

SP- 125002
(New)



Iowa Department of Transportation

SPECIAL PROVISIONS FOR WATER MAIN

Muscatine County
STP-U-5330(616)--70-70

Effective Date
September 17, 2013

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 - DESCRIPTION

1.01 SUMMARY.

This Special Provision covers construction, connections to, and repairs made on Muscatine Power and Water's (MP&W) water distribution system.

1.02 CODES AND STANDARDS.

- A.** In the event of a conflict between codes and standards, the one establishing the more stringent requirements shall be followed.
- B.** The following standards and specifications are used in or referred to in this Special Provision:
 - 1. American Water Works Association (AWWA).
 - 2. Occupational Safety and Health Act of 1970, as amended (OSHA).
 - 3. American National Standards Institute (ANSI).
 - 4. Iowa Department of Health.
 - 5. Iowa Department of Transportation (Iowa DOT).
 - 6. Iowa Department of Natural Resources (Iowa DNR).
 - 7. Recommended Standards for Water Works - Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers.
 - 8. American Society for Testing and Materials (ASTM).
 - 9. City of Muscatine, Iowa, Codes and Standards.
 - 10. Muscatine Power and Water's rules and regulations as outlined in WATER CUSTOMER SERVICE HANDBOOK.
 - 11. Muscatine Power and Water's current "Backflow Prevention Policy".
 - 12. Steel Structures Painting Council (SSPC).
- C.** The most current versions or updates of the above specifications are to be used unless otherwise noted in the contract documents.
- D.** Copies of all codes and standards referenced in these Special Provisions are on file for review at the offices of Muscatine Power and Water, 3205 Cedar Street, Muscatine, Iowa 52761.

1.03 SUBMITTALS.

- A.** Contractor shall submit manufacturer's catalog data for all items to be used in constructing the Project.
- B.** Contractor shall submit certificates from manufacturers evidencing compliance with standards listed in this Special Provisions and as listed in the contract documents.

PART 2 - MATERIALS**2.01 PRODUCTS.**

- A.** Ductile iron water main pipe (DIP) shall conform to ANSI/AWWA C151/A21.51 American National Standard for Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids. Pipe shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4 American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water. Thickness design of pipe shall conform to ANSI/AWWA C150/A21.50 American National Standard for the Thickness Design of Ductile Iron Pipe. Pipe joints shall be push-on, lock ring restrained or mechanical as required by the design and shall conform to ANSI/AWWA C111/A21.11 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings. Pipe shall be minimum Class 51 or Pressure Class 350 unless specified otherwise on the plans or in the contract documents. In cases where it is determined that hydrocarbon contamination is present, neoprene gaskets will be required.
- B.** Ductile iron fittings shall conform to ANSI/AWWA C110/A21.10 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids and ANSI/AWWA C153/A21.53 American National Standard for Ductile-Iron Compact Fittings for Water Service. Fittings shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4 American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water. Fittings shall be push on or mechanical joint as required by the contract documents. Bolts, nuts and washers shall be stainless steel or high strength low alloy Corten steel.
- C.** High density polyethylene (HDPE) pipe and fittings shall conform to ANSI/AWWA C906 Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in. for Water Distribution and Transmission.
 - 1. HDPE pipe shall be ductile iron pipe size, DR 9, black with two painted blue stripes.
 - 2. HDPE pipe fittings for new construction shall be heat fused unless otherwise noted in the contract documents.
 - 3. Restrained mechanical joints for HDPE pipe shall be Mueller AquaGrip.
 - 4. The use of HPDE pipe will be permitted on a case-by-case basis as shown in the contract documents.
- D.** Gate valves shall conform to AWWA C509 AWWA Standard for Resilient-Seated Gate Valves for Water and Sewage Systems. Gate valves shall meet the following specific requirements:
 - 1. Bolted bonnet.
 - 2. Designed to permit repacking under pressure with valve wide open.
 - 3. Brass or bronze trim.
 - 4. O-ring packing.
 - 5. Non-rising stem with 2 inch square wrench nut.
 - 6. Turn clockwise (right) to open.
 - 7. Resilient seated wedge type.

