

Appendix A - Technical Specifications
084-20 Cured-In-Place Pipe (CIPP) Unit Price Construction

1. SCOPE

- 1.1. The scope of this IFB includes but is not limited to providing Cured-In-Place Pipe (CIPP) technology for rehabilitation of sewer pipe in Jacksonville, Florida.

1.2. REFERENCES

- 1.2.1. This specification references ASTM F1216 (Rehabilitation of pipelines by inversion and curing a resin impregnated tube), ASTM F1743 (rehabilitation of pipelines by pulled-in-place installation of a cured-in-place thermosetting resin pipe), ASTM D5813 (Cured-In-Place, Thermosetting Res-in Sewer Pipe), ASTM D790, ASTM2990, NASSCO Cured-In-Place Pipe Installation, Performance Specification Guideline, July 2019 Update
- 1.2.2. This section supplements JEA Wastewater Standards. In the case of contradictory information, this specification takes precedence over JEA Wastewater Standards, located on JEA.com.
https://www.jea.com/Engineering_and_Construction/Water_and_Wastewater_Standards/

1.3. QUALITY ASSURANCE

- 1.3.1. The process (materials, methods, and workmanship) must be proven through previous successful installations, commensurate with the prequalification levels.
- 1.3.2. Sewer rehabilitation products that will be utilized must have had successful independent third-party test results prepared in accordance with ASTM F1216 substantiating the performance and design of the proposed product. No product shall be approved without independent third-party testing verification (Submitted with pre-qualification submittal).
- 1.3.3. The contractor is to provide a narrative of the Contractor Quality Control program employed during the manufacture of the reconstruction system components, the installation of the proposed reconstruction system, and certification of qualification of the personnel proposed to provide design, engineering, technical support, project management, installation, and supervisory duties (Submitted with pre-qualification submittal).

1.4. PROJECT MANAGEMENT

- 1.4.1. By Friday at 9:00 AM, at the latest, the Contractor will provide the project schedule for the following three weeks to: Construction Inspector, Project Outreach, and Manager – Maintenance Planning and Engineering.

1.5. PUBLIC OUTREACH

- 1.5.1. The Contractor will place JEA approved door hangars in the neighborhoods a minimum of 48 hours prior to the work, where the work will be performed, as well as being responsive to JEA's Project Outreach or City of Jacksonville inquiries.

2. PRODUCTS

2.1 MATERIALS

- 2.1.1 The liner material shall be a polyester fiber felt resin-impregnated tubing.
- 2.1.1.1 Inspection of equipment may be made.

- 2.1.1.2 Seams in the Tube shall meet or exceed the design properties required for the entire tube in accordance with ASTM D 1216.
- 2.1.1.3 The outside of the Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol. The tubes must be manufactured in the USA.
- 2.1.1.4 Resin - The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the design of the CIPP for this project. The resin shall produce CIPP, which shall comply with the structural and chemical resistance requirements of this specification.
- 2.1.2. Structural Requirements
- 2.1.2.1. The CIPP shall be designed as per ASTM F1216. The CIPP design shall assume no bonding to the original pipe wall.
- 2.1.2.2. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples shall be cut from the work. Any reoccurrence may cause rejection of the work.
- 2.1.2.3. The cured pipe material (CIPP) shall conform to the structural properties, as listed below:

Test Method		Minimum Physical Properties	
		Minimum Resin per ASTM F1216	Resin 400,000 psi Properties
Modulus of Elasticity	ASTM D-790 (short term)	250,000 psi	400,000 psi
Flexural Stress	ASTM D-790	4,500 psi	4,500 psi

