STANDARD WATER MAIN SPECIFICATIONS

LANSING BOARD OF WATER AND LIGHT

January 2023

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A. DESCRIPTION

1. General

This Work shall consist of the construction of ductile iron water mains and the construction of new water services for the Lansing Board of Water and Light (BWL) as shown on the plans and directed by the Engineer.

This Work shall be in accordance with AWWA standards and MDOT Standard Specifications for Construction. Unless otherwise noted, all Work, equipment and materials shall conform to the latest revisions of these standards, specifications, and to BWL standards as set forth in the Water T&D Construction Standards as described herein. All materials shall be new and ANSI/NSF 61 Certified.

2. Submittals

The Contractor shall submit shop drawings for all materials necessary for the construction of the water main, valves, hydrants, temporary main and water services.

3. Contractor Qualifications

The Contractor shall submit to the BWL documentation relating to their recent experience with installing water mains and water services which adequately demonstrates to the BWL that the contractor or subcontractor is capable of installing these facilities in accordance with all contract requirements.

B. MATERIALS

1. General

Product manufacturers and material suppliers listed below have been approved by the BWL for use in construction of their facilities. The Contractor shall be responsible for ensuring that materials submitted for use on the project are those that fully comply with the FHWA Buy America provision. All product suppliers listed in the specifications may not meet the Buy America requirements and these products will not be allowed.

2. Backfill

Backfill shall conform to Section 401 of the MDOT Standard Specifications for Construction with the following modifications:

a. Bedding and backfill material placed within 12 inches of the pipe shall be MDOT Class IIIA granular material.

b. Stone bedding or other material that could damage the Polyethylene pipe encasement shall not be used.

3. Ductile Iron Pipe

Ductile Iron Pipe shall meet or exceed the following standards or latest revision thereof, or approved equal:

Ductile Iron Pipe – ANSI/AWWA C151/A21.51; ANSI/NSF 61
Cement-mortar Lining – ANSI/AWWA C104/A21.4; ANSI/NSF 61
Rubber Gasketed Joints – ANSI/AWWA C111/A21.11; ANSI/NSF 61

Ductile Iron Pipe shall be as manufactured by the following or approved equal:

U.S. Pipe Company
McWane Ductile
American Ductile Iron Pipe Company

Ductile Iron Pipe shall meet AWWA thickness for pressure class 350 for 3 inches through 20 inches, pressure class 300 for 24 inches, and pressure class 250 for 30 inches.

Ductile Iron Pipe shall be furnished in 18 or 20-foot nominal lengths.

Ductile Iron Pipe shall be cement-mortar lined and coated inside and outside with a bituminous seal.

4. Joints

Joints shall meet or exceed the following standards or latest revision thereof, or approved equal:

Rubber-gasket Joints – ANSI/AWWA C 111/A21.11/NSF 61

Unrestrained joints shall be the following products or approved equal:

U.S. Pipe Company – Tyton Joint
McWane Ductile – Tyton Joint
American Ductile Iron Pipe Company – Fastite Joint

Restrained joints shall be the following products or approved equal:

American Ductile Iron Pipe Company – Fast Grip, diameter 4-inch to 30-inch
American Ductile Iron Pipe Company – Field Flex Ring, diameter 14-inch to 36-inch
U.S. Pipe Company – Field-Lok 350

Glands shall be the following products or approved equal:

EBBA Iron Company – Mega-Lug (Series 1100)
Ford Meter Box Company – Uni-flange (Series 1400)
Sigma – “One-Lok” retainer gland, “SLD” Series Flange Adaptors

Environmental joints shall use an approved joint depending on the contamination type on site. Gasket type will be determined on a case by case basis by an environmental review. When possible, Nitrile gaskets are preferred. Gaskets shall be compliant with the approved pipe and joint materials specified above. Environmental gaskets can be expected to consist of either:

Nitrile (Buna-N or NBR) - Preferred
Fluoroelastemer Fluorel (FKM)

Environmental Gaskets shall be as manufactured by the following or approved equal:

U.S. Pipe Company
McWane Ductile
American Ductile Iron Pipe Company

Push-on joint pipe shall be of a type, which employs a single gasket (without gland) to affect the joint seal.

Mechanical joint pipe shall be bolted gland and gasket type.

5. Hydrants

All fire hydrants shall be the dry-barrel type and shall be furnished and installed in accordance with the latest revision of AWWA C502, C600, and UL 246.

Fire Hydrants shall be the following or approved equal:

American Waterous – Pacer 250 psi
East Jordan Iron Works – 5BR250

Hydrants shall be nominal 5-inch size with the inlet to be 6-inch mechanical joint. Slip joints shall not be used for hydrants. The main valve opening shall have a minimum diameter of 5¼ inches. Barrels shall be flange above ground line so that the head can be turned. This flange shall be “Traffic Model” break-a-way design; weakened flange bolts, by themselves, shall not constitute an acceptable break-a-way design.

Hydrants shall be 5.5’ depth of bury (5’ depth of cover).

Main valves, which open against line pressure, shall have a bronze seat ring held in place by bronze retainer ring or bushing.

Hydrant heads shall have two 2½-inch National Standard hose connections and one 5-inch integral Storz^{tm} fitting as manufactured by Harrington, Inc. or Kochek Co. for the pumper connection, all to be in the same plane. The use of Storztm adapter nozzles will not be permitted. The connection caps shall be equipped with heavy-duty, non-kinking chains or cables to keep caps attached to the nozzle section.