8. Epoxy coated.
 9. All bolts to be stainless steel.
 10. Acceptable manufacturers are Mueller, Clow, and American Flow Control.
- E.** Butterfly valves shall conform to AWWA C504 AWWA Standard for Rubber-Seated Butterfly Valves. Butterfly valves shall meet the following specific requirements:
1. Pressure class for 150 psi upstream and 0 psi downstream.
 2. Stem with 2 inch square wrench nut.
 3. Turn clockwise (right) to open.
 4. Epoxy coated.
 5. All bolts to be stainless steel.
- F.** Tapping valves shall conform to the applicable requirements for gate valves. Tapping valves shall have full sized opening to accommodate MP&W's Hydra-Stop tapping and hydra-stopping machine.
- G.** Tapping sleeves for ductile iron pipe shall be epoxy coated carbon steel with 3/4 inch NPT test plug and stainless steel bolts and nuts, Smith-Blair 622 or approved equal.
- H.** Tapping sleeves for pressure taps on cast iron pipe water mains shall be full mechanical joint with side gaskets and end rings or stainless steel fully enclosed tapping sleeve with full wrap gasket and stainless steel bolts and nuts, PowerSeal 3490MJ by Pipeline Products Corporation or approved equal.
- I.** Valve boxes shall be Tyler 664S with centering ring or approved equal. Cover shall have the word "WATER" cast into the cover. Provide 5 foot standard length unless specified otherwise.
- J.** Fire hydrants shall conform to AWWA C502 AWWA Standard for Dry-Barrel Fire Hydrants. All hydrants shall be Mueller Centurion or Waterous Pacer Model WB 67-250 meeting the following specific requirements:
1. Mechanical joint connection.
 2. Nozzles: two 2 1/2 inch hose nozzles, one 4 1/2 inch hose nozzle.
 3. Nozzle threads to be National Standard.
 4. O-ring packing.
 5. Suitable for 5 foot depth of cover unless specified otherwise in the contract documents.
 6. Valve opening of 4 1/2 inches or 5 1/4 inches.
 7. Automatic drain valve to drain hydrant barrel when main valve is closed.
 8. Direction of opening shall be clockwise (right).
 9. Operating nut shall be National Standard 1 inch square.

10. Oversized mechanical joint shoe.
 11. Epoxy coated bowl.
 12. Hydrants shall be factory primed and painted. Finish paint shall be Sherwin Williams Kem Lustral Enamel. Colors to be custom white and light blue. Contractor to provide paint samples to verify exact color with shop drawings.
 13. All underground parts shall be constructed of ductile iron with Stainless steel bolts.
- K.** Tie rods shall be 3/4 inch diameter threaded steel coated with two coats of coal tar epoxy paint or approved spray on bituminous automotive undercoating material. Tie rod system or assembly is subject to Muscatine Power and Waters approval.
- L.** Mechanical joint restraints shall be EBAA Iron Inc. 1100, 1100SD, or 1100HD Series MEGALUG Mechanical Joint Restraints or equal.
- M.** Polyethylene pipe wrap shall conform to ANSI/AWWA C105/A21.5 American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
- N.** Insulation shall be Pittsburgh Corning Foamglas with Pittwrap. Insulation thickness shall be as shown on the plans.
- O.** Service lines 2 inches in diameter and smaller shall be Type K (heavy), soft annealed, seamless copper. Connections to existing service lines (where required) shall be three piece compression type, Mueller or Ford style.
- P.** Corporation and curb stops shall be as follows:
1. Corporation: Mueller No. B-25008, 1 inch brass. Corporations are provided by Muscatine Power and Water unless otherwise specified in the Contract Documents.
 2. Curb stops: Mueller H-10314 curb stop box and valve with 5 foot long curb box, extension type – arch pattern base, one piece lid with rod, upper section lid to be two hole.
- Q.** Service tapping saddles 1 1/2 inch and 2 inch sizes for tapping ductile iron and cast iron pipe shall be Smith Blair 317 service saddles, flexi-blue epoxy coated with stainless steel straps for use on ductile iron or cast iron pipe.
- R.** Service saddles for tapping HDPE pipe shall be Smith-Blair 317 service saddles, flexi-blue epoxy coated with stainless steel straps for use on HDPE pipe.
- S.** Backflow prevention devices shall conform to requirements of MP&W's current "Backflow Prevention Policy" and MP&W's current "Customer Service Handbook". Check with MP&W's Metering Department for latest updates of both documents.
- T.** Tracer wire to be #12 copper, blue polyethylene jacketed direct bury type. Tracer wire splices shall be Nicopress sleeve number TI-080C.

