MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**COMBINED SEWER**

DET:MS 1 of 4 APPR:CJD:KSH:10-06-21

**a. Description.** The work consists of removing and installing a combined sewer and its appurtenances as shown on the plans. This work includes excavation, sheeting, bracing, placement of pipe, backfilling, dewatering, testing, providing as-built plans, and all related work necessary to complete the combined sewer installation.

**b. Materials.** Furnish all pipe and appurtenant materials required for the contract in accordance with the standard specifications, *ASTM Standards*, the City of Detroit Water and Sewerage Department (DWSD) specifications, and the Special Provision for Bypass Pumping as applicable.

1. Ensure all combined sewer mains, unless otherwise shown on the plans, are reinforced concrete pipe. Provide reinforced circular concrete pipe as described in subsection 909.04.A of the Standard Specifications for Construction. Ensure sewer pipe class is in accordance with Table 402-1 of the Standard Specifications for Construction, based on depth of cover.

2. Ensure combined sewer manhole materials are in accordance with section 403 of the Standard Specifications for Construction and as detailed on the plans. Ensure precast manhole sections are in accordance with *ASTM C478/C478M* with the following modifications: During manufacture, cast holes and install resilient connectors for future pipe connections into bases.

3. Furnish resilient connectors (rubber boots) between pipes and precast sections per *ASTM C923/C923M* and in accordance with the manufacturer’s recommendations. Connectors using castings and bolts with non-resilient bearing are not acceptable. Install seals per the manufacturer’s recommendations. Acceptable manufacturers are Link-Seal, Innerlynx, Modular Seal, or approved equal.

4. Ensure sheet piling materials are in accordance with subsection 704.02 of the Standard Specifications for Construction.

**c. Construction.** Construct the combined sewer and structures in accordance with sections 203, 206, 402, and 403 of the Standard Specifications for Construction, *ASTM D2321*, and as detailed on the plans. Construct sheet piling and bracing in accordance with section 704 of the Standard Specifications for Construction. Remove combined sewer where shown on the plans, or directed by the Engineer, in accordance with section 203 of the Standard Specifications for Construction.

1. Verify invert elevations of the existing sewer at existing manholes prior to tapping the structure for proposed sewer work.

2. Maintain the flow of the existing sewer system at all times during construction of the sanitary sewer and/or structures, by temporary pumping, construction staging or other means as approved by the Engineer. Provide bypass pumping equipment, labor, and materials to perform the work of bypass pumping for the interrupted flow of sewage in the sanitary sewer mains during construction of the proposed sanitary system in accordance with the Special Provision for Bypass Pumping and coordinate the progress with the Engineer. Ensure equipment used for dewatering and bypass pumping is of a size and type adequate to perform the job and operated in such a manner as to minimize disruption to the public. On operations which require continuous pumping over prolonged periods of time, provide pumps, generators, and other equipment that meet local and state noise ordinances. The work may need to be performed on weekends, holidays, or off-peak hours to minimize impact. Upon successful testing of the new combined sewer, divert the flow into the new combined sewer.

3. Subject all combined sewer to air, infiltration, and/or exfiltration tests, and video inspection prior to approval of the combined sewer. Where the groundwater level above the top of the sewer is more than 7 feet, ensure all sewer is subjected to the air infiltration test. Where the groundwater level above the top of the sewer is 7 feet or less, ensure all sewer is subjected to the air infiltration or exfiltration test.

A. Measure infiltration flow by a 90-degree V-notch weir with free-fall discharge or by other means acceptable to the Engineer.

B. If an exfiltration test is performed, the maximum exfiltration rate is the same as that permitted from infiltration. For the purpose of exfiltration testing, ensure the internal water level is equal to the external water level plus 7 feet, as measured from the top of the pipe.

4. Perform dewatering work as necessary to lower and control groundwater levels and hydrostatic pressures so that excavation and construction are performed in near-dry conditions. Control of surface and subsurface water, ice, and snow are part of the dewatering requirements. For dewatering system design and construction, conform to the provisions of the 1994 PA 451, Part 91 Soil Erosion and Sedimentation Control. For dewatering operations, conform to the requirements of all federal, state, and local agencies having jurisdiction.