The hydrant nozzle section shall be capable of rotation through 360 degrees with respect to the standpipe.

Upon installation, drain ports shall be plugged unless a competent person on-site determines the drain ports may remain open. Under no circumstances shall the drain ports be opened if the competent person observes or suspects seasonal or permanent high groundwater table or the presence of contamination in the area of the hydrant installation. All other aspects of the installation shall comply with AWWA C502 and C600.

All hydrants shall be furnished with a 1½-inch pentagon-operating nut at least 1-inch in overall height and shall open by turning counterclockwise.

The finish color of paint above the ground line and extending a minimum of 18 inches below the ground line shall be Fire Engine Red, by Valspar, or Engineer’s approved equal.

6. Polyethylene Pipe Encasement

Polyethylene pipe encasement shall meet or exceed ANSI/AWWA C 105/A21.5.

Polyethylene pipe encasement shall be as manufactured by the following or approved equal:

Repcor Incorporated
Trumbull Industries, Inc.

Polyethylene pipe encasement shall be at least 8 mils thick.

7. Valves

Valves 3-inch to 20-inch shall be resilient-wedge gate valves meeting or exceeding AWWA C509, ANSI/NSF Standard 61. Protective epoxy interior castings shall meet or exceed ANSI/AWWA C550.

Valves 24-inch to 36-inch shall be horizontal resilient wedge gate valves meeting or exceeding AWWA C509, ANSI/NSF Standard 61. Protective epoxy interior castings shall meet or exceed ANSI/AWWA C550.

Valves shall be the following products or approved equal:

American Flow Control – Model 2500 Series
Clow Company – Model F-6100 Series
U.S. Pipe Company – Model 250 R/S Series
Mueller Company – Model 2360 Series
East Jordan Iron Works – Flow Master Series

All valves shall have a 2-inch square-operating nut.

Valve operators for valves on existing pipes 16-inches and greater and proposed pipes 24-inches and greater shall use bevel gearing. Horizontal installation gate valves shall be furnished with rollers, tracks, and scrapers. Bevel gearing shall be in a totally enclosed gear case.

Valve operators for valves on existing pipes 16-inches and greater and proposed pipes 24-inches and greater shall use bevel gearing. Horizontal installation gate valves shall be furnished with rollers, tracks, and scrapers. Bevel gearing shall be in a totally enclosed gear case.

Resilient-Wedge Valves:

a. Resilient-wedge valves shall be fusion-bonded epoxy coated inside and out and have a bottle-tight shut-off.

b. The wedge shall be constructed of gray ductile cast iron, and fully encapsulated in synthetic rubber except for the guide and wedge nut areas.

c. The wedge rubber shall be molded in place and bonded to the ductile iron portion, and shall not be mechanically attached with screws, rivets, or similar fasteners.

d. The wedge shall seat against seating surfaces arranged symmetrically about the centerline of the operating stem, so that seating is equally effective regardless of direction of pressure unbalance across the wedge.

8. Fittings

Fittings shall meet or exceed the following standards or latest revision thereof, or approved equal:

Ductile Cast Iron Fittings – ANSI/AWWA C153/A21.53
Cement-mortar Lining – ANSI/AWWA C104/A21.4
Rubber-gasket Joints – ANSI/AWWA C111/A21.11
Protective Epoxy Interior Coating – ANSI/AWWA C550 & ANSI/NSF Standard 61

Fittings shall be as manufactured by the following or approved equal:

American Flow Control
Clow Company
Tyler/Union Foundry
U.S. Pipe Company
Star Pipe Products
Sigma Corporation

All mechanical-joint fittings shall be of the short-body design (except sleeves, which shall be long pattern) rated for 350 psi for ductile cast-iron.

All fittings shall be cement-lined and coated inside and outside with a bituminous seal, or epoxy coated.

9. Valve Boxes

Valve boxes shall accommodate a manufacturer's standard 5¼-inch shaft. Buffalo style curb boxes shall accommodate a 2½-inch shaft. Valve boxes shall have a standard size bonnet with a base width between 17-18 inches.

10. Follower Glands and Restraining Joint Glands

Glands shall meet or exceed ASTM A536, ANSI/AWWA C115/A21.15, ANSI/AWWA C111/A21.11 and ANSI/NSF 61.

Glands shall be wedge type. Screw or pin type glands are not acceptable.

Acceptable manufacturers of glands were listed in section 4 – Joints.

11. Service Connection Piping

Service connections shall be constructed of Type K, soft temper copper, ASTMB88, ANSI/NSF 61, water tube for underground service.

Water service piping shall be as manufactured by the following or approved equal:

Cerro Flow Products
Mueller Industries
Wolverine Brass

Cambridge Lee
Howell Metal Company
Yorkshire Copper Tubing
Kobe Wieland Copper Products
National Copper Products (coils only)

Service piping with diameters 1 inch and less shall be supplied in 60 or 100-feet coils. All service piping greater than 1 inch shall be supplied in 20 feet stick lengths only.

12. Corporation Stops

Corporation stops shall meet or exceed ANSI/AWWA C-800 and ANSI/NSF 61 with copper AWWA/CC taper thread. Inlet and outlet diameters shall be of the same size as service connection.