PART 3 - CONSTRUCTION

3.01 INSPECTION AND TESTING.

- A.** Construction will be inspected by MP&W or other designated representative.
- B.** In place trench compaction testing will be done in accordance with Article 2552.03, F of the Standard Specifications.
- C.** One set of four concrete test cylinders shall be taken for each concrete pour. Cylinders will be retained by MP&W and broken if a question arises as to the strength of the concrete provided. Each cylinder shall be provided with a tag giving the date, time, location and strength requirements specified for the Project. Tag to be taped to each cylinder with several wraps of fiber packing tape.
- D.** All pipe and appurtenances are subject to inspection by MP&W at the point of delivery. Material found to be defective due to manufacture or damaged in shipment shall be rejected or recorded on the bill of lading and removed from the job site. MP&W may perform tests as specified in the applicable AWWA standard to ensure conformance with the standard. In case of failure of the pipe or appurtenance to comply with such Specifications, responsibility for replacement of the defective materials becomes that of the Manufacturer or Contractor.
- E.** Tracer wires will be tested by MP&W for continuity shortly after pressure testing has been completed.
- F.** Pressure and leakage testing shall conform to the requirements of ANSI/AWWA C600 AWWA Standard for Installation of Ductile Iron Water Mains and Their Appertenances. Portions of the above Specification with minor editing are included below for field reference.

Pressure test after initial flushing of line and after bacteriological testing has passed

Pressure testing shall be conducted through MP&W installed corporations and not through fire hydrants.

- 1.** Water mains shall be pressure tested at valved sections, not exceeding 1200 feet in total length. The owner shall be notified of the time of the test a minimum of 24 hours prior to the test. Pressure tests shall be conducted only after successful bacterial testing if chlorination tablets are utilized for disinfecting the main. If chlorine injection disinfection is used, pressure testing can be performed before chlorination. Tap shall be installed just after the first valve and at the end of the line not to exceed 1200 feet to allow for test ports for pressure testing and sampling.

Test pressure shall not exceed pipe or thrust-restraint design pressure.

The pressure test shall consist of holding a minimum hydrostatic pressure of 150 pounds per square inch for a period of two hours at the lowest elevation of the test section. A 2 pound test gauge with a minimum capacity of 160 pounds will be required. The test shall begin and end at the same pressure. The water necessary to bring the line to initial pressure shall be measured according to AWWA C600-82.

Valves shall not be operated in either direction at differential pressures exceeding the rated valve working pressure.

Test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

CAUTION: Pressurizing HDPE pipe for testing or placing into service requires additional precautions: Pressurize HDPE pipe in accordance with manufacturer's recommendations. Leaks at pressurized fusion joints may immediately precede catastrophic and sudden pipe separation and result in violent and dangerous movement of piping or attached parts and cause a sudden release of piping contents under pressure. Never approach or attempt to repair or stop leaks while pipe is pressurized. Always depressurize pipe before making corrections. Faulty fusion joints cannot be repaired. They must be cut out and rejoined using proper heat fusion procedures.

2. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. After all the air has been expelled, all corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place as directed by MP&W.
3. Allow the system to stabilize at the test pressure before conducting the leakage test.
4. All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, hydrants, or joints that are discovered during the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until line passes test.
5. All make up water and make up water containers and pumps shall be cleaned and disinfected with chlorine.
6. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
7. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SDP^{0.5}}{148,000}$$

Where:

- L = allowable leakage, in gallons per hour
- S = length of pipe tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the leakage test, in pounds per square inch (gauge)

These formulas are based on an allowable leakage of 10.49 gpd/mi./in. of nominal diameter at a pressure of 150 psi.

