MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**WATER MAIN MATERIALS AND CONSTRUCTION**

BWB:CAW 1 of 7 APPR:RPB:CJD:02-21-24

**a. Description.** This work consists of installing the following materials as part of the city of Port Huron water system. Unless otherwise noted below, ensure all work, materials, construction requirements, and methods of measurement and payment are in accordance with the standard specifications.

**b. Submittals**. Submit PDF product data consisting of shop drawings and manufacturer’s literature to the Engineer and the city of Port Huron for approval at least 10 working days prior to construction.

Submit a general work plan outlining the procedure and schedule to be used for installation of the water main.

**c. Materials.** Furnish the listed materials below in accordance with *AWWA* standards and the standard specifications. The specific items listed conform to city of Port Huron water system requirements and no substitutions are permitted.

All materials supplied must comply with the Michigan Safe Drinking Water Act of 1976 and the

Reduction of Lead in Drinking Water Act, Public Law 111-380.

1. Ductile Iron Pipe. Furnish Class 52 DI pipe of the sizes shown on the plans, except ensure 20-inch diameter and larger pipes are Class 54 DI pipe.

2. Ductile Iron Fittings. Each fitting must have clearly marked on the body *ANSI/AWWA C153/A21.53*, the pressure rating, nominal diameter of openings, manufacturer’s identification, country where cast, the letters DI or the word Ductile, and for bends the number of degrees. During storage ensure the DI fittings are stacked neatly.

Ensure DI fittings are in accordance with *AWWA C153, Class 350* DI for sizes 6-inch diameter through 24-inch diameter and *Class 250* for sizes larger than 24-inch diameter. All fittings, unless authorized by the Engineer, must have mechanical joints. Ensure mechanical joint fittings are in accordance with *ANSI/AWWA C111/A21.11*. Crosses for fittings will not be allowed.

Ensure fittings are thrust blocked as shown on the plans.

3. Joints. Ensure joints for mainline DI pipe are of the push-on-type as manufactured by Tyton, Super Bell-tite, Fastite or Engineer approved equal. Ensure joints for fittings and valves are mechanical type. Ensure both push on type and mechanical type joints are in accordance with all applicable requirements of *AWWA C111*.

Between pipe sections, valves and fittings, ensure a positive connection is maintained to electronically trace the pipe. For push on type joints, place a minimum of two brass wedges between each section of pipe up to 8-inch diameter, and four brass wedges for pipes 10 inch and larger. Brass wedges are not required to be installed at mechanical joints.

Joint restraint is required for all fittings, valves, water main lowerings, river crossings, hydrant leads, water main within casing pipes, and/or as directed by the Engineer. Restrained joints must consist of stainless steel or DI components coated as provided by the manufacturer. Ensure restrained joints are rated for a minimum of 350 psi for 3-16 inch and 250 psi for 18-48 inch with a safety factor of 2 to 1 and be *UL* listed.

Ensure for main line DI pipe, boltless restraint are used. Acceptable boltless restraint for sizes 6-inch diameter through 24-inch diameter pipes are the FIELD-LOK restraining gasket as furnished by U.S. Pipe, Clow, Griffin, or Engineer approved equal. For pipe sizes larger than 24-inch diameter pipe, acceptable boltless restraints are T.R. Flex, Flex-Lok, Super-Lok, or Engineer approved equal.

Ensure bolted restraints are used for all fitting and valve joints. Bolted restraints that utilize gripping wedges must have torque limiting twist off nuts for the gripping wedges. Ensure bolted restraints are MJ FIELD-LOK, EBAA Megalug Series 1100, Romac Industries RomaGrip or Engineer approved equal. Concrete thrust blocks as shown on the plans are still required even though restrained joints are used.

Water main construction within the contaminated areas require fluoroelastomer gaskets.

4. Gate Valve. Ensure gate valves are RIGHT TURN OPEN and must have mechanical joint ends. Ensure gate valves are in accordance with *AWWA C509*, cast iron body, fully bronze mounted, no-rising stem type (4-inch to 12-inch) EJIW, Clow, Mueller, or Engineer approved equal. Ensure valves are rated for minimum 200 psi working pressure, 400 psi test on valves 4 to 12-inches. All valves must have bronze non-rising stems with O-ring seals. All resilient seal valves must have a bonded epoxy coating inside. Ensure gate is cast iron or ductile, with no exposed iron surface. Valve must have operating nut attached to stem. Ensure operating nut is no more than 1/2 inch above the top of the valve body or seal plate to assist in preventing dirt from entering into the stem seal area, and also to reduce the potential for stem damage during handling. Ensure all resilient seal valves are mechanical joint or equal. Ductile iron fittings and appurtenances constructed within contaminated areas require a special polyethylene wrap as recommended by the manufacturer and in accordance with *ANSI/AWWA C105/A21.5*.