5. Where groundwater conditions require dewatering operations to construct the sewer, the Contractor may, at his/her option, perform a preliminary air test after backfilling and while the dewatering equipment is still operating. After dewatering operations have ceased and groundwater has stabilized at its normal level (7 feet or less above the sewer), and if the preliminary air test was satisfactory, the preliminary air test may be accepted as final to the satisfaction of the Engineer.

6. The maximum allowable infiltration must not exceed 200 gallons per inch of diameter per mile of pipe per 24 hours for any individual run between manholes.

A. Air Test. Test the combined sewers by applying an air pressure test described herein. Ensure any methods of testing and measurement other than as specified herein are approved by the Engineer. Perform all testing in the presence of the Engineer.

(1) Furnish all equipment and labor for air testing including, but not limited to, a portable air compressor, standard air hose, one single and one triple connection pneumatic sewer plug, one hand air pump, stopwatch, and one air gauge with range 0-30 psig graduated in tenths from 0 to 10 psig.

(2) Test the pneumatic plugs, in the presence of the Engineer, prior to actual line testing in the following manner: Remove all debris from the pipe prior to air testing. Lay one length of sewer pipe on the ground and seal at both ends with pneumatic plugs for checking; introduce air into the pipe until the pipe pressure reaches 15 psig. Check that the pneumatic plugs hold against this pressure without the need for bracing, and without movement of the plugs out of the pipe. Ensure all pneumatic plugs pass the test before using them to test the actual installation.

B. Test Procedures. Use air testing techniques in accordance with the latest *ASTM* standard practice for testing sewer lines by low-pressure air test method for the appropriate pipe material.

(1) Immediately following the pipe cleaning, introduce low pressure air into the sealed line until the internal air pressure reaches 3.5 pounds psi greater than the average hydrostatic pressure of any groundwater that may be over the pipe. Allow at least 2 minutes for the air pressure to stabilize.

(2) The tested portion of the line will be accepted if the portion under the test meets or exceeds the requirements of *ASTM F1417*. The time, in minutes, required for the pressure to decrease from 3.5 to 2.5 psig greater than the average back pressure of any groundwater that may be over the pipe must not be less than the time shown for the given diameter in Table 1 of *ASTM F1417*. If the system does not meet specified requirements, locate, and repair the leaks at no extra cost and repeat the tests until the allowable leakage is obtained.

7. Video Inspection. Perform video inspection in accordance with subsection 402.03.J of the Standard Specifications for Construction for all diameter of combined sewer.

8. As-Built Plans. Provide as-built plans of the combined sewer, acceptable to the Engineer, to be forwarded to the DWSD. Information required for acceptable as-built plans includes, but is not limited to, pipe size, pipe and manhole locations, invert elevations, tees, tie-ins, and individual service connections. Combined sewer work will not be considered complete, and payment may be withheld, until acceptable as-built drawings have been provided to the Engineer.

**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**

Combined Structure, Rem Each

Combined Sewer, Rem, Less than 24 inch Foot

Combined Sewer, Conc, \_\_ inch, Tr Det \_\_ Foot

Combined Structure, \_\_ inch dia Each

The cost of all labor, equipment, and materials necessary to conduct the specified testing and to remedy any unsatisfactory test, including removing and replacing any backfill or piping, is included in the contract unit price for the associated combined sewer or combined structure pay items.

Preparation of as-built plans is included in the contract unit price for the associated combined sewer and combined structure pay items.

The cost of sheeting, shoring, bracing, and dewatering is included in the unit prices for the related combined sewer pay items.

1. **Combined Structure, Rem** will be measured and paid for as described for **Dr Structure, Rem** in section 203 of the Standards Specifications for Construction.

2. **Combined Sewer, Rem, Less than 24 inch** will be measured and paid as described for **Sewer, Rem, Less than 24 inch** in section 203 of the Standard Specifications for Construction.

3. **Combined Sewer, Conc, \_\_ inch, Tr Det \_\_** of the size and trench detail specified will be measured and paid as described for **Sewer, Cl \_\_, \_\_ inch, Tr Det \_**\_in section 402 of the Standard Specifications for Construction.

4. **Combined Structure, \_\_ inch dia** will be measured and paid as described for **Dr Structure, \_\_ inch dia** in section 403 of the Standard Specifications for Construction.