- a. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. of nominal valve size shall be allowed.
- b. When hydrants are in the test section, the test shall be made against the main valves in the hydrants.
- c. Acceptance of installation. Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in this section, the Contractor shall, at Contractor's own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.
- d. All visible leaks are to be repaired, regardless of the amount of leakage.
- e. Maximum allowable leakage at 150 psi test pressure is shown in following table:

Pipe Diameter (inches)	Maximum Allowable Leakage Rate (gallons per hour per 1000 feet of pipe)
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.16
16	1.32
18	1.49
20	1.66
24	1.99
30	2.48
36	2.98

- G. Bacteriological testing - MP&W will take bacteriological samples for in-house analysis on two successive days after disinfection and before pressure testing of each section of new installation. Contractor shall assist MP&W in collecting samples as required. MP&W will not place installation into operation until test results from water samples taken test out satisfactory. All bacteriological and pressure testing shall be completed prior to the installation of service lines.

A more specific description of the process follows:

Once the pipe section has been slowly filled (if tablets were used), the bacterial/disinfection test will be officially started. The test requires the pipe to stand for 24 hours undisturbed after the initial chlorination testing confirms that a minimum of 25 ppm available chlorine is present. If less than 25 ppm of chlorine is available at initial filling, the test will be considered invalid and pipe must be rechlorinated. After 24 hours the residual will be checked to confirm that not less than 10 ppm of chlorine is available. If confirmed, the pipe can be flushed until the available chlorine is equal to the normal distribution levels and a sample for analysis will be drawn. The pipe shall be isolated again for 24 hours. After 24 hours the water will be tested a second time to confirm not less than 0.3 ppm of chlorine remains in the main. If confirmed a second sample will be drawn for bacteriological analysis. If both samples confirm negative for bacteria the line can be pressure tested and placed in service once the pressure testing has been successfully completed. Failure of any of the above test results will require additional testing and chlorination.

3.02 LOCATING BURIED UTILITIES.

Contractor shall contact the Iowa One-Call system at 1-800-292-8989 for locations prior to doing any excavating (48 hour notice required).

3.03 PROTECTION OF EXISTING FACILITIES.

Contractor shall exercise care to assure that all private and publicly owned facilities, buildings, poles, wires, walkways, roadways, and other items near the construction area and not shown as removal items on the Plans are protected so they are not damaged or destroyed. Contractor shall repair or replace all damaged items.

3.04 WORK BY OWNER AND COORDINATION WITH OWNER.

- A. Contractor shall coordinate activities with MP&W so that disturbances to normal utility water system operations are minimized. Contractor shall provide a minimum 24 hours notice to MP&W to allow adequate scheduling of men and equipment. Contractor shall assume all responsibilities

for costs incurred due to the lack of 24 hour notice to MP&W.

- B. Operation of all valves and hydrants during charging of main, pressure testing, disinfection and bacteria testing shall be by MP&W unless MP&W specifically directs otherwise.
- C. MP&W will provide tapping and corporations up to 2 inch size required for blowing off air and making pressure tests to line segments installed. This work will be paid by MP&W and not billed to contractor.
- D. Tapping of existing water mains with taps of up to 12 inch size will be done by MP&W unless otherwise noted in the contract documents. Costs for this work will be paid by MP&W and not billed to contractor.
- E. MP&W will hold electrical poles where necessary for construction if construction is within the MP&W's electrical service area. Contractor shall provide a minimum 24 hours notice to MP&W to allow adequate scheduling of men and equipment.

3.05 TRENCH EXCAVATION.

- A. Excavation depth to provide a minimum 5 feet cover over top of pipe.
- B. Trench width shall be ample to permit the pipe to be laid and joined properly but should be no more than 12 inches on either side of the pipe. Keep walls of trench vertical below top of pipe.
- C. Level trench bottom to provide uniform bearing and support for full length of the pipe barrel. Provide bell holes for each pipe joint. Stones found in the trench shall be removed for a depth of at least 6 inches below bottom of pipe.
- D. If soft, spongy, or otherwise unsuitable materials are encountered which do not provide suitable bedding or support for the pipe, Contractor shall notify Contracting Authority's designated representative immediately.
- E. If removal of unsuitable material is authorized, Contractor shall replace unsuitable materials granular backfill as appropriate.
- F. All pipe installations shall be conducted only in dry materials. Contractor shall take such steps as are necessary to prevent surface and ground water from flowing into the excavation. Remove all accumulated water by pumping or dipping with equipment bucket.
- G. Dewatering systems, if required, shall be subject to MP&W's approval and shall remain in place until construction work and testing have been completed.
- H. Compact light weight trench boxes or shoring shall be required in front yard stop box replacements for contractor's safety and to minimize disturbances to lawn, sidewalk and parking areas.