5. Butterfly Valve. Ensure butterfly valves are of the size as shown on the plans. Butterfly valves are to be LEFT TURN OPEN and must have mechanical joint ends. Ensure butterfly valves are in accordance with *AWWA 504, 1.1.1.4*. Ensure butterfly valves, 16 inch and larger are rated for minimum 150 psi working pressure, 300 psi test pressure. Ensure the valve body is constructed of *ASTM A126, Class B* cast iron or *ASTM A536* DI. Ensure butterfly valve discs are *ASTM A126, Class B* cast iron or *ASTM A536* DI. Furnish discs with 316 stainless steel seating edge to mate with the rubber seat. Ensure the butterfly valve seat is Buna-N rubber located on the valve body. Ensure valve shafts are stainless steel *ASTM A564/A564M*, *Type 630, Condition H-1100*. Design shaft seals that allow replacement without removing the valve shaft. Ensure butterfly valve actuators are fully grease packed and have stops in the open and closed positions. Ensure all components are designed and rated for buried service. Prior to burial, ensure the gear box and opposite side stuffing box is completely coated with gear grease and wrapped in polyethylene of not less than 1 mill thickness. Install a standard valve box over the standard *AWWA* 2-inch square operating nut and adjusted to final grade. Ductile iron fittings and appurtenances constructed within contaminated areas require a special polyethylene wrap as recommended by the manufacturer and in accordance with *ANSI/AWWA C105/A21.5*.

6. Valve Boxes. Ensure valve boxes are of 3-piece cast iron construction having a base section which is flared and circular. Ensure valve box shafts are 5¼-inch inside diameter, with a top section of the screw type and furnished with a drop-in cover marked “WATER”, Tyler Pipe 6860 Series (usually D). Furnish valve box bases as follows:

• 12-inch valves and larger = #160 base

• 8-inch and 10-inch valves = #6 base

• 4-inch and 6-inch valves = #4 base

7. Water Service Taps. Water services, unless noted otherwise, must consist of a 1-inch full bore corporation stop, and a 1-inch Type “K” copper pipe. Water service taps of 1½-inch diameter or larger must include a double strap bronze saddle with threaded connection installed per pipe manufacturer’s recommendations. Ensure corporation stops are Ford F-600 series, flare type, full bore for the size stated.

8. Curb Stop and Box. Curb stops must consist of a Ford B-22 Series full bore curb stop (without waste). Ensure the accompanying box is a cast iron adjustable screw type service box, such as Tyler/Union with arch pattern base and a bolt down lid marked “WATER”. For curb stops larger than 1-inch, use valve boxes instead of curb stop boxes.

9. Corporation Stops. Ensure corporation stops are full bore, Ford 600 Series, as sized on the plans Stops must be of all brass construction with the types of ends as required by the conditions of installation and Mueller style threads.

10. Hydrants. Ensure hydrants in the city Port Huron are EJIW Model 5BR 250, 5.5 feet bury depth, with mechanical joint connections. Endure hydrants are of the compression type and conform to *AWWA Standard Specifications* and the *UL* requirements. Hydrants must have two, 4½-inch diameter pumper connections only. Pumper connection threads must conform to Detroit Standard Thread (4.566 X 6). Ensure hydrant barrels are a minimum of 6-inches in diameter with a 6-inch diameter valve opening. Ensure the hydrant inlet is a 6-inch mechanical joint connection.

Extension kits can only be used if approved by the Engineer. Paint all hydrants red above grade. Do not furnish cap retaining chains. Ensure hydrant valves are RIGHT TURN OPEN.

11. Polyethylene Wrap. All DI pipe, fittings and appurtenances constructed within contaminated areas require a special polyethylene wrap as recommended by the manufacturer and in accordance with *ANSI/AWWA C105/A21.5.*

12. Concrete. Pour concrete thrust blocks in place and in accordance with the standard specifications and must have a minimum flare strength at 28 days of 3000 psi.

