

SECTION 5300 – CURED-IN-PLACE PIPE

PART 1 - GENERAL

1.01 SCOPE: This Section covers cured-in-place pipe for rehabilitation of existing sanitary and storm sewer mains and services. Topics include product and installer qualifications, prebid inspection, pipe preparation, lining design, cured-in-place pipe, building service restoration, point repair, and building service lining.

1.02 RELATED WORK: Refer to the following sections for related work:

Site Restoration	Section 1000-General Requirements
Traffic Control	Section 1300-Traffic Control
Open Cut Repair	Section 5100-Sanitary Sewer Main
Bypass Pumping	Section 5100-Sanitary Sewer Main
Tightness Tests	Section 5100-Sanitary Sewer Main
Water and Electric Power	Section 1000-General Requirements

1.03 SUBMITTALS: Contractor shall submit for review including, but not limited to, product data for the following:

- A. Liner tube, resin, sealant, and fittings, adapters, and specials.
- B. Certificates and Affidavits (furnish prior to shipment or installation as applicable):
 - 1. Affidavit of compliance with applicable standards for resins and tube materials.
 - 2. Certification that Contractor is a licensed installer of any patented process.
- C. Post installation video.

1.04 DELIVERY AND STORAGE: Delivery and storage of lining and other materials shall conform to requirements of the manufacturer. Furnish required storage facilities. Handle lining materials in compliance with manufacturer's recommendations. Damaged material will be unacceptable for installation.

1.05 PREQUALIFICATIONS: In order to be considered in the bid evaluation process, Contractor shall have: A minimum nation wide installation history of 250,000 feet of cured-in-place lining installations; a minimum nation wide installation history of 1,000 point repair lining installations; and a minimum nation wide installation history of 5,000 building service lining installations. All products shall have minimum 1 year installation history in MARC area counties. Applicant shall list references with contact names and phone numbers. Contractor shall provide Unified Government with prequalification information regarding cured-in-place projects at time of bid. This information shall include total linear feet of pipe installed, diameter of pipe, materials used, and contact name, address, and phone number of the owner to whom the service was provided. Unified Government may, at its discretion, adjust or waive the aforementioned prequalifications.

- 1.06 BIDDER'S INSPECTION:** Bidder shall examine video tapes of lines prior to prebid meeting. Bidder shall use tape to identify service connections, obstacles, and residual load carrying capacity of the host pipe. Bidder shall make a reach by reach (manhole to manhole) determination of load carrying capacity of the host pipe before the prebid meeting. Engineer will review differing opinions regarding host pipe capacity at the prebid meeting and make a determination of the required design assumptions by addendum. Obstacles located by Bidder shall be identified at the prebid meeting. Lines so deteriorated as to risk collapse with a complete and thorough cleaning shall be identified and discussed at the prebid meeting. Bidder shall evaluate obstacles and determine appropriate repair strategy. Successful Bidder shall submit copy of the prebid video tape along with a tape log and a proposal listing obstacle locations and repair strategy. Tape log shall include obstructions and all service or other connections to the pipe.
- 1.07 LINING DESIGN:** Minimum liner thickness for each liner depth/diameter combination shall be as scheduled on the drawings. Engineer may consider Contractor proposed changes in thickness based upon use of higher flexural modulus resins. Contractor proposed changes must be supported by detailed calculations satisfactory to Engineer.
- 1.08 POST INSTALLATION VIDEO:** Contractor shall provide one copy of a videotape showing pipe after lining. Video shall be annotated to indicate all restored services.

PART 2 - PRODUCTS

- 2.01 CURED-IN-PLACE LINING PRODUCTS:** Products shall conform to ASTM D5813, "Cured-In-Place Thermosetting Resin Sewer Pipe".
- 2.02 LINER TUBE:** The tube shall consist of one or more layers of flexible needled felt or an equivalent nonwoven material capable of carrying resin and withstanding installation pressures and curing temperatures. The liner tube shall be manufactured of a resin-impregnated flexible tube cured in place using circulating hot water. The tube shall be compatible with the resin system used. The tube shall be capable of conforming to offset joints, bells, and disfigured pipe sections. The tube shall be custom fabricated to a size that, when installed, will tightly fit the internal circumference of the original conduit. Allowance shall be made for circumferential stretching during installation. Contractor shall determine the tube lengths for individual installation runs in accordance with manufacturer's recommendations.