3.06 BACKFILL AND COMPACTION.

- A. Backfill shall not proceed until water main installation, thrust blocking or thrust restraints have been inspected and approved by MP&W.
- B. Backfill materials shall be suitable soils from trench excavation or from a borrow area approved by Contracting Authority. Suitable materials shall be free of debris, small stones, rock, roots, lumps, frozen materials or any other items that will prevent placing and compacting the material to the density required.

- C. Backfill under or within five feet of the edge of roadways or parking areas shall be granular backfill compacted in accordance with this Special Provision.
- D. Backfill shall be placed on both sides of pipe simultaneously to prevent displacement. Place backfill in successive horizontal lifts of not more than 8 inches loose depth. This depth may be adjusted if it can be shown that required compaction can be achieved utilizing a different layer thickness. Backfill shall be placed and compacted using hand equipment up to 18 inches above top of pipe.
- E. Place material at proper moisture content for obtaining specified density.
- F. Compaction requirements are as follows:
 - 1. Areas beneath or within 10 feet of edge of roadways or parking and other paved areas shall be compacted to 95% of maximum dry density as determined by ASTM D698.
 - 2. All other areas shall be compacted to 90% of maximum dry density as determined by ASTM D698.
 - 3. Method of compaction is subject to Contracting Authority's and MP&W's approval.
- G. "Flooding" or "jetting" of backfill trench is not an acceptable compaction method or process and will not be approved.

3.07 PIPE AND MATERIAL HANDLING AND STORAGE.

- A. All pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with hoists or skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skid ways shall not be rolled or skidded against pipe on the ground.
- B. Slings, hooks, or pipe tongs shall be used in such a manner as to prevent damage to the exterior surface or internal lining of the pipe.
- C. Stored materials shall be kept safe from damage. The interior of all stored and placed pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times by use of tight fitting end plugs or sturdy durable plastic bags or other MP&W approved means. Pipe and fittings contaminated with mud and surface water shall be removed from the site and not used in construction unless thoroughly cleaned by the Contractor and inspected and approved by MP&W. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.
- D. Gaskets for mechanical and push-on joints shall be stored in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. Mechanical-joint bolts shall be handled and stored in a dry location in a manner that will ensure proper use with respect to types and sizes.

3.08 PIPE INSTALLATION.

- A. Pipe installation shall conform to the requirements of ANSI/AWWA C600 AWWA Standard for Installation of Ductile Iron Water Mains and Their Appurtenances.
- B. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench by means of suitable tools, rigging and equipment, in such a manner as to prevent

damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench. The trench shall be dewatered prior to installation of the pipe.

- C. All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the MP&W, who may prescribe corrective repairs or reject the materials.
- D. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.
- E. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other materials shall be placed in the pipe at any time.
- F. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material. Lay pipe in the dry.
- G. At all times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the MP&W. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water.
- H. Cutting pipe for insertion of valves, fittings, or closure pieces shall be done in conformance with all safety recommendations of the manufacturer of the cutting equipment. Cutting shall be done in a safe, workmanlike manner without creating damage to the pipe or cement-mortar lining. Pipe may be cut using a hydraulic squeeze cutter, abrasive pipe saw, rotary wheel cutter or guillotine pipe saw. Cut ends and rough edges shall be ground smooth, and for push-on joint connections, the cut end shall be beveled by methods recommended by the manufacturer and approved by the MP&W.
- I. For installations requiring polyethylene encasement for ductile-iron pipe, the encasement shall be installed in accordance with ANSI/AWWA C105/A21.5 and recommendations of Ductile Iron Pipe Research Association Installation Guide for Ductile Iron Pipe.
- J. Pipe which is damaged or unsound will be rejected. Sound pipe before installation to detect cracks.
- K. Use suitable fittings where grades or alignments require offsets greater than manufacturer's recommended joint deflections.
- L. Follow manufacturer's recommended installation and assembly practices.
- M. CAUTION: Pressurizing HDPE pipe for testing or placing into service requires additional precautions: Leaks at pressurized fusion joints may immediately precede catastrophic and sudden pipe separation and result in violent and dangerous movement of piping or attached parts and cause a sudden release of piping contents under pressure. Never approach or attempt to repair or stop leaks while pipe is pressurized. Always depressurize pipe before making corrections. Faulty fusion joints cannot be repaired. They must be cut out and rejoined using proper heat fusion procedures.

