SECTION TEN

GROUP 561 SPECIFICATIONS

August 7, 2023

DEPARTMENT OF TRANSPORTATION
COBB COUNTY GEORGIA

SPECIAL PROVISION

2024 COUNTYWIDE UNIT PRICE CONTRACT

Section 561 – Renovating Existing Pipe

Replace Section 561 with the following:

CURED IN PLACE (CIPP) LINING

It is the intent of this section of these Specifications to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube that is either inverted or pulled into the original pipeline/conduit and expanded to fit tightly against said pipeline by the use of water or air pressure. The resin system shall then be cured by elevating the temperature of the fluid (water/air) used for the inflation to a sufficient enough level for the initiators in the resin to effect a thermosetting reaction.

1. **Definitions**

   General Provisions 101 through 150.

2. **Related References**

   ASTM D5813
   ASTM F1216
   ASTM F1743

3. **Materials**

   - **The Tube** - The tube shall consist of one or more layers of a flexible needled felt or an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials, capable of carrying resin and withstanding the installation pressures and curing temperatures. The tube should be compatible with the resin system to be used on this project. The material should be able to stretch to fit irregular pipe sections and negotiate bends.
     - The tube should be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit Allowances should be made for the longitudinal and circumferential stretching that occurs during placement of the tube.
     - The tube shall be uniform in thickness and when subjected to the installation pressures will meet or exceed the designed finish wall thickness.
     - Any plastic film applied to the tube on what will become the interior wall of the finished CIPP shall be compatible with the resin system used, translucent enough that the resin is clearly visible, and shall be firmly bonded to the felt material.

- The tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall also include the lining manufacturer's name or identifying symbol.

- **The Resin System** - The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured meets the minimum requirements given herein or those that are to be utilized in the design of the CIPP for this project.

4. Structural Requirements

The design thickness of the liner shall be arrived at using standard engineering methodology. ASTM F1216, Appendix X1, has such an acceptable methodology that may be used where applicable. The long- term flexural modulus to be used in the design shall be verified through testing. The long-term modulus shall not exceed 50% of the short-term value for the resin system unless the tube contains reinforcements. In the event that a reinforced tube is utilized, the long-term flexural modulus shall be the percentage of the short-term modulus as determined by the above referenced testing.

The layers of the finished 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 such that the knife blade moves freely between the layers. If separation of the layers occurs during testing of the field samples, new samples will be cut from the work. Any reoccurrence may be cause for rejection of the work.

The finished CIPP shall fit tightly to the host pipeline at all observable points and shall meet or exceed the minimum thickness established by the design process. Toe materials properties of the finished CIPP shall meet or exceed the following structural standards:

MINIMUM PHYSICAL PROPERTIES				
PROPERTY	**ASTM TEST METHOD**	**POLYESTER SYSTEM**	**FILLED POLYESTER SYSTEM**	**VINYL ESTER SYSTEM**
Flexural Strength	D790	4,500 psi	4,500 psi	5,000 psi
Flexural Modulus (Initial)	D790	250,000 psi	400,000 psi	300,000 psi
Flexural Modulus (50 Yr)	D790	125,000 psi	200,000 psi	150,000 psi
Tensile Strength	D638	3,000 psi	3,000 psi	4,000 psi

5. Installation

The CIPP shall be installed in accordance with the practices given in ASTM F1216 (for direct inversion installations) or ASTM F1743 (for pulled-in-place installations). The quantity of resin used for the tube's impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances being made for polymerization shrinkage and the anticipated loss of any resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used in conjunction with a roller system to achieve a uniform distribution of the resin throughout the tube.

Temperature gauges shall be placed at the upstream and downstream ends of the reach being lined to monitor the pressurized fluid's (air or water) temperature. In addition to monitoring the temperature inside the tube, temperature gauges shall be placed between the host pipe and the liner at as many points as is practical to record the heating that takes place on the outside of the liner.

Curing of the resin system shall be as per the Manufacturer (Licensor) of the CIPP product. The temperatures achieved and the duration of holding the pressurized fluid at those temperatures shall be per the Manufacturer's (Licensor's) established procedures.