The cured liner tube shall conform to the following minimum structural standards:

- A. Tensile strength- 3,000 psi.
 - B. Flexural stress- 4,500 psi.
 - C. Flexural modulus of elasticity- 250,000 psi.
- 2.03 RESIN:** The resin used shall have the following characteristics:

- A. The resin used shall be high-grade corrosion resistant isophthalic polyester, vinyl ester, or epoxy that is compatible with the liner tube and installation process to be used.
 - B. The resin must be able to cure in the presence of water, and the initiation temperature for cure shall be less than 180° F.
- 2.04 SEALANT:** A sealant composed of a resin mixture compatible with the liner tube and as recommended by the liner tube manufacturer shall be used at pipe terminations and at points where the cured lining tube fails to make a tight seal.
- 2.05 INTALLATION EQUIPMENT:** Provide equipment for the installation and curing of the liner tube as recommended by the manufacturer.

PART 3 - EXECUTION

- 3.01 GENERAL:** Installation shall be in accordance with ASTM F1216, “Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube” or ASTM F1743, “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).”
- 3.02 PRECLEANING:** Contractor shall remove all internal debris, solids, and roots from the sewer line that will interfere with the installation or adhesion of the lining. Only fully deteriorated lines identified at the prebid meeting as subject to collapse by cleaning operations shall be exempt from a complete cleaning. Contractor shall make a post cleaning/pre-installation video to verify line is clean and obstructions are clear.
- 3.03 SPOT REPAIRS:** Line obstructions shall be repaired as follows:
- A. The original pipeline shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross-sectional area of more than 20 percent that will prevent the insertion of the resin-impregnated tube. Protruding service connections shall be removed to prevent dimpling of the finished liner. Maximum allowable protrusion shall be 1/2-inch. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, a spot repair excavation shall be made to uncover and remove or repair the obstruction.
 - B. Contractor shall perform all cured-in-place sectional and spot repairs for the sewer line segments scheduled.
 - C. Building service lining shall be provided where called out on plans or special conditions.
- 3.04 BYPASS PUMPING:** See related work in Part 1.
- 3.05 PLACEMENT AND CURING:**
- A. Installation by inversion is required to be in compliance with ASTM F1216 as follows:

1. Prepare inversion tube by vacuum impregnating the liner tube with the uncured resin. Install inversion standpipe over existing manhole or other Unified Government-approved access. Attach and insert inversion tube through the standpipe with watertight seal and lubricated as recommended by the manufacturer. Invert liner to predetermined length through the existing pipe using hydrostatic pressure in the standpipe and in accordance with manufacturer's approved procedure.
2. Maintain water at constant temperature during hydraulic leak test that shall be performed during the curing period. Provide certification of test results for each installed section.
3. Cure installed liner using a hot water recirculation system designed to develop uniform curing temperature throughout the entire length of the lined section. The manufacturer shall approve the procedure and temperature for the resin/catalyst system employed. The resin manufacturer shall recommend duration of the cure period, and liner shall obtain proper hardness before curing is considered complete.
4. Cool the hardened liner by introducing cool water into the recirculation system and draining the heated water. Maintain static head on cured liner until temperature throughout the liner is reduced below 100° F. Limit drainage rate to avoid creating a vacuum and damaging the freshly cured liner.
5. Seal any annular space between the cured liner tube and the existing pipe where the cured tube fails to make a tight seal. Seals shall be a resin mixture compatible with the resins in the inversion tube.

3.06 BUILDING SERVICE REINSTATEMENT: Prior to installation, Contractor shall record the location of service connections and lateral lines. Service reinstatements shall be made by trenchless technologies that provide continuous lining from the main through the connection and a minimum 3 feet into the service. If, after review by Engineer, it is determined a service cannot be reinstated with trenchless technology, it shall be reinstated with conventional open cut methods. Services shall be reinstated within the time limits listed in Section 5100, regardless of method.

3.07 STRENGTH TESTS: Short-term flexural properties and tensile properties tests specified in ASTM F1216 shall be performed and the results submitted to Engineer.

3.08 TIGHTNESS TESTS: Tightness tests can be conducted by any means allowed for sanitary sewer mains. As a substitute to the tightness test, hydrostatic test conducted during curing will be allowed when equipment is set up to provide accurate measurement of makeup water. Results shall be submitted to Engineer.

END OF SECTION 5300