3.09 TRACER WIRE INSTALLATION.

- A. Wire splices shall be made with a sleeve type connector, Nicopress splice sleeve kit no. TI-080C

for 12 B&S to 12 B&S, national standard.

- B. Two tracer wires shall be installed on top of water main once backfill has been brought up to top of pipe.
- C. Wire splices are to be wrapped first with a butyl rubber tape and second with electrical tape or shrink tubing.
- D. Each layer of tape should overlap the previous layer by approximately 50%.
- E. Tracer wires will be tested for continuity before final acceptance of the Project. Wires without continuity shall be repaired or reinstalled by Contractor.
- F. Tracer wire shall be brought up to ground level at all valve boxes by drilling or sawing a vertical slot in lower section of each valve box and bringing ends of the tracer wires up into the top of the valve box. File or grind slot or hole to remove any rough edges or burrs that could damage tracer wire or tracer wire insulation.
- G. Where spacing between line valve boxes is greater than 500 feet, provide separate tracer wire box set on a sackcrete base.

3.10 HORIZONTAL AND VERTICAL SEPARATIONS.

- A. Water mains shall be separated from gravity sewer mains by a horizontal distance of at least 10 feet unless:
 - 1. The bottom of the water main is at least 18 inches above the top of the sewer; and,
 - 2. The water main 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 sewer.
 - 3. If relocation is impossible to obtain the required horizontal clearance of 3 feet and the vertical separation of 18 inches between water mains and sewers, the sewer must be replaced with Class 51 mechanical joint ductile iron pipe conforming to ANSI/AWWA C151. However, a linear separation of at least two feet shall be provided.
- B. Water mains shall be separated from sewer force mains by a horizontal distance of at least 10 feet unless the force main is constructed of water main materials meeting AWWA pipe material specifications and a minimum pressure rating of 150 psig.
- C. Vertical separation of water mains crossing over any sanitary sewer or force main should be at least 18 inches when measured from the bottom of the water main to the top of the sewer. If this separation is impossible, the water main shall not be placed closer than 6 inches above a sewer or 18 inches below a sewer. The separation distance shall be the maximum feasible in all cases.

Where the water main crosses a sewer, one full length of water pipe shall be located so both joints are as far as possible from the sewer. The water and sewer pipes must be adequately supported and have water tight joints. A low permeability soil shall be used for backfill material within 10 feet of the point of crossing.

- D. 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.
- E. Should physical conditions exist such that exceptions to above separations are required, Contractor shall obtain MP&W's assistance for details which will provide protection equal to that provided by above items.

3.11 CONNECTIONS TO EXISTING WATER MAINS.

- A. Existing water mains shall remain in service during installation of new water main. Length of time for tie-in shall be kept to a minimum. Coordinate tie-in with MP&W.
- B. Uncover existing mains, to which connections are to be made, a sufficient time ahead of pipe laying operations to verify fittings required.
- C. Clean and disinfect existing main and inside of fittings and valves in accordance with Disinfection and Dechlorination section of this Special Provision.

3.12 GATE VALVES AND FITTINGS.

- A. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and seating surfaces, handling damage, and cracks. Defective valves shall be corrected or held for inspection by the MP&W. Valves shall be closed before being installed.
- B. Valves, fittings, plugs, and caps shall be set and joined to the pipe in the manner specified for cleaning and laying and joining pipe, except that 12 inch and larger valves should be provided with special support, such as crushed stone, concrete pads, or sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.
- C. Install valves with stems vertical, except where shown otherwise on Plans.
- D. Tighten valve glands on new and existing valves as work is installed; replace o-rings if required and retighten glands after valves are placed in operation and brought up to operating pressure. Replace any o-ring which is deteriorated or in unsatisfactory condition.
- E. A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve. Valve box shall be centered over the operating nut of the valve using an MP&W approved centering ring manufactured for that purpose. The box cover shall be flush with the surface of the finished area unless otherwise directed by the MP&W.
- F. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

3.13 TAPPING VALVES AND SLEEVES.

- A. Conform to requirements for gate valves and fittings above.
- B. Follow manufacturer's recommended assembly and installation practices.