Corporation stops shall be the following products or approved equal:

Ford Meter Company – Model No. FB1000-Q-NL
Mueller Company – Model No. B25008N

Corporation stop adapters shall be the following products or approved equal:

Ford Meter Company – Series C104-XX-Q-NL
Mueller Co. – Series H15502/H15072N (½-1 inch XS) and H15512N (¾-inch and 1-inch XXS)

13. Service Saddles

All service saddles shall meet or exceed ANSI/AWWA C800 and ANSI/NSF 61. All service saddles shall have 304L stainless steel straps and malleable or D.I. body with an enamel shop coat finish. Service saddle outlet shall be tapped for AWWA taper (C.C.).

Service saddles shall be the following products or approved equal:

Ford Meter Box Co., Inc.
Mueller Co.
Smith-Blair, Inc.
Romac Industries, Inc.
Cascade Waterworks Mfg.
A. Y. McDonald (4” – 12”)

14. Curb Stops and Boxes

Curb stops shall meet or exceed ANSI/AWWA C-800 and ANSI/NSF 61. Curb stops shall be the same diameter as the new service connection.

Curb stops shall be the following products or approved equal:

Ford Meter Company – Model No. B44-444-NL
Mueller Company – Model No. B25209

Curb boxes shall be the following products or approved equal:

Tyler Corporation – Model No. 650095E

Bibby-Ste-Croix – Model No. BSC-95EB
Sigma – 95E Type
Star – 95E Type
A.Y. MacDonald – 5700 41x66

15. Tapping Sleeves

Tapping sleeves shall be a mechanical joint and meet or exceed ANSI/NSF 61. Taps shall be done under pressure without interruptions to service.

Tapping sleeves shall be as manufactured by the following or approved equal:

Powerseal Pipeline – 3480 or 3490 series
Romac Industries – SST III series
Smith-Blair Incorporated – 662, 663, 664, or 665 series
Ford Meter Box Co. FAST or FTSS series

16. Repair Sleeve

Repair sleeves shall be ductile iron and meet or exceed the latest revision of the following standards:

ANSI/AWWA C111/A21.11
ANSI/NSF Standard 61

The exterior of the repair sleeve shall be Type 304 stainless steel and shall be full-circle design with a full-circumference gasket. The nuts and bolts shall be Type 304 stainless steel.

17. Couplings

Couplings shall be shoulder stop type compression fittings only. Pack joint type fittings shall not be allowed. Couplings shall be the following or approved equal:

Mueller Company – Style 110
Ford Meter Box Company – Quick Joint
A.Y. MacDonald Mfg. Co. “Q” Series

18. Temporary Water Main

Temporary water main system (pipe, joints, connectors, restraints, etc.) shall be the following or approved equal:

CertainTeed Certa-Lok – Yelomine (High Impact)
JM Eagle - HDPE

NSF-61 PVC certified water pipe can be used for temporary potable water services for individual homes provided that the PVC piping will be replaced during the construction season with copper piping. PVC piping shall also meet NSF Standard 14 and bear the “NSF-PW” (NSF-Potable Water) mark on the outside wall of the pipe.

19. Line Stops

All water main line stop materials shall be Type 304 stainless steel. Line stops shall be suitable for cast iron water mains with normal water pressure of 80 to 90 psi. Line stops must be able to remain in place until directed for removal.

20. Trench Dams

Trench dam fill shall be bentonite material which shall consist of bentonite chips and/or bentonite pellets.

Trench dam fill shall be the following or approved equal:

Baroid – Holeplug 3/8” coarse grade
AquaBlok

C. CONSTRUCTION

1. Maintaining Water Service

The Contractor shall maintain water service to existing residences while installing the new water main. Any damage to existing utilities by the Contractor shall be repaired at their expense.

Known non-standard water services (lead or galvanized iron pipe) that are active have been replaced as part of a previous project. If non-standard services are encountered and disturbed during construction, the Contractor shall immediately close the curb stop to the property and notify the Engineer and the BWL. The BWL will determine the applicable method for providing temporary water service to the affected property until the non-standard service is replaced. The Contractor shall assist the BWL as necessary to install the temporary service.

Known non-standard water services (lead or galvanized iron) that are inactive may be replaced with a new service stub as part of this project as determined by the BWL. These locations have been identified in the construction plans.

Any change to the design plans indicating relocation of water main to facilitate new utility construction shall be approved by the Engineer.

Unless approved by the Engineer, water mains scheduled to be relocated to facilitate new utility construction shall be relocated prior to the new utility construction. New water services shall not be installed onto the new main until the new main has been tested, disinfected, approved, and connected to the existing main.

2. Temporary Water Main

Where it is not feasible, as indicated by the Engineer, to relocate the main prior to the new utility construction, the Contractor shall construct and maintain a temporary water service system, upon approval by the Engineer and BWL. The system shall consist of an "at grade" manifold system with service connection made at the existing curb stop. The Contractor shall submit a written proposal showing the proposed temporary water service system, layout, and schedule of the duration of the temporary system. The temporary system shall be in place, tested, and approved by the Engineer and BWL

prior to shutting off the existing main and maintained until the services are ready to be connected to the new main.

