MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**WATER MAIN MATERIALS AND CONSTRUCTION**

BCY:DJM 1 of 6 APPR:NJM:CJD:07-23-24

**a. Description.** This work consists of installing the following materials as part of the city of Saginaw’s 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 Saginaw 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 current *AWWA* standards and the standard specifications. The specific items listed conform to city of Saginaw water system requirements and no substitutions are permitted.

1. Pipe and Fittings. Furnish Class 52 DI pipe. Furnish DI mechanical joint or push-on type fittings as follows: DI fittings must meet *ANSI/AWWA C153/A21.53* and be Class 350. Ensure fittings are cement-lined in accordance with *ANSI/AWWA C104/A21.4*. Rubber gasket joints must meet *ANSI/AWWA C111/A21.11*. Furnish electrical conductivity at each joint. Coat the outside of the pipe with standard bituminous seal. Ensure the metal thickness class, net weight of the pipe without lining, the nominal size, and the manufacturer’s identifying symbol are clearly marked on each length of pipe. Wrap all DI pipe in PE in accordance with *ANSI/AWWA C105/A21.5*. In areas where non-hazardous contaminated soil is suspected, ensure DI pipe with Nitrile gaskets and poly wrap is used and are included in the cost of the water main.  Ensure the joint for the fittings are mechanical joint with elastomeric gasket in accordance with *ASTM D3139* and *ASTM F477*. PVC pipe must meet the requirements of *ANSI/AWWA C909*. Pipe must have a ratio of diameter to wall thickness (DR) of 18. Pipe must meet both *ANSI/NSF Standard 61* and *ANSI/NSF Standard 14*. Ensure pipe is marked with “NSF PW” or otherwise indicates it meets *NSF 14* and *61*. Ensure the pipe manufacturer and class is marked on each length of pipe. Ensure joints for pipe are push-on type with elastomeric gaskets meeting the requirements of *ASTM D3139*. All PVC pipe must come with a 50-year manufacturer’s warranty.

2. Restrained Joints. Furnish restrained mechanical joints from EBAA Iron, Inc. Megalug 1100 Series for mechanical joints for DI pipe, 1700 Series for push joint/bell restraints on DI pipe, 19MJ00 for mechanical joints for C909 PVC pipe, and 1900 for push joint/bell restraints on C909 PVC pipe. Ensure joints are in accordance with *ANSI/AWWA C111/A21.11*. Ensure all bolts for mechanical joints are made of low-alloy weathering steel in accordance with *ANSI/AWWA C111/A21.11*. Restrain all mechanical joints with retainer glands within length(s) according to restraint schedule as determined using EBAA Iron Restraint Length Calculator. Submit to Engineer product information and restraint schedule showing locations of use.

3. Gate Valves. Furnish Mueller, Clow, East Jordon Iron Works (EJ), or Engineer approved equal gate valve. Ensure valves meet *AWWA C509* and are resilient wedge with DI body. Ensure surfaces are epoxy coated per *AWWA C550* inside and outside. Valves must have a bronze non-rising stem (NRS) with two-inch square nut, fully encapsulated DI wedge per *ASTM D429*, with protective wedge guide covers for all sizes four inches and above. Ensure all wedges, four inches and above, are DI and fully encapsulated with ethylene propylene diene monomer (EPDM) rubber. Ensure valve stems are sealed with three O-rings that are replaceable under full pressure. Gate valves must have a clear waterway equivalent in area, when fully open equal to that of the connecting pipe. Ensure valves are made to open when turned to the right, or clockwise. Furnish gate valve joints with mechanical joints in accordance with *ANSI/AWWA C110/A21.10*, *ANSI/AWWA C111/A21.11,* or *ANSI/AWWA C153/A21.53*.

4. Valve Boxes. Ensure valve boxes comply with *AWWA M44* for cast-iron valve boxes. Include a slide or screw type top section, an adjustable extension length as required for depth of burial of the valve, and a plug with lettering “WATER”. Furnish a bottom section with a base of adequate size to fit over the valve and an approximately five-inch diameter barrel. Furnish boxes manufactured by Mueller, EJ, or Engineer approved equal. Ensure the valve box is cast iron, 5½ inch diameter, and three-piece adjustable screw type. Valve box extensions are required for depths greater than 6½ feet. No. 6 round bases are required for gate valves up to 8 inches in diameter and No. 160 oval bases for gate valves 10 inches and greater.

