) for 12" and larger or under pavement

Accepted Types: Clow F5205, Mueller H615, Kennedy, Tyler/Union, AFC 2800 series, US Pipe T9

Make: _____ **Model:** _____ **Year:** _____

TAPPING SLEEVES (SS)

Accepted Types: Smith-Blair 662/663, Ford FAST, Mueller H304, Romac SST, JCM 432

*Smith-Blair 665 or Cascade EX3655 (with nitrile gaskets) for LUST areas

Make: _____ **Model:** _____ **Year:** _____

MECHANICAL JOINT RESTRAINTS (Megalug with Blue Bolts)

Accepted Types: Ebaa Iron Sales Inc., 1100 series – ductile, 2000 PV for PVC

Make: _____ **Model:** _____ **Year:** _____

VALVES (Gate) ANSI/AWWA C509

Accepted Types: Clow F2640, Kennedy 1571X, Mueller A2360-20 or US Pipe A-USP020

Make: _____ **Model:** _____ **Year:** _____

VALVES (Butterfly) ANSI/AWWA C504, Class 150B

Accepted Types: Clow, Pratt, Mueller, American Darling, Kennedy, M&H, DeZurik or Val-Matic

Make: _____ **Model:** _____ **Year:** _____

VALVES (Tapping)

Accepted Types: Clow F2640, Mueller T2360-16, Kennedy 4950, US Pipe A-USP016

Make: _____ Model: _____ Year: _____

VALVE BOXES (Slip Type NOT Screw Type; Flanges must be cut or knocked off top piece)

Accepted Types: Tyler 6855 series; item 666A , East Jordan 8555 series; item 666A (51" to 71")

Make: _____ Model: _____ Year: _____

HYDRANTS (4.5" for <= 12" DIP; 5.25" for >= 16" DIP) AWWA C502

Accepted Types: Clow F2545 Medallion, Mueller Super Centurion 250

Make: _____ Model: _____ Year: _____

SLEEVE TYPE COUPLINGS (with stainless nuts and bolts)

Accepted Types: Standard solid black (Tyler/Union 5-1442, Griffin), Bolted Straight with SS nuts and bolts (Smith/Blair 441 or Romac 501)

Make: _____ Model: _____ Year: _____

TRACER WIRE BOXES

Accepted Types: US Filter, WaterPro or Utility Equipment: Valvco 95E, 2.5" with lockable cast iron lid minimum 18" long telescoping

Make: _____

TRACER WIRE & CONNECTORS

Accepted Types: #12 solid copper, THHN insulation in yellow, orange or blue

** Connectors for wire must be DB Plus Twister Type (with weatherproof gel)

Make: _____ Color: _____

OTHER NOTES:

CONTRACTOR COMPANY: _____

CONTRACTOR SIGNATURE: _____ **DATE:** _____