MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**WATER MAIN, HIGH-DENSITY POLYETHYLENE, DIRECTIONAL BORE**

UTL:CJD 1 of 3 APPR:RPB:DMG:07-20-23

**a. Description.** This work consists of constructing an underground crossing using the horizontal directional boring method to install HDPE pipe for a proposed water main as shown on the plans. The work includes excavation, installation, connections to 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, at least 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 Materials Designation Code (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

Furnish two copper-clad steel trace wires with 45 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. Wires 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 1150 pounds breaking strength.

**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 Livonia.

Make HDPE pipe joints using heat fusion in accordance with *ASTM D3261* 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.

Clearly label and terminate tracer wires on the top step within gate valve structures. 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.

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. No curves will be accepted with a radius less than 150 feet, unless authorized by the Engineer. 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. Reaming diameter must not exceed 1.25 times the diameter of the product pipe being installed. 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 operation.

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 in accordance with *ASTM F2164*, disinfection, and water analyses of all water main installed by the 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. The HDPE pipe will be filled with water and raised to test pressure and allowed to stabilize. The test pressure will be 150 psi, the final test period will be one (1) hour. 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*.

Cap and plug the main as shown on the plans for future connection by the City of Livonia.

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 Livonia 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 item:

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

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

**Water Main, HDPE, \_\_ inch, Directional Bore** will be measured horizontally from bore entrance to exit with no allowance for curvature of the pipe and includes all utility location, excavation, backfill, sheeting and bracing, dewatering, boring, connections, furnishing and installing all fittings, joint restraints, 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.