3. Water Service Interruptions

The Contractor shall not schedule a water main or water service shutdown prior to 9:00 a.m. or after 5:00 p.m. in a primarily residential area, without authorization from the BWL.

For commercial, government and institutional properties, and apartment complexes the Contractor shall coordinate water service interruptions with the business and shall not schedule water main or water service shutdowns during normal business hours, without approval from the BWL. Scheduled shutdowns in commercial areas may require nighttime and/or weekend activities, the cost of which shall be considered incidental to the cost of installing the water main and/or services. Note that nighttime and/or weekend activities may require a noise ordinance waiver from the City.

The Work to "cut off" existing water mains and to connect new and temporary water mains to the existing water main shall be performed within the time constraints specified above. The connection of existing water services to new or temporary water mains shall be performed within the time constraints specified above and shall not exceed 30 minutes in duration. Water services interrupted as part of the sewer construction shall not be included in the time constraints specified above but shall be reestablished as soon as possible and prior to completion of the day's activities. Contractor shall provide information to the customer pertaining to the City of Lansing Fire Department regulations which apply when a building’s fire protection service is interrupted. Fire Department information will be provided to the Contractor by the BWL.

The above time constraints shall not apply to individual properties whose water service is interrupted to facilitate sewer construction. In such instances, water service shall be re-established as soon as possible and prior to the completion of the day’s activities.

The Contractor shall notify the Engineer in writing of all scheduled water main shutdowns a minimum of three working days in advance of the shutdown.

The Contractor shall provide written notification to all properties a minimum of three working days in advance of a scheduled shut down. Notices to commercial properties shall be delivered personally to a manager or other responsible person at the business. Where individual water services may be potentially shut down during construction, the Contractor shall notify the property owner/resident a minimum of one working day in advance of the Work.

In the event of an unscheduled water main shut down the Contractor shall immediately notify the Engineer. If the Engineer is not immediately available, the Contractor shall contact the BWL and report the shutdown. The Contractor shall immediately begin activities to notify affected residents of the shut down and begin repairs to the water main and reestablish the water service.

4. Contractor Operation of Existing Valves

Operation of valves, hydrants, or other water related components by the Contractor to facilitate the Work shall follow the BWL's recommended guidelines. This includes, but is not limited to, the opening speed of valves/hydrants to minimize pressure surges. Any damage resulting from the improper operation of water related components by the Contractor shall be repaired and/or replaced by the Contractor to the satisfaction of the BWL at no additional cost.

The Contractor shall operate water valves as necessary, with prior notification to the BWL. The Contractor shall follow the BWL "lock out-tag out" policy when operating water main valves. Upon completion of the water main Work, the Contractor shall ensure that all valves on the system have been opened and notify the Engineer. At no time shall a valve on a water main in operation be left in the closed position.

5. Utility Conflicts

The Contractor shall uncover existing utilities sufficiently in advance of the water main installation so that potential elevation conflicts between the water main and other utilities, including existing sewer mains and sewer house leads, can be determined, and adjustments to the elevation of the water main can be made.

In order to avoid such conflicts, the water main shall be lowered by deflecting at a rate not to exceed the pipe manufacturer's recommendations, or a vertical/horizontal offset constructed. Clearance between existing utilities and the proposed water mains shall be no less than 18 inches, unless otherwise directed by the Engineer. No additional compensation shall be allowed to the Contractor for meeting the requirements of this provision unless receiving approval by the Engineer prior to installing water main.

6. Protection of Trees and Shrubs

Where directed by the Engineer, the Contractor shall tunnel beneath trees; being careful not to disturb the roots any more than is necessary. Work to tunnel beneath trees shall be included in the cost to reconstruct the water service.

7. Trenching and Shoring

Trenches shall be open cut to a minimum depth sufficient to provide for a 3-inch cushion of MDOT Class IIIA granular material under the pipe, and 5 feet of cover over the top of the pipe on the line established by the Engineer, and shall be excavated to sufficient width for proper placing of the pipe and fittings. The depth of cover on the pipe may vary based on the location of existing utilities. Any change shall be approved by the Engineer.

Prior to excavation, the pavement shall be saw cut vertically to its full depth. Location of saw cuts shall be determined by the Contractor and approved by the Engineer.

Alignment of the trench shall be as shown on the drawings unless otherwise indicated in writing by the Engineer.

All water mains installed deeper than 6 feet below final grade must be approved by the Engineer.

All valves installed deeper than 6 feet below final grade, must be approved by the Engineer. If valves are approved to be constructed deeper than 6 feet for the

convenience of the Contractor, the Contractor shall provide the necessary valve box extensions and operating unit extensions at no additional cost. If the Engineer directs the Contractor to install valve(s) deeper than 6 feet, the cost to provide the valve box and operating nut extensions shall be considered extra Work and paid for as “Additional Fittings.”

The excavation shall be opened to the required grade for an adequate distance in advance of the completed water main to reveal obstruction but, unless permitted by the Engineer, not more than 50 feet of trench shall be open at one time.

8. Pipe Installation

The Work shall be in accordance with the latest revision of AWWA Standard C600.

Water mains shall be installed with a minimum of 10 feet horizontal separation from all sanitary and storm sewers and at a minimum depth of cover of 5 feet, unless otherwise approved by the Engineer.

All pipe fittings, valves, hydrants, and other accessories shall be handled in such a manner to avoid damage to the lining and coating. Damaged lining and coating shall be repaired in a manner satisfactory to the Engineer.