6. Installation Responsibilities for Incidental Items

It shall be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and to provide rights of access to these points. If a street must be closed to traffic because of the orientation of the pipeline, the Owner shall institute the actions necessary to do this for the mutually agreed time period. The Owner shall also provide free access to water hydrants for cleaning, installation of the tube, and other work items requiring water. Toe contractor will be expected to uncover buried manhole lids and bring them to grade.

The Contractor, when required, shall remove all internal debris out of the pipeline that will interfere with the installation of the CIPP. The Contractor shall provide a dumpsite for all debris removed during the cleaning operations. Any hazardous waste encountered during this project will be considered as a changed condition.

The Contractor, when required, shall provide for the flow of water around the section, or sections, of pipe designated for rehabilitation. The bypass shall be made by plugging the line at the existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. The Owner may require a detail of the bypass plan to be submitted.

Experienced personnel trained in locating breaks, obstacles, and service connections by close circuit television shall perform inspection of the pipelines. The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the CIPP into the pipelines, and it shall be noted so that these conditions may be corrected. A videotape and suitable log shall be kept for later reference by the Owner.

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.

In coordination with the County, the Contractor will be responsible for contacting each home or business adjacent to the storm sewer and informing them of the work to be conducted. The Contractor shall also provide the following:

- Written notice to be delivered to each home or business describing the work, schedule, how it affects them, and a local telephone number of the Contractor they can call to discuss the project or any problems that could arise.
- Personal contact and attempted written notice the day prior to the beginning of work being conducted on the section relative to the residents affected.

7. Quality Assurance Procedures

The Contractor shall prepare a sample for each installation of CIPP. The samples shall be restrained samples for diameters of CIPP less than 18"; and flat plate samples for diameters of CIPP

18" and larger. The flat plate samples shall be taken directly from the wet out tube, clamped between flat plates, and cured in the downtube. The restrained samples shall be tested for thickness and initial physical properties; flat plate samples shall be tested for initial physical properties only.

In addition to physically sampling the finished CIPP, the Contractor shall post-TV the completed work. The television inspection should be used to confirm tightness of the fit of the CIPP to the host pipe and to identify any imperfections. The finished liner shall be continuous over its entire length and be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination.

8. Payment

Payment for the work included in this section will be in accordance with the unit prices set forth in the proposal for the quantity of work performed. All CIPP unit prices bid shall include mobilization, setup, labor, equipment, and materials necessary to perform the work. In addition, unit prices bid shall include typical point repairs, pre and post CCTV, and pipe cleaning (less than 25% full).

Payment for cleaning pipes greater than 25% full shall be paid for in the applicable pay item Pipe Cleaning > 25% full.

CENTRIFUGALLY SPRAY APPLIED CEMENTITIOUS MORTAR (SPINCASTING)

This specification document contains the minimum material requirements and installation techniques required for pipe lining rehabilitation/repair to storm drainage and related pipe as may be directed by the appropriate engineer, owner, or utility agency.

1. Definitions

General Provisions 101 through 150.

2. Related References

ACI 306 R-88
ACI 305 R-10
ASTM C 157
ASTM C 1202
ASTM C 109
ASTM C 666A
ASTM C 309

a. Delivery Storage and Handling

- All materials shall be delivered to the jobsite in their original, unopened packages, clearly labeled with the manufacturer's identification, printed instructions and batch code for shelf life and traceability.
- Store and condition the specified product as per the appropriate product data sheet.
- For handling instruction, refer to the Safety Data Sheet.

b. Environmental Conditions

Condition and maintain all materials and surfaces that contact pipe rehabilitation material to between 50"F and 90°F (l0°C and 32°C), but optimally between 60°f and 75°F (I5°C and 24°C).