5. Hydrants. Furnish a 5¼ inch, EJ Model 5BR250, and 150-pound working pressure, traffic model fire hydrant in accordance with *AWWA C502* and *UL 246*, meeting the city of Saginaw requirements, with 4½ inch pumper nozzle, two 2½ inch hose nozzles, National Standard Thread (NST), 15/16-inch square operating nut and with mechanical joint (MJ) inlet. Painted city of Saginaw standard of Red at the factory with primer and two coats. Ensure the barrel length is properly sized, so the centerline of the pumper nozzle is 21 inches to 27 inches above grade at the specified depth of cover over the pipe. Furnish hydrant extensions that are 36-inch maximum, limited to one per hydrant. Install between breakaway flange and top of hydrant lower section. Ensure fire hydrants are completely assembled at the factory with the drain opening sealed with a threaded plug. Ensure hydrants open to the right (clockwise). Mark the opening direction with an arrow near the operating nut showing the opening direction. Ensure fire hydrants are bronze mounted throughout with no iron-to-iron or steel contacts or threads. Ensure the operating stem in the base and valve seat is bronze. Ensure all iron parts are of high strength grey iron in accordance with *ASTM A126 Class B*. Fire hydrants must have a 6-inch valve opening with a 6-inch mechanical joint inlet. Ensure the minimum inside dimension is 8 inches. Furnish proper length for installation in a water main depth of 6 feet or as shown on the plans. All fire hydrants must have a concrete collar around the lower barrel, as shown on the plans and as approved by the Engineer. Fire hydrants must have a fire hydrant marking flag, Pollard P68801.

6. Water Services. Replace water services in the existing size, but no less than 3/4 inch. Use Type K, annealed, seamless copper tubing in accordance with *ASTM B88*. Furnish compression type corporation stops, curb stops, and fittings in accordance with *AWWA C800*, *NSF 61* and city of Saginaw specifications. Ensure corporation stops are *AWWA* threaded inlet. Ensure fittings are in accordance with *ASME/ANSI B16.26 Cast Copper Alloy Fittings for Flared Copper Tube*. Water services include double strap saddles, corporations, copper tubing Type K, flared joints, and all other material for complete operation.

7. Curb Stop and Box. Ensure curb stop is manufactured by Ford, Model #Z-22-333. Ensure curb stops are 5½ feet deep. Ensure curb stop boxes are the standard Buffalo patterns and all parts of the same, including extension sections, are interchangeable and fit up with corresponding parts of other standard Buffalo pattern boxes. Ensure the internal diameter of the base shaft is 2½ inches for 3/4 inch and 1 inch curb stops. Ensure the boxes are cast iron, suitably coated to resist corrosion, and the casting smooth and free of any imperfections. The covers must overlap and fit outside the rim of the upper section, and they must have a horseshoe-shaped groove in them to receive the bolt head and the word “water” embossed on the top surface. Ensure all boxes are Tyler 6500 (2½ inch boxes) Series. Ensure curb stops and boxes are in accordance with municipality standards.

8. Corporation Stops and Saddles. Ensure corporation stops less than or equal to 2 inches are Ford Model #F-600-3-NL. Ensure for Pressure Class 350 DI pipe, any taps greater than 3/4 inch and less than or equal to 2 inches are Style 202-BS double strap saddles as manufactured by Ford Brass. Ensure for PVC C909 pipe, any taps less than or equal to 2 inches are Style 202-BS double strap saddles as manufactured by Ford Stainless Steel.

9. Gaskets. All water main gaskets must meet the requirements of *ANSI/AWWA C111/A21.11*. Furnish and install nitrile gaskets for pipe joints installed in soils contaminated with volatile organic compounds as shown on the plans and approved by the Engineer.

10. Repair Clamps. For DI and PVC pipe furnish stainless steel full circle repair clamp manufactured by Smith Blair, Ford F Style or Engineer approved repair clamp.