The interior of all pipe, fittings, and other accessories shall be kept clean and free from all soil and foreign matter at all times.

Valves and hydrants, before installation, shall be drained and stored in a manner that will protect them from damage by freezing.

All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to pipe. Under no circumstances shall materials be dropped into the trench.

A 4-inch compacted sand cushion (MDOT Class IIIA granular material) shall be provided under the entire length of the pipe. Pipe shall be carefully laid to the line and grade and shall have bearing on the sand cushion over its entire length; except at joints where bell holes shall be of such size as to give adequate room to work.

Immediately before installation, each section of pipe or fitting shall be thoroughly cleaned of all debris, dirt, and other foreign material. The pipe shall be inspected for damage to coating or pipe material and repairs made where required. Care shall be taken to keep the interior of the pipe clean and free from dirt with the use of bulkheads at the open end of the pipe.

Polyethylene pipe encasement shall be placed on each section of pipe, and on all fittings and valves, in compliance with ANSI/AWWA C105/A21.5 requirements, Method "A,” so that there are no voids in the coverage, with the exception of a drainage hole at each hydrant panel.

In areas of contaminated soil, Contractor shall construct a clay dam at the ends of the contaminated area, as directed by the Engineer. See section 23 “Trench Dams”.

9. Restrained Pipe and Fittings

At all pipe deflections over 20 degrees, tees, valves, bends, and dead ends shall be restrained joints, tied, or harnessed in a manner approved by the Engineer. The restraint shall be applied to joints in each direction from the deflection to resist the axial thrust of the test pressure to the minimum distance as shown on the Pipe Restraint Schedule on the Drawings. Joint restraint shall be installed on either side of the valves. Fire hydrant valves shall be restrained from the main line to the hydrant. Details of all proposed joint restraint, showing the type and locations, shall be submitted to the Engineer for approval. All pipe and fitting restrained joints shall be rated for a minimum of 250 psi.

Restrained joints shall also be used in areas of poor soils, as directed by the Engineer. Environmental restrained joints shall be used in areas of soil contamination, as directed by the Engineer.

Where directed by the Engineer, the Contractor shall install additional joint restraints beyond the limits specified on the Pipe Restraint Schedule. When not shown on the drawings or specified, installations of additional fitting or restraint will be considered extra Work.

Where directed by the Engineer, the Contractor shall install environmental joints. Environmental joints may be restrained or non-restrained joints depending on the soil conditions and shall use approved restrained joints and approved environmental gaskets.

Mechanical-joint fittings shall be used at tees, bends and valves.

10. Thrust Blocks

Where shown on the plans and directed by the Engineer, the Contractor shall construct thrust blocks. The use of thrust blocks in lieu of joint restraint will not be permitted unless approved by the Engineer.

11. Hydrants

Hydrants assemblies will be provided and installed by the BWL from the outlet side of the isolation valve to the fire hydrant per the Fire Hydrant Assembly detail. The Contractor shall install the fire hydrant valve assembly in order to complete the installation of the hydrant within the following criteria.

The Contractor shall perform the excavation for the installation of the fire hydrant with the trenches being in accordance with MIOSHA standards prior to the BWL being onsite to perform the hydrant installation. The Contractor shall notify the BWL Inspector to schedule BWL crews when the fire hydrant valve assembly and excavation for the hydrant installation are complete. The BWL shall be responsible for setting the hydrant within 2 working days' notice. If the hydrant is not installed within the 2 working days, the Contractor may backfill the hole and the BWL will have to complete the excavation and backfill with their own crews.

The BWL shall set the hydrants at the location shown on the drawings and as directed by the Engineer. All hydrants set within the street right-of-way shall have their grade line

mark located 2-8 inches above the finished grade at the hydrant. The Contractor shall be responsible for setting the hydrant isolation valve at the correct depth, so no additional fittings or extensions are required to maintain proper grade.

Hydrants on water mains installed with more than 5 feet of cover shall be set to proper grade by use of bends and fittings, to be paid as “Additional Fittings”. Hydrant extensions will not be used without prior approval from the BWL. Hydrant barrels shall be wrapped in polyethylene pipe encasement with an opening made at the drain hole to allow water to flow from the hydrant barrel when closed.

The Contractor shall follow the BWL "lock out-tag out" policy when operating water main valves. Newly installed hydrants shall be bagged until hydrant is in use.

Upon the completion of the hydrant installation by the BWL, the Contractor shall backfill the trench in accordance with the detail for the Fire Hydrant Valve Assembly and the trench details within the contract.

12. Pressure Testing, Flushing and Disinfecting

Refer to Water T&D Construction Standard W-02-0005, “Flushing, Pressure Testing, and Disinfection of New Water Mains/Large Services”.

13. Standard Service Line Connection

Where shown on the plans and directed by the Engineer, the Contractor shall construct new water services from the water main to the curb stop continuously without intermediate couplings, except where noted on the plans or as directed by BWL.

Corporation stops shall be constructed in accordance with AWWA C-600. Corporations shall be constructed a minimum of 12 inches apart. Polyethylene pipe encasement shall be taped in accordance with AWWA C-105 and BWL Standard Detail.

