MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**CURED-IN-PLACE PIPE LINER FOR SANITARY SEWER**

OAK:VAL 1 of 3 APPR:RPB:DMG:05-17-23

**a. Description.** This work consists of the design and installation of the cured-in-place resin impregnated felt liner into an existing sanitary sewer by hydrostatic inversion or by the direct pulled-in-place method at the locations shown on the plans. Cure the liner in place so that the finished installation is continuous, provides structural support and is tight fitting to the existing pipe. The manufacturer of the liner system must provide the design, installation and inspection of the liner and must have an authorized representative on site during installation.

Provide video inspection of the sewer before (after cleaning) and after lining. All sewer cleaning, maintaining flow, bypass pumping and site preparation is included in this work except as described below.

**b. Materials.** Use tube and resin material in accordance with one of the following standards: *ASTM F1216*, *ASTM F1743*,or *ASTM F2019*, as applicable.

Design the liner for HS-20 live loading. Design the required cured-in-place liner wall thickness in accordance with *Appendix X1 of* *ASTM F1216*. Use the formulas assuming a fully deteriorated pipe condition and assume the water table is at the top surface of the pavement over the existing pipe.

Furnish documentation and calculations to the Engineer indicating the proposed design liner thickness for each run of pipe, all component materials, and that the liner meets the minimum chemical resistance requirements in accordance with *Appendix X2 of* *ASTM F1216* prior to installation.

Furnish a tube consisting of one or more layers of flexible needled felt or equivalent woven or nonwoven material capable of carrying resin, withstanding installation pressures and curing temperatures. Ensure the tube is compatible with the resin system used. Ensure the tube material can stretch to fit irregular sewer sections. Ensure the outside layer of the tube is plastic-coated with a material that is compatible with the resin system used. Fabricate the tube to the required size to fit the inside diameter for the full length of the existing sewer when cured. Ensure allowance is made for circumferential stretch during the hydrostatic inversion method and for longitudinal stretch during the direct pulled-in-place method.

1. Furnish a corrosion resistant, unsaturated, isophthalic polyester or vinyl ester thermoset resin and catalyst system. The cured-in-place pipe liner must have a long-term (50 years minimum) corrosion resistance to typical chemicals found in domestic sewage.

2. The cured-in-place pipe liner, when cured, must be chemically resistant to withstand internal exposure to sewage gases containing hydrogen sulfide, carbon monoxide and dioxide, methane gas, dilute sulfuric acid, and external exposure to soil bacteria and chemical attack which may be due to materials in the surrounding ground or sewage within.

3. Use minimal styrene chemicals for the cured-in-place pipe resin to minimize styrene odors in residential homes and business offices. The maximum level of released styrene must not exceed 50 parts per million (ppm).

**c. Construction**. Notify the Engineer at least 10 work days prior to starting the work. Electronically submit all required documentation to the Engineer for approval prior to starting the work. Do not begin work until approval is received from the Engineer.

Video inspect the existing and lined pipe in accordance with subsection 402.03.J of the Standard Specifications for Construction. Thoroughly clean the existing pipe prior to video inspection. Dispose of all debris in accordance with subsection 205.03.P of the Standard Specifications for Construction.

Propose a corrective action to eliminate any obstruction revealed by the pre-installation inspection that cannot be removed by conventional pipe cleaning equipment and that prevents the cured-in-place liner from being installed properly. Ensure the proposed corrective action is approved by the Engineer prior to commencement of the work.

Maintain flow around the run of the pipe designated for lining as necessary. Ensure the bypass pumping system can provide adequate capacity to handle the existing flow. Electronically submit a bypass pumping plan containing all necessary details to the Engineer for approval at least 10 work days prior to conducting the work.

Continuously monitor all pumps and equipment. Follow local noise ordinances if pumping is required on a 24-hour basis.

Install the cured-in-place liner in accordance with the manufacturer's guidelines and *ASTM F1216*, *ASTM F1743*, or *ASTM F2019*, as applicable. Ensure the finished liner is continuous over the entire length of the pipe and is free from visual defects, such as foreign inclusions, dry spots, pinholes, lifts, and delamination. Wrinkles or other flaws in the cured liner that reduce the hydraulic capacity of the pipe are unacceptable. Correct any deficiency found at no cost to the contract, utilizing a method approved by the Engineer. Remove and dispose of excess resin and other materials generated from the installation.

For all types of resin and installation methods, capture and dispose of all process water and wastewater resulting from the installation and flushing of the cured-in-place liner. Ensure the captured water is disposed of at a local wastewater treatment facility or as otherwise approved by the Engineer in accordance with applicable federal, state, and local regulations and permit requirements. Provide written authorization to the Engineer for acceptance of this water from the local wastewater treatment facility prior to starting the work. Provide written confirmation to the Engineer from the disposal facility verifying the process water was disposed of properly. Ensure the process water is not discharged directly or indirectly into a ditch, storm sewer, surface water body, or other unapproved location.

Monitor and record styrene odor levels when monitoring structures and when requested by the Owner or Engineer. Read and record styrene levels every 1 hour with a Draeger Gas Detection Tube or approved equal. Measure styrene levels a maximum of 10 feet away from the inversion manhole while liner is being inverted and cured. Notify the Owner or Engineer and implement procedures for work progress should styrene level readings exceed 50 ppm or resident complaints of excessive styrene odors are filed.

Prepare and test samples for each lined run of pipe in accordance with *ASTM* *F1216*, section 8.1 or *ASTM F2019*, section 7.1, as applicable.

Provide a certification, sealed by a Professional Engineer licensed in the State of Michigan, verifying that the lining system has been designed, manufactured, and installed in accordance with the applicable *ASTM standards* and this special provision.

1. Record location of all service connections.

2. Determine capped and unused services with the Owner.

3. Establish service connections to reinstate.

A. Reinstate all service connections unless otherwise directed by the Owner.

B. Coordinate with the Owner any service connections that are not to be reconnected.

C. Record plan for all service connections.

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

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

Cured-In-Place Pipe Lining, \_\_ inch Foot

**Cured-In-Place Pipe Lining, \_\_ inch** includes cleaning, debris disposal and video inspection necessary to line the sanitary sewer as described.

The cost for the work to remove an obstruction that cannot be removed with conventional pipe cleaning equipment will be paid for separately in accordance with the contract.

Any additives, resin modifications, installation methods, or other changes in work necessary to reduce styrene odors is included in the contract bid price for **Cured-In-Place Pipe Lining, \_\_ inch**.