MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**WATER MAIN, HIGH-DENSITY POLYETHYLENE**

UTL:CJD 1 of 4 APPR:NJM:DMG:05-03-23

**a. Description.** This work consists of constructing an underground crossing using open cut and the horizontal directional bore methods to install HDPE pipe for a proposed water main as shown on the plans. The work includes excavation, installation, connections to the existing system, backfilling, disinfection, testing, and cleanup as shown on the plans and specified herein.

The Contractor may request changes to the proposed vertical and horizontal alignment of the installation and the location of the entry and exit points. Submit proposed changes in writing to the Engineer for approval, a minimum of 10 working days prior to construction.

**b. Materials.** Furnish HDPE pipe manufactured in accordance with *AWWA C906*, of the size shown on the plans. Ensure that the HDPE pipe is PE 4710 material, Pressure Class 200 psi or higher, ductile iron pipe size (DIPS), and has a Dimension Ratio (DR) of 11 or less. Furnish a manufacturer’s certification that all delivered HDPE pipe is in accordance with the requirements of *AWWA C906* and *ASTM F714.* Ensure that all HDPE pipe meets EGLE Water Bureau *Suggested Practice for Water Works Design, Construction and Operation for Type I Public Water Supplies.*

Ensure that the HDPE pipe is clearly marked in accordance with *AWWA C906* with the following information:

Nominal Size and Outside Diameter base

Standard Material Code Designation (PE 4710)

Standard Dimension Ratio

AWWA Pressure Class

AWWA Standard Designation Number (*AWWA C906*)

Manufacturer's identification

NSF International Standard 61 and 14 approvals

“NSF International-potable water” designation

**c. Construction.** Ensure that all work is conducted in accordance with the standard specifications and as specified herein. Install all HDPE pipe in accordance with *AWWA C906 and AWWA M55*. Ensure all permits required for the horizontal directional boring operation are coordinated and obtained by the Contractor, except the EGLE Water Main Construction Permit will be obtained by the City of Flint.

Make HDPE pipe joints using heat fusion in accordance with *ASTM F2620* and *AWWA M55* procedures,equipment recommended by the manufacturer and approved by the Engineer. Accurately time the "melt" time of all joint welds. Provide to the Engineer, on request, sample joints to verify a smooth and completely "rolled" internal joint bead.

Install a copper-clad steel trace wire with 30 mil HDPE insulation, blue in color suitable for direct burial installation. Ensure concentric copper cladding is metallurgically bonded to a steel core through a continuous solid cladding process. Copper cladding to measure 3 percent minimum of the overall wire diameter. Wire to be 21 percent conductivity, 12 AWG, 0.0808 inch diameter, 0.00242 inch nominal copper thickness, 7.565 ohms nominal resistance per 1000 feet, and Extra High Strength (EHS) 867 pounds breaking strength. Clearly label and terminate tracer wire within gate valve structures as shown on the plans. Ensure the locations of the terminations are noted on the as-built plans.

Ensure a representative from the drilling contractor, who is experienced with the equipment and boring procedures, is on site at all times during the boring operation to address immediate concerns and emergency operations. The representative must have a minimum of 5 years’ experience supervising drilling operations of similar scope and subsurface conditions. Submit qualifications of the drilling contractor’s representative to the Engineer for review and approval prior to conducting the work.

For locations of drilling in rock, demonstrate that the drilling contractor has successfully completed borings of similar length, depth, and size of pipe in rock, with a minimum 5000 feet installed in the past 5 years. Submit drilling contractor qualifications to the Engineer for review and approval. Drilling contractor must submit a description of similar projects which include, at a minimum, a listing of the locations, dates, facility Owner with contact information, pipe type, material and size, subsurface conditions, length of installation, and other pertinent information. Provide documentation of a minimum of 5 years’ experience for members of the drilling crew. Provide equipment suitable for rock drilling with a strength range of 1,000 to 40,000 psi, a minimum model D100x140 (pullback and torque), 100,000 pound class drill rig and a magnetic wireline locating system to control line and grade of the bore path.

Installation must not begin until the Engineer agrees that proper preparations have been made. Notify the Engineer at least 2 working days prior to starting the work.

Begin the directional bore with a pilot hole drilled along the proposed bore alignment. Monitor and provide directional information to the drilling operator using navigation equipment on the surface. A reverse drilling reamer is attached to expand the pilot hole to allow for the HDPE pipe installation. Bentonite slurry is pumped through the drill steel where it is mixed by the reamer to stabilize and lubricate the wall lining of the bore hole and protect the HDPE pipe.