Where existing water services are removed within the sanitary sewer trenching, for the convenience of the Contractor, the entire service between the main and curb stop shall be replaced at the Contractor’s expense.

Prior to connecting the new service piping to the existing service piping, the new service piping and existing service piping shall be flushed and back flushed with sufficient volume and velocity to remove all foreign material and inspected for leaks and the corporation and curb stop with line pressure on. If foreign material is not removed and causes subsequent damage to the individual residence’s/user’s service or meter, the Contractor shall be solely responsible for all repairs to the individual residence’s/user’s service or meter.

14. Non-Standard Water Services

Non-standard water services are defined as water services which are not constructed of copper, such as lead (Pb), or galvanized iron. As noted previously, known non-standard water services that are active have been replaced by the BWL. There may be areas in which inactive non-standard services exist that will require the Contractor to install a new service stub for future use. These areas are identified on the construction plans.

If non-standard services are encountered and disturbed during construction, the Contractor shall immediately close the curb stop to the property and notify the Engineer and the BWL. The BWL will determine the applicable method for providing temporary water service to the affected property until the non-standard service is replaced. The Contractor shall assist the BWL as necessary to install the temporary service.

Non-standard water services to vacant lots shall be replaced to the curb stop only. The Contractor shall remove the existing curb box, and stake location of new curb box using #5 rebar per the detail on the plans.

When replacing non-standard water services, all Work shall be completed between the normal hours allowed for water shut down. The maximum duration of water interruption for an individual property shall be 8 hours, unless a water shut down is ordered by the BWL.

Non-standard water services left in place shall be abandoned by the Contractor. Cost for abandonment and shut down of the corporation on these services shall be included with adjacent items of Work.

Existing corporations on a live main that are to be abandoned, whether from non-standard services, standard services or temporary service connections, shall have the service pipe removed, corporation shut off, and a screw on cap placed on the corporation. The cost for abandoning the existing corporation shall be included in other items of Work.

15. Repair to Individual Residence's/User's Service

In the event that an individual residence's/user's service or internal plumbing system is plugged, or otherwise damaged due to actions of the Contractor such as: in-adequate flushing of the water mains or service connections, improper operation of valves and hydrants, etc. the following steps shall be taken:

a. The Engineer/BWL shall be notified immediately.

b. The BWL shall inspect the residence's/user's plumbing system to determine the cause of the plugging/disruption.

c. If the BWL determines the cause of the disruption is related to actions of the Contractor, the Contractor shall immediately take all steps necessary to restore water service to the residence/user and correct all damage done by the construction debris/foreign materials. This shall include all activities required by a licensed plumber to clear, fix, or replace any plumbing components within the residence's/user's property, which has been affected by the construction debris/foreign materials. The corrective actions shall be completed within one full calendar day of notification by the BWL.

16. Testing of Hydrants

The Contractor shall test each hydrant by flushing the hydrant in the presence of a BWL agent and RPR. During the test period, the gate valve shall be closed and opened.

The hydrant shall be checked for leaks by first expelling all air from the barrel of the hydrant and then allowing normal water main pressure to fill the hydrant with all outlet caps tightly in place.

17. Water Main Cap-Off

Where called for on the plans or directed by the Engineer, the Contractor shall cap off the existing water main. Where the proposed water main cannot be relocated prior to construction of the sanitary sewer and as approved by the Engineer, the Contractor shall temporarily cap off the existing water mains until the proposed water main has been constructed. The existing water main shall be capped with a mechanical joint cap or plug with a 2-inch curb stop tapped into the end of the cap, a 2-inch riser pipe to grade level, and flushed on an as-needed basis using low flow conditions until the discharge water runs clear.

18. Valve Testing

The Contractor shall test all valves, including curb stops, in the presence of the Engineer and BWL representative after final surface restoration and before removal of traffic control. The test shall consist of ensuring that the valve wrench will engage with the operation nut and that the valve can be fully opened and closed. The Contractor shall ensure that all valves, both new and existing, which are within the project or were otherwise operated to facilitate the construction, have been left in the open position.

19. Connecting to Existing Water Mains

The connection of the new water main to the existing water main shall typically be made with “megalugs.” In the event that the existing water main is of such material that the material is structurally deficient to withstand the tightening of the lugs, refer to the Engineer for an alternative method of connection.

20. Water Utility Investigation

Where shown on the drawings or directed by the Engineer, the Contractor shall investigate the location of existing water main or service, or perform a valve dig-up for BWL crews. This Work shall include all preliminary investigation required, including contacting the utility owner, use of magnetic or other type instruments and all field investigation required to locate the water main or service. Included in this Work will be the excavation to expose the existing utility, protection of other utilities, measurements as to its location, placement of compacted backfill and the placement and maintenance of any temporary roadway surface.

This Work may also include excavation, backfill, and placement of a temporary road surface in areas where the water main/valves are repaired by BWL crews.

21. Meter Pit Installation

Where shown on the drawings or directed by the Engineer, the Contractor shall perform a dig-up for an exterior meter pit replacement by the BWL. The Contractor shall remove the existing meter pit, excavate for the new meter pit, and backfill once the meter pit

installation is complete. The BWL will perform the removal of the water meter and the installation of a new water meter and associated piping.

22. Environmental Management

Handling:

If suspicious, known or unknown, spoil/water contamination is found, workers shall immediately notify their supervisor and/or project manager and BWL Engineer and stop work. Contamination may be identified by, but not limited to, any of the following conditions: odor, a Photoionization Detector reading, color or sheen.