13. Pipe Bedding Material. Ensure pipe bedding material is Trench Backfill IIIA, Modified. Trench Backfill IIIA, Modified must meet the following gradation requirements:

**Table 1: Gradation Requirements**

|  |  |  |
| --- | --- | --- |
| Material | Sieve Analysis - Total % Passing | Loss by Washing |
|  | 3/8 | 100 | % Passing No. 200 |
| IIIA Modified | 100 | 0-35 | 0-7 |

14. Backfill Material. Ensure the backfill material is in accordance with the standard specifications and is the type specified on the plans as Port Huron Trench Detail.

**d. Construction.** Ensure construction is in accordance with the *AWWA* standards, the standard specifications, city of Port Huron standards and as detailed on the plans. Construct water main with a minimum of 5 feet of cover.

1. Shutting Off Water. On any water shutdown, all customers affected must have a 24-hour notice taped to the front door window or on a door hanger telling them how long the water is to be off and an approximate time of the day the shut off will occur. The city of Port Huron can supply to the Contractor pre-made flyers in which the date and time need to be filled in. Distributing the flyers is the responsibility of the Contractor.

After the water main is shut down, wait 1/2 hour before cutting the water main. This is considered enough time for any resident or business to contact the city if they do not have water and were not notified, they would be without water. Only operate valves on new mains not yet physically connected to the existing water system. The Contractor must familiarize themselves with the location of existing valves and have the valves witnessed so they are made easily accessible for emergency shut offs. Ensure witness information is approved by the Engineer prior to removing the street or placing new valves in service. Select witness references such that information is useable throughout all phases of the work. Ensure access to all active valves is always maintained. The Contractor must always keep on the job all the necessary equipment to make emergency repairs without undue delay.

If the city’s Utilities Division cannot shut the water main down at the requested time, no down time will be given to the Contractor. There is no guarantee that shutdowns will be complete. (i.e. valves may leak or not close all the way). There will be no compensation for down time or trench dewatering/pumping if the water main cannot be completely shut down.

In case of an emergency break in a water main due to construction operations, it is the Contractor’s responsibility to notify the city Utilities Division at (810) 984-9770. The Contractor is responsible for fixing that water main break. The Contractor must supply potable water for the immediate needs of those deprived of such service.

Before the water shut down will occur, the Contractor must verify with the city of Porth Huron that the Contractor has all material to do the work.

Operations of commercial, industrial, and other municipal water system customers can necessitate shutdowns be scheduled to occur outside of normal working hours such as at night or on Sunday. No additional compensation will be made for having to work outside of normal working hours.

2. Pipe Handling. Distribute the pipe at the site as required and exercise care to prevent damage to the pipe in handling. Furnish proper tools and implements satisfactory to the Engineer for safely handling the pipe and other materials. Prevent pipe from falling either from the truck to the ground or into the trench. When distributed along the line or stored near a road, ensure the pipe and fittings are placed to avoid posing a potential hazard to passing vehicles or pedestrians. Neatly stack the pipe. Do not stack pipe near intersections nor under drip lines of trees. Inspect all materials before placing in the trench, and if found to be defective, marked "REJECTED" and remove from the site. There will be no compensation for rejected materials.

3. Trench Bottom. Ensure the bottom of the trench is uniform and graded so that the entire barrel of the pipe is uniformly supported by the required thickness of bedding material. Take special care so that the bedding material below the bottom of the pipe is compacted to furnish firm support for the entire barrel of the pipe. Dig bell holes, as required, to receive the bells of the pipe. No shims, piles of sand or lumps of earth can be used to raise the pipe to grade, use a firm and even bed formed of approved bedding material properly placed and compacted.

4. Pipe Bedding and Trench Backfill. Do not place backfill against any portion of a structure until the structure has passed inspection and has been approved by the Engineer for backfilling. Backfill all trenches as soon as inspection is completed.

Pipe bedding material from 4 inches below the pipe barrel to a level at least 12 inches above the pipe barrel must conform to the trench material on the plans and this special provision, carefully placed in 6-inch layers and compacted to not less than 98 percent of maximum density. Backfill compaction is subject to testing by the controlled density method.