Furnish and maintain instrumentation that accurately locates the pilot hole and measures drilling fluid flow and pressure at all times.

After the HDPE pipe has been installed, ensure cleaning pigs of the appropriate size are used to remove residual water and debris. The Engineer must witness and approve the cleaning.

Connections between HDPE pipe and ductile iron (DI) pipe require the utilization of an HDPE/DI transition section with a stainless steel ring stiffener and a raised ring to allow for a restrained mechanical joint connection. Connections cannot be made until at least 24 hours after the HDPE pipe has been pulled through the bore hole to allow for expansion/contraction. Anchor each end of the directional bored pipe in accordance with the flex restraint detail shown on the plans.

Contain drilling fluids within the drilling area and clean up within 48 hours following completion of HDPE pipe installation. Dispose of drilling fluid in accordance with local regulations.

Ensure deflections in HDPE pipe are made by bending the pipe in accordance with the manufacturer’s recommendations.

Restore any damage caused by heaving, settlement, escaping drilling fluid (frac-out), or the drilling setup and operation. Ensure a frac-out contingency plan is provided and approved by the Engineer prior to starting the work.

If an obstruction is encountered during boring that prevents completion of the installation in accordance with the design location and specification, the HDPE pipe may be abandoned and left in place with approval by the Engineer. If the HDPE pipe is approved to be left in place, ensure it is immediately filled with flowable fill and bulkheaded. Submit a revised plan prior to beginning another boring for approval by the Engineer. If, during construction, damage is observed, cease all work until a plan to minimize further damage and for restoration is obtained and approved by the Engineer.

If conditions warrant removal of any materials installed in a failed bore path, as determined by the Engineer, it will be at no additional cost to the contract.

Hydrostatic testing, disinfection, and water analyses of all water main installed by the drilling contractor are required. Ensure hydrostatic testing, disinfection, and water analyses is coordinated with other water main work and is performed in accordance with the standard specifications, except that the HDPE pressure test must include an initial expansion phase prior to testing, allowable leakage is zero and disinfecting solutions must not exceed 12 percent active chlorine in accordance with the *Plastic Pipe Institute’s Handbook of Polyethylene Pipe* and *AWWA Manual M55*. Collect water samples at each branch, every 1200 feet and at the pipe installation ends in accordance with *AWWA C651*.

Submit product data consisting of shop drawings and manufacturer’s literature in PDF for all materials and equipment associated with the HDPE water main construction to the Engineer and the City of Flint for approval at least 10 working days prior to construction.

Provide the Engineer a complete set of as-built plans, showing all bores (successful and failed), within 30 calendar days of completing the work. Ensure as-built plans include the locating equipment used; horizontal and vertical alignment with degree of accuracy; entry and exit points; bore diameter; tracer wire termination locations; drilling fluid composition; and important subsurface features. Ensure the as-built plans are legibly drawn on project plan sheets or sheets developed by the boring contractor. The Engineer will have 15 calendar days to review and approve the as-built plans.

**d. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

**Pay Item** **Pay Unit**

Water Main, HDPE, \_\_ inch, Tr Det \_\_ Foot

Water Main, HDPE, \_\_ inch, Directional Bore Foot

Water Main, HDPE, \_\_ inch, Directional Bore in Rock Foot

1. **Water Main, HDPE, \_\_ inch, Tr Det\_\_** of the sizes and trench details specified, will be measured in place for each foot, along the centerline of the pipe, with no deductions for fittings.

2. **Water Main, HDPE, \_\_ inch, Directional Bore** will be measured horizontally from bore entrance to exit with no allowance for curvature of the pipe.

3. **Water Main, HDPE, \_\_ inch, Directional Bore in Rock** will be measured horizontally from bore entrance to exit with no allowance for curvature of the pipe.

These items include all utility location, excavation, backfill, sheeting and bracing, dewatering, boring, connections, furnishing and installing all fittings, joint restraints, HDPE/DI transition section with stainless steel ring stiffener, concrete flex restraint, tracer wire, monument boxes, grouting around the HDPE pipe, testing, disinfection and flushing, cleanup, disposal, as-built plans, and all other miscellaneous items of work necessary to complete the bore and install the HDPE pipe.

No payment will be made for the water main items or directional boring until as-built plans have been reviewed and approved by the Engineer.