Once workers are cleared to proceed, all potentially contaminated spoils/water shall be segregated from the work area immediately and stored properly until characterization of spoils/water is complete (e.g. spoils in roll off box; on top of protective barrier (plastic), protected from precipitation and erosion or water in a frac tank, drums, lined detention pond).

All suspicious or known contaminated spoils shall not be utilized as backfill within the water main trench under any circumstances.

Spoils/water shall be properly contained on site in appropriate containers during Work.

If previously unknown or unsuspected hazardous material(s) are encountered during construction, the material must be handled and stored in the legal manner that prevents cross-contamination with clean backfill until a determination is made for transportation and disposal.

Disposal:

All spoils/water shall be disposed of in accordance with all applicable Federal, State and Local waste disposal regulations at an approved licensed landfill and/or treatment, storage, or disposal facility.

Manifests, utilized for hazardous waste (if generated), nonhazardous waste and liquid industrial by-products, shall be submitted to the representative of the project owner.

23. Trench Dams

Where shown on the drawings or directed by the Engineer, the Contractor shall place cut-off trench dams of bentonite material across and along the pipe trench at locations shown on the plan. Trench Dam construction shall comply with BWL Construction and Material Standards, or plan details if approved by the BWL Engineer.

D. MEASUREMENT AND PAYMENT

The completed Work as described will be measured and paid for at the contract unit price using the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Water Main, Connect to Existing	Each

Water Main, DI, _____ inch, Tr Det G, Modified .....Foot
Water Main, DI, _____ inch, Tr Det G, Modified, Raw .....Foot
Water Main Fitting, _____inch, Sleeve .....Each
Water Main Fitting, _____inch x _____inch, Tee .....Each
Water Main Fitting, _____inch x _____inch, Cross .....Each
Water Main Fitting, _____inch x _____inch Reducer .....Each
Water Main Fitting, _____inch, _____ Deg Bend .....Each
Water Main, Additional Fittings .....Lb
Water Main, _____ inch, Cap Off .....Each
Water Main, Additional Restraint .....Each
Water Main, _____ inch, Abandon and Fill .....Foot
Water Main, MJ Environmental Joint, _____inch .....Each
Water Main, SJ Environmental Joint, _____inch .....Each
Water Main, RSJ Environmental Joint, _____inch .....Each
Water Main, Trench Dam .....Each
Gate Valve and Box, _____ inch, Modified .....Each
Valve Box, Rem .....Each
Water Service, Main Connection, _____ inch .....Each
Water Service, _____ inch .....Foot
Water Service, Curb Stop and Box .....Each
Fire Hydrant, Valve Assembly .....Each
Fire Hydrant, Rem .....Each
Fire Hydrant, Excavation and Backfill .....Each
Fire Hydrant, Assembly .....Each
Gate Box, Salv .....Each

Measurement and payment for ***Water Main Connect to Existing*** shall be on the basis of the unit price bid for each location where a new water main or valve, larger than 2 inch diameter, is connected to an existing water main irrespective of the number of water pipes connected thereto. Payment shall include excavation, backfill, compaction, notification to users, connecting the new main to the existing main using required tees, elbows, offset pipes, thrust blocks, temporary restraint and other fittings, installation of blow-off valve, flushing, chlorination and testing, and all other labor, materials and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, DI, ____ inch, Tr Det G, Modified*** shall be on the basis of the unit price bid per foot of water main constructed. Measurement shall be along the centerline of the water main including all fittings except those listed separately. Payment shall include saw cutting of existing pavement, excavation, construction of water main including all fittings; restrained joints per the Pipe Restraint Table; design, construction, and maintenance of temporary water services; backfill, compaction, testing, disinfecting, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, DI, ____ inch, Tr Det G, Modified, Raw*** shall be on the basis of the unit price bid per foot of water main constructed. Measurement shall be along the centerline of the water main including all fittings. Payment shall include saw cutting of existing pavement, excavation, construction of water main including all fittings; restrained joints per the Pipe Restraint Table; design, construction, and maintenance of temporary water services; backfill, compaction, testing, disinfecting, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main Fitting, _____ inch, Sleeve*** shall be on the basis of

the unit price bid for each sleeve constructed. Payment shall include excavation, providing and installing the sleeve, joint restraint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main Fitting, _____ inch x _____inch, Tee*** shall be on the basis of the unit price bid for each tee constructed. Payment shall include excavation, providing and installing the tee, joint restraint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main Fitting, _____inch x _____inch, Cross*** shall be on the basis of the unit price bid for each cross constructed. Payment shall include excavation, providing and installing the cross, joint restraint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main Fitting, _____inch x _____inch, Reducer*** shall be on the basis of the unit price bid for each reducer constructed. Payment shall include excavation, providing and installing the reducer, joint restraint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main Fitting, _____ inch, _____Deg Bend*** shall be on the basis of the unit price bid for each bend constructed. Payment shall include excavation, providing and installing the bend, thrust block or joint restraint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, Additional Fittings*** shall be on the basis of the unit price bid per pound for the identified weight of each additional fitting to be used. Payment shall include only fittings that are not shown on the plans and the installation of which is directed by the Engineer. Payment shall also include restraining the joint at the fitting.