5. Hydrant Installation. Install hydrants as shown on the plans, or as directed by the Engineer, and set plumb. Ensure hydrant leads are 6-inch diameter pipe. Install in the “L” shaped configuration shown on the plans unless otherwise approved by the Engineer. Adjust hydrants so that the standard pumper connections are equally oriented toward the street, unless otherwise directed by the Engineer. Ensure the fire hydrant valve is not turned by the Contractor. Furnish and install the hydrant such that the break-a-way point of the hydrant, (bottom of the lower flange), is located not less than 2 inches nor more than 6 inches above finish grade at the hydrant, regardless of water main depth. Where required due to variances in water main depth of cover, install fittings between the hydrant valve and the hydrant, including up to 10 feet of hydrant lead pipe between the 90-degree elbow and the hydrant base, included in the hydrant pay item. Ensure hydrant shutoff valves are 6-inch with a standard cast iron valve box with drop-in cover marked "WATER". Install extension of the hydrant lead after the valve is installed. Install hydrant valves as close to the water main as possible. Before the fire hydrant is put in service, ensure the hydrant is inspected by the Engineer to insure proper flow.

When replacing hydrants on existing mains and depth (bury) adjustment is required, accomplished this with angle fittings between the elbow and the hydrant shoe on the hydrant lead. Where required due to variances in water main depth of cover, install fittings between the hydrant valve and the hydrant, and are considered as included with the installation of the hydrant assembly.

6. Cleaning and Disinfection. The city of Port Huron uses only the *AWWA Wet Method* for disinfection of water main sizes 16-inch diameter and smaller. Before the new water main lines are pressure tested, ensure they are cleaned, disinfected, and passed bacteriological testing. Ensure the steps used in the disinfection process are in accordance with the *AWWA Standard for Disinfecting Water Mains*, *ANSI/AWWA C651*. Approved method for accomplishing disinfection in the city of Port Huron is the "continuous-feed method". The procedure must follow the *AWWA* standards in addition to the following:

A. Preventative Measures During Construction. Prevent undesirable materials from entering the water main during storage, construction, or repair.

Do not store pipe over the winter months on site nor near an intersection. Ensure all openings in the pipeline are closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons.

B. Velocity Flushing. Remove by velocity flushing, and other means, those undesirable materials that may have entered the water main.

Before being chlorinated, ensure the main is filled through a Reduced Pressure Zone (RPZ) backflow preventer to eliminate air pockets and flushed to remove particulates. Furnish the RPZ to be installed by the city’s Utilities Division. Installation will not occur until the appropriate hydrant use permit is obtained from the city of Port Huron’s Water Office. The hydrant use permit requires that the RPZ has been certified within the last year by a licensed plumber. During Velocity Flushing, a Contractor’s representative must be present at all times. After 1 hour of velocity flushing the Contractor will stop flushing the main unless given express consent in writing from the Engineer to continue. Direct the flushing water to a sanitary or combined sewer only.

C. Final Flushing. Final flushing, up to 1 hour, then wait another 24 hours.

During the final flushing, city personnel will be monitoring the flushing at all times. At no time must the hose be in a cross-connection situation. Ensure the flushing hose is not placed in a manhole or catch basin at any time. Once the concentration reaches the general prevailing concentration in the system, which is estimated to be about 1 hour, stop the flushing or be billed for the additional water used.

D. Bacteriological Testing. No bacteriological tests will be permitted from a fire hydrant, whether the hydrant is new or old.

Samples will be taken by city personnel. Arrange for samples to be collected by city personnel and tested by city personnel. The current city of Port Huron collection and laboratory test fee per sample will be at the Contractor's expense.

Flushing between tests is not allowed.

Hoses are acceptable for flushing if they have only been used for potable water. Take samples from copper whips installed for that purpose. On pipe installation of less than two pipe lengths long, cleaning and disinfection is acceptable, with the approval of the Engineer. Ensure the pipe is thoroughly inspected during this process.

7. Hydrostatic Testing. Pressure testing can be performed before the bacteriological testing, if that part of the system being tested is physically disconnected from the distribution system, or an approved block and bleed isolation connection is constructed. Correct all visible leaks regardless of the amount of leakage. Hydrostatic testing of the pipe will not be paid for separately but is included in the price for the water main pay item.

**e. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price in accordance with subsection 823.04 of the Standard Specifications for Construction except as follows:

**Pay Item Pay Unit**

Water Main, DI, \_\_ inch, Port Huron Tr Det Foot

Water Main, Butterfly Valve and Box, \_\_ inch Each

1. **Water Main, DI, \_\_ inch, Port Huron Tr Det** will be measured and paid for as specified in this special provision and section 823 of the Standard Specifications for Construction.

2. **Water Main, Butterfly Valve and Box, \_\_ inch** includes all labor, materials, and equipment necessary to perform the installation, as required by this special provision and section 823 of the Standard Specifications for Construction.