- 2.2.2.4. The Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by his Company. Such testing results are to be used to determine the Long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) shall be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, shall be verified by this testing. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in Design. The cured pipe material (CIPP) shall conform to the long-term structural properties, as listed below:
- 50-Year Flexural Strength (ASTM D790, D2990, or DIN EN 761): 2,500 psi minimum.
 - 50-Year Flexural Modulus (ASTM D790, D2990, or DIN EN 761): 200,000 psi minimum, with no greater than a 55% reduction from initial (hour 0.02) strength.
- 2.2.2.5. The required structural CIPP wall thickness shall be based as a minimum, on the physical properties and in accordance with the Design Equations in ASTM F1216, and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design	As determined by Long-Term tests described above
Ovality	2%
Enhancement Factor, k	7
Groundwater Depth (above invert)*	At grade
Soil Depth (above crown)	See table 1
Soil Modulus	850 Psi
Soil Density	120 Pcf
Poisson's ratio	0.3
Live Load	AASHTO HS-20
Design Condition (partially or fully deteriorated)	FD

2.1.3. Testing Requirements

2.1.3.1. Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples without plastic coating meet these chemical testing requirements.

2.1.3.2. Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

2.1.4. Hydrophilic Seals

2.1.4.1. Provide hydrophilic end seals to prevent water from migrating between the liner and host pipe into the manhole. Provide one of the following:

- Seamlessly molded neoprene end seal. Product and Manufacturer: Insignia End Seal Sleeve as manufactured by LMK Technologies or equal.
- Hydrophilic bands that are 23 mm wide, 7mm high, with double bump. Miter cut and glued to form circular bands. Product and Manufacturer: Sika, Hydrotite Style RS-0723-3.5i (16" to 36")

3. EXECUTION

3.1. PRE-INSTALLATION

3.1.1. The Contractor shall clean and remove all internal debris out of the sewer line to permit proper installation.

3.1.2. If liner cannot be installed through existing manhole opening, notify OWNER prior to lining the segment of main. CONTRACTOR may remove portions of the manhole as required to install the liner. Following installation of the liner, replace removed portions of the manhole and restore site. CONTRACTOR may replace the removed portions of manhole in good condition with approval of ENGINEER.

3.2. INSTALLATION

3.2.1. CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:

- Resin Impregnation - The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process or equivalent shall be used to ensure thorough resin saturation throughout the length of the felt tube.
- Temperature gauges shall be placed inside the tube at the invert level of each end to monitor the temperatures during the cure cycle.
- Curing shall be accomplished by utilizing hot water under hydrostatic pressure in accordance with the manufacturer's recommended cure schedule or with any alternative method deemed acceptable by JEA.

3.3. END SEALS

- 3.3.1. Insert continuous or properly trimmed hydrophilic seals at each manhole opening, centered within the intersection of the host pipe and the manhole wall. Trimmed seals edges (shall be butted up against each other at the crown of the pipe using a 45° miter cut. Seals with any gap between the ends will not be accepted. If defects in the host pipe near the manhole are such that the end seal will not form a watertight seal between the liner and host pipe, apply hydraulic cement to the defects in the host pipe to provide a smooth surface to receive the end seal.

3.4. REINSTATEMENT OF BRANCH CONNECTIONS AND MANHOLE CONNECTIONS

- 3.4.1. The Contractor is responsible for confirming the locations of all branch service connections prior to installing the CIPP.
- 3.4.2. A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP, shall be applied at manhole/wall interface in accordance with 2.1.4.1. and 3.3.1.
- 3.4.3. Reconnections of existing services shall be made after the CIPP has been installed, fully cured, and cooled down. It is the Contractor's responsibility to make sure that all active service connections are reconnected.
- 3.4.4. A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least 90% of the service connection opening area and the bottom of both openings must match. The opening shall not be more than 100% of the service connection opening. The edges of the opening shall not have pipe fragments or CIPP fragments which may obstruct flow or snag debris. In all cases, the invert of the sewer connection shall be cut flush with the invert entering the main line.
- 3.4.5. In the event that service reinstatements result in openings greater than 100% of the service connection opening, the Contractor shall install a CIPP type repair, sufficient in size to completely cover the over-cut service connection. No additional compensation will be made for this repair.
- 3.4.6. Coupons of pipe material resulting from the sewer tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Coupons are not allowed to pass through the system.
- 3.4.7. Compensation shall be for the actual number of services reinstated. The unit price bid per service line reconnected shall include all labor, materials, equipment, and supplies necessary to complete the work as required in these specifications.