11. Thrust Blocks. In accordance with details on the plans.

12. Corrosion Protective Material. Ensure the corrosion protective material is applied to all buried nuts, bolts, threaded rod, and is manufactured by the following: San Chem Inc., product: NO-OXG-GG-2, Coronado Paint product: coal tar epoxy, 10 mil (DMT), or Engineer approved equal. Ensure DI pipe bends, tees, crosses, fittings, and fire hydrants assemblies are double wrapped in candy cane pattern to within 1 foot of finished grade with PE encasement. Furnish 8 mil low-density PE film or 4 mil HDPE film in accordance with *ANSI/AWWA C105/A21.5*. Ensure the wrap is secured during the backfill operation.

13. Tracer Wire. Ensure the tracer wire is PE coated steel core copper wire, manufactured by the following: Copperhead Industries, LLC, product: Copperhead Reinforced Tracer Wire. The use of solid copper tracer wire is prohibited. Tracer wire connectors must contain a dielectric waterproof and corrosion proof sealant, lock shut and be color coded blue. Approved manufacturer is Copperhead Industries, LLC, SnakeBite Corrosion Proof Wire Connectors. Attach tracer wire to all pipe using tape or other approved means. Tracer wire is included in the cost of water main.

14. Tracer Wire Box. Ensure tracer wire boxes are magnetized, furnishes a direct connection to tracer wire without removing the cover, be color coded and have a locking cover. Furnish SnakePit Magnetized Tracer Box manufactured by Copperhead Industries, LLC. Install tracer wire boxes at every fire hydrant when main line pipe is installed or other water pipe endpoint.

15. Valve Box Collar. Furnish materials in accordance with subsection 403.02 of the Standard Specifications for Construction with the following exceptions:

A. Furnish Concrete, Grade 3500 as directed by the Engineer in accordance with sections 1004 and 1006 of the Standard Specifications for Construction, respectively. Furnish hot-poured joint sealant in accordance with section 914 of the Standard Specifications for Construction.

B. For concrete curb or concrete curb and gutter repairs furnish materials in accordance with the standard specifications.

**d. Construction.** Ensure construction is in accordance with the *AWWA* standards, the standard specifications, and as detailed on the plans. Construct water main with a minimum of 5.5 feet of cover.

1. Connection to Existing Water Main. Connections to the public water distribution system are not allowed until the new water main has been pressure tested, chlorinated, and laboratory tests show satisfactory results in accordance with EGLE Standards for safe drinking water. The city of Saginaw standards for safe drinking water require that coliform testing by membrane filtration display a lack of coliform bacteria and a lack of atypical bacteria. The city of Saginaw standards for safe drinking water also require that the Heterotrophic Plate Count (HPC) is less than or equal to 50 cft/mL to display the water quality is reasonably equal to the potable supply. HPC requires 48 hours for each sample taken before the results are known. Locate the existing water main prior to construction of the proposed water main and furnish and install the necessary fittings, including tees, bends, crosses, cutting-in-sleeves, pipe and/or adaptors to complete the connection. Connect the proposed water main to the existing water main as shown on the plans or as directed by the Engineer. Connect the proposed water main to the existing water main in a continuous effort to complete the work. Once the existing water main has been disconnected (or shutdown), the Contractor must not leave the work site until the connection is complete and the system is placed back into service and approved by the Engineer.

2. Water Main Shutdowns. The Contractor is responsible for all de-watering including dewatering if the city of Saginaw is unable to obtain complete shutdown due to age or deterioration of existing valves.

3. Water Service Installation.

A. Install water services in accordance with *ANSI/AWWA C810* *Replacement and Flushing of Lead Service Lines*.

B. Work must not begin until the proposed main has been tested, disinfected, approved by the Engineer and is in operation.

C. Open cut services must pass visual inspection by the Engineer, under system pressure prior to backfilling.

D. Backfill the water service trenches with granular material Class II.

E. When a service bore will cross an existing water main, ensure a sight hole is excavated sufficient in size for the Engineer to visually verify the bore will clear the existing main.

F. Water services installed using a bore method must pass an Engineer approved line pressure test witnessed by the Engineer prior to backfilling connection points.