Measurement and payment for ***Water Main, _____inch, Cap Off*** shall be on the basis of the unit price bid for each main cut and capped. No payment shall be made for cap off not explicitly called for on the plans or directed by the Engineer. Payment shall include excavation, backfill, compaction, cutting on the existing main, construction of the cap or plug, installation of the curb stop or permanent plugs, joint restraint, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, Additional Restraint*** shall be on the basis of the unit price bid for each restrained joint beyond the limits specified in the pipe restraint schedule. Payment shall include excavation, providing and installing the restrained joint, backfill and compaction, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, _____ inch, Abandon and Fill*** shall be on the basis of the unit price bid per foot of existing water main abandoned and filled. Payment shall include abandoning and filling, in whole or in part, existing water main, dispose of removed materials, backfill and compact, and all other labor, material, and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, MJ Environmental Joint, _____ inch*** shall be on the basis of the unit price bid for each environmental mechanical joint constructed at the direction of the Engineer. Payment shall include all materials, labor and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, SJ Environmental Joint, _____ inch*** shall be on the basis of the unit price bid for each environmental stab joint constructed at the direction of the Engineer. Payment shall include all materials, labor and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, RSJ Environmental Joint, _____ inch*** shall be on the basis of the unit price bid for each environmental restrained stab joint constructed at the direction of the Engineer. Payment shall include all materials, labor and equipment necessary to complete the Work.

Measurement and payment for ***Water Main, Trench Dam*** shall be on the basis of the unit price bid for each as directed by the Engineer. Payment shall include sheeting, geotextile fabric, trench preparation, installation, and all other labor, materials and equipment necessary to complete the Work.

Measurement and payment for ***Gate Valve and Box, _____ inch, Modified*** shall be on the basis of the unit price bid for each valve and box constructed. Payment shall include excavation, backfill, compaction, construction of the valve and box, including base and joint restraint, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Valve Box, Rem*** shall be on the basis of the unit price bid for each valve box removed. Payment shall include removal and disposal of the valve box, opening of the valve if required, and all labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Service, Main Connection, ____ inch*** shall be on the basis of the unit price bid for each corporation constructed. Payment shall include excavation, providing and installing the corporation, compression union (south side only), abandonment of the existing corporation, backfill, compaction, and all other labor, material, and equipment necessary to complete the Work. Payment for connections between water services larger than 2-inch and the water main shall not be paid for separately but shall be included in the pay item for Water Service, ____ inch.

Measurement and payment for ***Water Service, _____ inch*** shall be on the basis of the unit price bid per foot of service constructed. This pay item is for construction of the water service between the main and curb stop, or service connection point using open-cut trenching methods. Only those services shown on the drawing or directed by the Engineer to be replaced shall be paid. Services removed and replaced for the convenience of the Contractor shall not be paid separately and shall be included in the cost to complete the project. Payment shall include excavation, disposal of the existing service materials, backfill, compaction, abandonment of the existing curb stop or valve, removal of any existing valves and existing service pipe, construction of the copper service including all fittings or restrained joints, thrust blocking, connection to the existing service and main, flushing, testing where necessary and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Water Service, Curb Stop and Box*** shall be on the basis of the unit price bid for each curb stop and box constructed. Payment shall include excavation, providing and installing the curb stop, backfill, compaction, adjusting of the curb box to final grade, testing, and all other labor, materials and equipment necessary to complete the Work. Where an existing curb box is to be salvaged and reused, no additional payment for the curb box shall be made. The Work to install and adjust the curb box shall be included in the price for the curb stop.

Measurement and payment for ***Fire Hydrant Valve Assembly*** shall be on the basis of the unit price bid for each assembly constructed. The assembly shall be measured by the each from the outlet of the tee and including the shut-off valve, plug, 2" nipple, ball valve cap per *Dead End Main with Temporary/Permanent Cap* detail. Payment shall include excavation, backfill, compaction, piping, joint restraints, shut off valve, valve box, testing, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Fire Hydrant, Rem*** shall be on the basis of the unit price bid for each hydrant removed. Payment shall include removal and disposal of the hydrant or salvaging the hydrant to the BWL if specified on the drawings, capping of the tee if require, and all labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Fire Hydrant, Excavation and Backfill*** shall be on the basis of the unit price bid for per each fire hydrant assembly constructed. The fire hydrant, excavation and backfill shall be measured by the each. Payment shall include excavation of trench per MIOSHA standards prior to BWL arriving on-site, protecting the excavation including protective fence until backfill is complete, backfilling, compaction including MDOT 6A stone around drip opening, testing, coordination with BWL inspector to schedule crew to install hydrant, and all other labor, materials and equipment necessary to complete the Work.

Measurement and payment for ***Fire Hydrant, Assembly*** shall be on the basis of the unit price bid for each assembly constructed. The assembly shall be measured from and including the fire hydrant to the water main. Payment shall include excavation, backfill, compaction, piping, all required fittings, joint restraints, shut off valve, valve box, fire hydrant, testing, and all other labor, materials, and equipment necessary to complete the Work.

Measurement and payment for ***Gate Box, Salv*** shall be on the basis of the unit price bid for each gate box salvaged. Payment shall include the removal of the gate box in a manner that causes no damage to the box and placement in a safe location for the BWL to pick up.