3.5. INSPECTION

- 3.5.1. CIPP samples shall be prepared and physical properties tested in accordance with ASTM F1216, Section 8.1 using either method proposed. The flexural modulus must meet or exceed the value used in design in Section 2.4 (Structural requirements for the pipe size and thickness furnished in design).
- 3.5.2. Leakage testing of the CIPP shall be accomplished during cure while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by JEA.
- 3.5.3. Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.

3.6. TELEVISION INSPECTION

- 3.6.1. A preliminary CCTV CD will normally be prepared by JEA's preferred CCTV provider. The tape will clearly identify the condition of the pipe, elevations, material types, and location of all lateral connections, and will be furnished to the Contractor. All other CCTV work performed by the Contractor, is incidental to the task. It is the Contractor's responsibility to field verify conditions and laterals.
- 3.6.2. Post lining CCTV is required. The finished video shall be continuous over the entire length of the sewer between two manholes and prove to be free from visual defects.
- 3.6.3. Defects including damage, unacceptable sags, faulty service connections, leaks, etc. which may affect the integrity or strength of the pipe in the opinion of JEA and/or their representative shall be corrected at the Contractor's expense.

3.7. SITE RESTORATION

- 3.7.1. The Contractor is responsible to repair any site damage and provide site restoration, which shall be remediated as follows: Sod – 7 calendar days, Concrete – 8 calendar days, Asphalt – 7 calendar days (<200 sq ft) or 14 days (>200 sq ft). The remediation time is additive. For example, if Sod and Concrete requires restoration, both must be complete within 15 calendar days.
- 3.7.2. Disturbed areas within City right of way shall be restored to original or better conditions and comply with JEA standards.
- 3.7.3. Disturbed areas in FDOT right of way must be restored to original or better conditions and comply with FDOT requirements and specifications.

3.8. AUTHORIZATION TO COMMENCE WORK

- 3.8.1. JEA will contact the Contractor and request the contractor provide a materials take off (estimate) for the JEA scope of the project for JEA review and approval. If JEA approves the project it is expected the Contractor will accept the job and commence work within 30 calendar days (45 days if a FDOT permit is required) of receiving the Purchase Order, unless otherwise mutually agreed to by the Parties. If the Contractor fails to commence work within 30 calendar days or other mutually agreed commencement date, the Contractor will be responsible for the costs incurred by any delays, including but not limited to, emergency work due to line failure, additional costs incurred by JEA to repair/replace the line beyond the estimate provided by the Contractor to perform the work.

3.9. SUPERVISOR QUALIFICATIONS

- 3.9.1. The Field Supervisory Personnel employed by the Cure in Place Piping Contractor and assigned to supervise Work for JEA shall have three (3) years of current Field Supervisory experience and a minimum of 50,000 linear feet (total experience) of installation of underground piping using cure in place piping replacement methods described in this Solicitation. The Bidder shall submit the resume

and project experience, which shall include the amount (linear feet) of pipe bursting experience of the Field Supervisory Personnel (free form) no longer than two (2), single side, 8½ x 11 inch pages to demonstrate experience.

- 3.9.2. JEA may request and the Contractor shall provide in 48 hours the above requested documentation. If the Contractor cannot provide the documentation, JEA will reject the Bid and not Award the contract to this Bidder.
- 3.9.3. The Contractor shall use the same supervisor during the performance of the contract. If the Contractor needs to utilize another supervisor, JEA will require the Contractor to meet the same qualifications listed above. If the Contractor cannot provide another approved Supervisor JEA may terminate the Contract.