4. Transition/Connection Fittings. Ensure transition/connections fittings are hand chlorinated prior to installation.

5. Disinfection. The water samples will be analyzed at the city of Saginaw water treatment plant certified laboratory. Take samples after flushing the disinfectant from the pipeline in accordance with *AWWA* requirements. Take samples and furnish them to the city for transport so that the testing and lab analysis can be done during normal business hours (8 a.m. to 4 p.m., Monday through Friday). Take care with bottles, sample collection, and transportation to ensure proper technique is followed. Minimize the number of fittings in the apparatus or blow-off used to obtain the samples to reduce the possibility of contamination. Disinfect the water main in accordance with *AWWA C651*, Continuous-Feed Method. Inject disinfectant, chlorine solution, to obtain a maximum concentration of 50 parts per million (ppm) at the start of the 24-hour period of disinfection. Ensure chlorine residual is not greater than 50 ppm solution, using a method as approved by the Engineer. The use of liquid chlorine (gas), chlorine pills, or tablets placed in a pipe during construction for use in the disinfection process is prohibited. Results of bacteriological sampling to determine if the new water main can be placed into service may take 7 to 10 days to receive.

6. Water. The Contractor will be issued a hydrant meter and be billed for water usage in accordance with the city’s latest billing schedule ($4.36 per 1,000 gallons). This cost must be borne by the Contractor.

7. Remove Water Mains. Remove and dispose of abandoned pipe and other appurtenances as called for on the plans. If the Engineer determines that abandoned mains may remain in place, block the ends of the abandoned mains with concrete. If shown on the plans or as directed by the Engineer, fill abandoned water mains with non-structural flowable fill.

8. Gate Box Remove. Remove and dispose of gate boxes and valves completely.

9. Valve Box Collar. For structures within the pavement area remove pavement adjacent to the valve box cover using a rotary or sawing method. When using a rotary coring method, remove a minimum 2-foot diameter section of pavement around the valve box. When using a sawing method, saw cut clean and remove a 2 foot by 2-foot pavement square.

For boxes within the curb line, saw cut and remove a 2-foot by 2-foot section of pavement around the box with the 2-foot dimension measured along the curb line. Remove curb and/or curb and gutter associated with the adjustment of boxes, as directed by the Engineer.

Prior to setting the box, compact exposed soil using a method approved by the Engineer.

For structures within the curb line, replace pavement around the box with Concrete, Grade 3500 as directed by the Engineer and HMA top course as shown on the plans.

Immediately remove any debris that falls into valve boxes due to Contractor operations.

Ensure saw overcuts are cleaned and sealed with hot-poured joint sealant.

10. Hydrants. Restrain hydrants with two 3/4-inch threaded rods, anchored to concrete block, welded steel pipe sleeve, or joint collars, in addition to blocking.

11. Ensure water main valves are operated by the city of Saginaw personnel.

12. The city of Saginaw must document the location of water pipe, appurtenances, and structures prior to backfilling.

**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.

**Pay Item Pay Unit**

Water Main, PVC, \_\_ inch, Tr Det F Foot

Water Main, Rem Foot

Water Main, \_\_ inch, Connection Each

Gate Valve, Rem Each

Valve Box, Collar Each

1. **Water Main, PVC, \_\_ inch, Tr Det F** will be measured and paid for in accordance with subsection 823.04.A of the Standard Specifications for Construction.

2. **Water Main, Rem** includes removing and disposing of existing water main, other appurtenances, and furnishing, placing, and compacting backfill. This will be measured along the centerline of the pipe and paid for by the foot and includes the cost of approved suitable backfill.

3. **Water Main, \_\_ inch, Connection** includes fittings, solid sleeves, reducers, plugs, and equipment necessary to accomplish this work.

4. **Gate Valve, Rem** includes removal and disposal of gate valve and box and furnishing, placing, and compacting backfill.

5. **Valve Box, Collar** includes furnishing all materials, saw cutting, removal, and disposal of existing pavement, adjustment of box to required elevation and cross-slope, placement of cover on open boxes to prevent accumulation of debris and cleaning existing boxes due to Contractor operations.