3. Products

a. Materials

- The pipe rehabilitation material shall be a centrifugally spray-applied, basalt fiber reinforced, pre- packaged cement-based mortar requiring only the addition of potable water. The material shall not contain any chlorides or lime other than amounts contained within the hydraulic cement composition. The manufacturer shall have at least 20 years of experience in the manufacture of cementitious repair materials. Contractor shall be trained in the installation standards of the manufacturer.

b. Material Properties

- The pipe lining/rehabilitation material shall meet all the following typical performance criteria when cured at 70°F (21°C):
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A. Compressive Strength, ASTM C 109	
• 1 Day • 7 Days • 28 Days	3,000 psi (20.7 MPa) 6,000 psi (41.4 MPa) 8,000 psi (55.2 MPa)
B. Bond Strength, ASTM C882	
• 7 Days	• 2,000 psi (14.8 MPa)
C. Length Change, ASTM C157	
D. Chloride Ion Permeability, ASTM C 1202	
• 28 Days	Very Low
E. Freeze/Thaw Resistance, ASTM C 666A	• 90% RDM @ 300 cycles
F. Working Time	• 30 Minutes

4. Execution

a. Examination

- Actual site conditions must be verified in order to properly assess whether or not the pipe is a candidate for in-situ repair. Registered engineer/contractor to verify surrounding soil conditions, existing pipe conditions and existing/future loading conditions are suitable for the repair to take place.

b. Pipe Conditions

- Completely remove or mitigate all obstructions that may hinder proper installation of product prior to commencing work.
- Ensure all active water flow is diverted or stopped prior to commencing work.
- Remove all loose, delaminated and weak materials including dirt and debris from work area. Prepare pipe surfaces using high pressure water blasting to thoroughly remove all contaminants and bond-inhibiting materials. Severely corroded pipe sections may need replacement.
- The sections to be repaired should be free of standing water; concrete pipe should be presoaked for 6-8 hours prior to installation or in accordance with manufacturer's specifications.
- All cracks in pipes identified shall be brought to the attention of the engineer and a determination made of whether the cracks shall be repaired or mitigated as directed prior to installation of the pipe rehabilitation material.
- All surfaces must be blown clean from surface preparation debris and residue prior to commencing work.
- Due to the potential corrosion reactivity between cementitious materials and aluminum, all aluminum pipe should be coated with a coal tar type coating (or similar material) prior to application of Cementitious Repair Material.

c. Application

- All necessary tools, equipment and materials shall be in good condition and as close as possible to the area being repaired.

- Appropriate clothing and safety equipment shall be worn to avoid breathing dust and prevent eye and skin contact with both dry and mixed repair materials, according to the Safety Data Sheets.
- An ample source of potable water shall be available for preconditioning, mixing, cleaning and curing.
- Mix according to manufacturer instructions.
- Position spray cast equipment within pipe and begin pumping material to nozzle. Commence application of material within pipe. As material is cast within the pipe, move applicator head accordingly so as to provide the necessary thickness and uniformity. Continue placement of material to minimize or prevent cold joints except over existing joints. Placement thickness and achievement of specified wall thickness are the responsibility of the contractor.

d. Curing

- Wet cure per manufacturers recommendations or for a minimum of24 hours after placement or apply curing compound meeting the requirements of ASTM C 309 immediately after placement.
- Repair material shall be protected from freezing, hydrostatic pressure and vibration as recommended by the manufacturer, until fully cured.

e. Field Quality Control

- Compressive Strength Test:
- Test in accordance with ASTM C109/Cl09M by making samples of the mortar. Obtain production samples of mixed mortar from the nozzle or the mixer during the application for compliance with specification for testing at 7 days and 28 days.
- Provide a minimum of three test specimens for each 200-lf of spun pipe and a minimum of 3 samples in total, whichever is greater, for testing.
- Provide manufacturer's original Quality Control results for batch used on site.

5. Payment

Payment for the work included in this section will be in accordance with the unit prices set forth in the proposal for the quantity of work performed. All Spincast unit prices bid shall include mobilization, setup, labor, equipment, and materials necessary to perform the work. In addition, unit prices bid shall include typical point repairs, pre and post CCTV, and pipe cleaning (less than 25% full).

Payment for cleaning pipes greater than 25% full shall be paid for in the applicable pay item Pipe Cleaning > 25% full.