3.14 FIRE HYDRANTS.

- A. Prior to installation, all hydrants shall be inspected for direction of opening, nozzle threading, operating-nut and cap-nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage, and cracks. Defective hydrants shall be replaced or held for inspection by MP&W.
- B. All hydrants shall be set plumb and shall have their nozzles parallel with or at right angles to the curb, with steamer (largest) nozzle facing the curb.
- C. Hydrants shall be set to the established grade, with the center line of the lowest nozzle at 18 inches to 24 inches above the ground unless otherwise directed by MP&W.

- D. Hydrant drains shall not be connected to, or located within 10 feet of, sanitary sewers and storm drains.
- E. All fire hydrants shall be independently valved.
- F. A detail showing typical hydrant installation is shown in the contract documents.
- G. In addition to thrust blocks all hydrant assemblies, tees, valves, and pipe shall have restrained joints.

3.15 THRUST RESTRAINT/BLOCKING.

A. Thrust blocking.

1. Provide thrust blocks where buried piping changes direction, changes size, and at dead ends.
2. Thrust blocks will be cast in place concrete unless otherwise noted on the Plans.
3. Concrete thrust blocks shall be cast against undisturbed vertical edge of trench for bearing. Bearing surface of thrust block shall be symmetrical vertically and horizontally with respect to line of force of pipe or joint.
4. Install thrust blocks as shown on drawings.
5. Sizes of thrust blocks in square feet of bearing area for water mains based on soil bearing capacity of 2000 pounds per square foot are listed below:

Pipe Size	90° Bend	45° Bend	22.5° Bend	Dead End or Tee
(Inches)	(Square Feet)			
4	3	2	2	2
6	6	3	2	4
8	10	5	3	7
10	14	8	4	10
12	20	11	6	14
14	26	14	8	19
16	34	19	10	24
18	40	22	11	28
20	52	28	15	37

6. Thrust blocking from pipe sizes greater than 20 inches will be as shown in the contract documents.
7. Concrete shall have a minimum compressive strength of 4000 psi in 28 days. Allow concrete adequate time to reach a compressive strength of 3000 psi prior to pressure testing.
8. Thrust blocks at dead ends, at plugs and at caps shall be removable so that lines may be easily extended after testing and a period of normal service.
9. Trust blocks at fittings shall be placed in such a manner as to permit tightening of mechanical joint bolts after placement of trust block.
10. Thrust blocks shall be subject to inspection and approval of the MP&W prior to water main

testing.

11. A detail drawing showing typical thrust block installations is shown in the plans.

B. Tie rods.

1. Tie rods and fittings shall be suitable for use with mechanical joint fittings.
2. Coat tie rods and fittings with two coats of coal tar paint or spray on bituminous automotive undercoating material after installation.
3. Tie-rod assemblies and systems are subject to MP&W's approval.

C. Thrust restraint.

Mechanical joint restraints for push on or mechanical joints may be used instead of concrete blocking when indicated on the Plans.

3.16 DISINFECTION AND DECHLORINATION.

- A. Disinfection shall be in accordance with ANSI/AWWA C651 AWWA Standard for Disinfecting Water Mains. Method to be used on new construction is 5 gram hypochlorite tablets unless otherwise specified. Contractor shall furnish and install hypochlorite tablets using appropriate food grade adhesive.
- B. Keep piping to be chlorinated isolated from lines in service and other points of use.
- C. Coordinate disinfection with MP&W in order to minimize disruption to MP&W's existing water system.
- D. Owner will dechlorinate and flush lines after disinfection.

PART 4 – METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Method of measurement and basis of payment shall be according to Section 2554 of the Standard Specifications.