

SECTION 02775 - CURED-IN-PLACE PIPE SECTIONAL LINING**PART 1 GENERAL****1.1 DESCRIPTION**

- A. The Contractor shall provide all materials, equipment, labor and incidentals for the installation and testing of cured-in-place pipe section liner within the sewer main between manhole runs.
- B. The sectional cured in place pipe lining process shall consist of inserting a resin-impregnated flexible tube which is inflated in a short length of the pipeline to form a hard, impermeable, corrosion resistant pipe within a pipe. When cured, the cured-in-place-pipe will be formed to the original conduit. The impermeable Cured-In-Place-Pipe (CIPP) should be continuous, tight-fitting, chemical resistant and air tight.
- C. The sectional cured in place pipe liner shall provide hydraulic flow equal to or greater than the existing sewer.

1.2 REFERENCE STANDARDS

- A. Comply with applicable provisions and recommendations of the following:

ASTM D638 – Standard Test method for Tensile Properties of Plastics.

ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

1.3 QUALIFICATIONS

- A. For each method of installation and curing used on this project the Contractor shall have a demonstrated history of at least 50 cured in place pipe sectional liners in sewers of similar size and using a similar resin and felt and using the specific method of installation and curing being used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Care shall be taken in shipping, handling and storage to avoid damaging the liner.
- B. All material shall be shipped, stored and handled in conformance to the material manufacturer's requirements and recommendations.

1.5 WARRANTY

- A. All lining work shall be fully guaranteed by the Contractor for a period of 5 years from the date of Final Completion.

1.6 SUBMITTALS

- A. Qualifications of Contractor and Foremen who will complete the lining process.

- B. Flexible Tube
- C. Resin
- D. Installation Procedure
- E. Sectional liner design assuming a fully deteriorated pipe section.
- F. Hydrophilic end seal material to be used and method of installation.
- G. Documentation of Pre-Construction and Post-construction CCTV Inspection of the pipe.
- H. Warranty

PART 2 MATERIAL

- 2.1 The tube will consist of one or more layers of flexible needled felt or an equivalent non-woven material. The tube will be continuous in length exhibiting a uniform minimum wall thickness based upon design calculations. The tube will be capable of conforming to offset joints, bells, and disfigured pipe sections. The liner shall be fabricated to a size that when reformed will tightly fit the sewer being rehabilitated. The length of the liner shall be that deemed necessary by the Contractor to effectively carry out installation and seal the liner at each end of the point repair. The finished point repair should be continuous over the length of the defect plus one foot. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing the liner. The flex tube shall contain no intermediate or encapsulated elastomeric layers. No materials shall be included in the tube that are subject to delaminating when cured. All dimensions shall be field verified by the Contractor prior to delivery of the liner.
- 2.2 The resin will be polyester or vinyl ester with proper catalysts as designed for the specific application. The cured-in-place pipe shall provide a smooth bore interior. Each installation shall have a design report documenting the design criteria for a fully deteriorated pipe section, relative to the hydrostatic pressures, depth of soil cover, and type of soil.

The composite of the materials above will, upon installation inside the host pipe, exceed the minimum test standards specified by the American Society for Testing Methods.

Test Standards for CIPP

FLEXURAL STRENGTH (ASTM D-790)	4,500 PSI
FLEXURAL MODULUS (ASTM D-790)	250,000 PSI
TENSILE STRENGTH (ASTM D-638)	3,000 PSI

- 2.3 The CIPP Sectional Liner design shall assume a fully deteriorated host pipe condition, groundwater over pipe to existing surface grade, a service life of 50 years and H₂O loading above the pipe. The point repair shall be designed as per ASTM F1216 and shall assume no bonding to the host pipe wall. The liner thickness of each pipe segment shall be determined by the Contractor and submitted per Paragraph 1.06 of this Section.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Inspect and confirm the inside diameter, alignment and condition of each segment to be lined. Use the data and information collected from this inspection to verify the size of the liner and refine the installation techniques.
- B. Clean and televise sewer lines immediately prior to the installation of the cured in place sectional liner. All roots, debris, and protruding service connections will be removed prior to lining. The sewer lines shall be free of any condition that will adversely affect the installation of the liner.
- C. As required, provide for continuous sewage flow around the section of sewer that is to be lined in conformance with the requirements of these Contract Documents.
- D. Grout pipe segments found to have actively leaking defects per the requirements of the Contract Documents.
- E. Remove pockets of water from the pipe in areas to be lined.

3.2 INSTALLATION

- A. Coordinate with adjacent property owners and Engineer prior to installation of the liner per the Notifications section of the Contract Documents.
- B. The tube shall be impregnated with the resin as recommended by the Sectional Liner Manufacturer.
- C. The tube shall be properly oriented and loaded onto the Carrier Train for proper installation over the repair area.
- D. The Carrier Train shall be pulled or winched to the damaged area and positioned by Closed Circuit TV camera guiding the installation.
- E. The installation shall follow the Manufacturers Process for inflation, curing and stripping out.
- F. The finished ends of the liner shall be neat and form a tight seal to the original host pipe. The finished ends of the liner shall provide a smooth transition from the host pipe to segment of pipe being lined and shall not be "curled" or in a condition that could cause the collection of debris.

3.3 POST-CONSTRUCTION INSPECTION OF COMPLETED WORK

- A. Provide Post-construction Inspection video documentation showing completed work in accordance with the Contract Documents. Post-construction video inspection shall be performed no sooner than 30 days after the completion of rehabilitation but prior to Conditional Acceptance. All defects discovered during the television inspection shall be corrected by the Contractor without additional compensation and the Post-construction Inspection for that sectional liner shall be repeated before Conditional Acceptance.

- B. The Post-construction Inspection video shall be submitted to the Engineer.

3.4 FINAL CLEANUP

- A. Upon completion of rehabilitation work and testing, clean and restore project area affected by the Work.

3.5 TESTING

- A. Hydraulic Capacity – Calculations must support that the finished Cured-In-Place-Pipe (CIPP) shall have at least 100% of the full flow capacity of the original host pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the original pipe material. A typical roughness coefficient for the CIPP shall be as verified by third part test data.

3.6 WARRANTY INSPECTION

- A. Provide a CCTV inspection 18 to 24 months after completion of the Cured in Place Sectional Liner work showing all completed work in accordance with the Contract Documents. The actual period for inspection shall be determined by the Engineer and will ideally be conducted during high groundwater conditions.
- B. Correct all defects discovered during the warranty period at no additional compensation. After all the defects are corrected, inspect the sewer again at no additional compensation to the Owner.

END OF SECTION – AD-2 02775 CURED-IN-PLACE PIPE SECTIONAL LINING

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