**CITY OF BILOXI**

**SPECIAL PROVISION NO. 907-208-1 CODE: (SP)**

**DATE: 06/14/2017**

**SECTION 208 – CURED-IN-PLACE-PIPE (CIPP)**

**208.01 - GENERAL**

**208.01.1 - Summary.** This includes the reconstruction of existing sewer/drain lines by forming a new pipe within an existing deteriorated pipe, which has generally maintained its original shape. The process is defined as the reconstruction of sewer/drain lines by installation of a thermosetting resin impregnated flexible felt fiber tube, coated on one side with polyurethane, which is installed into the existing sewer line utilizing a water column or air/steam inversion.

Curing is accomplished by circulating hot water or heated air throughout the length of the inverted tube to cure the thermosetting resin into a hard impermeable pipe with the polyurethane coating on the inside surface of the new pipe.

The pipe shall extend the full length of the original pipe and shall provide a structurally sound, jointless, close fitting, and corrosion resistant cured-in-place pipe. The cured-in-place-pipe (CIPP) shall provide flow capacity equal to or greater than 100% of the original pipe’s flow capacity when new.

**208.01.2 – Submittals.** The following submittals will be required from the Contractor during the course of the project. The numbers of sets of each are as stated.

A. Shop drawings, catalog data, and manufacturer’s technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer’s recommendation for handling, storage, and repair of pipe and fittings damaged. Four sets.

B. Detail drawings and written description of the entire construction procedure to install pipe, bypass sewage flow and reconnection of sewer service connections. Two Sets.

C. Certification of workmen training for installing pipe. Two Sets.

D. The CCTV DVDs and NASSCO PACP coded defect report shall be submitted to Owner’s Representative before and after new pipe installation. Two copies.

E. Contractor shall provide to the City Engineer or his Authorized Representative, with the videos and defect report, an exhibit that is color coded to reflect the NASSCO PACP standard mainline defect ratings in 5 point increments (0-5,6-10,11-15,16-20, etc…). The Engineer will provide the Contractor with paper or digital copies of the basemap to use in preparation of the required exhibits.

F. Two (2) copies of an exhibit recommending the location of point repairs and a schedule of values in accordance with the Unit prices shown on the Proposal Form. Approval in writing for making point repairs shall be made to the Contractor prior to commencement of work.

**208.01.3 - Project Conditions**

1. Available data and records are indicated in contract documents.
2. Public Notification Program:
3. Deliver written notices to each home or business 48 hours before commencement of work being conducted on section, including a local telephone number of Contractor contact for inquiries or complaints.
4. Provide owner or occupant a summary of work to be completed, and time and duration of service interruption to building.
5. Contact any home or business that cannot be reconnected within time stated in written notice.

**208.02 - PRODUCTS**

**208.02.1** Resin - The resin used shall be a high-grade corrosion resistant polyester, vinyl ester or epoxy and catalyst system specifically designed for the cured-in-place-pipe (CIPP) being installed. The minimum length shall be that deemed necessary by the engineer to effectively span the pipelining distance of the necessary sectional repair unless otherwise specified. In most cases complete reaches of pipe will be lined (inside face of manhole to inside face of manhole). The line lengths shall be verified in the field before impregnation of the tube with resin.

**208.02.2** General Requirements of CIPP - The finished pipe must be such that when the thermosetting resin cures, the total wall thickness will be a homogeneous and monolithic felt and resin composite matrix that will be chemically resistant to withstand internal exposure to domestic sewerage. When cured, the CIPP must form a mechanical bond with the existing conduit.

**208.02.3** Reference Specifications - Installation and material tests of cured-in-place-pipe (CIPP) must meet the minimum requirements demonstrated in the following ASTM standards:

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| ASTM F-1216 Standard Practice for the Installation of Cured-in-Place Pipe by Inversion Lining | | |
| ASTM D-638 Test Method for Tensile Properties of Plastics | | |
|  | Tensile Strength | 3,000 psi |
| ASTM D-790 Test Method of Flexural Properties of Plastics | | |
|  | Flexural Strength | 4,500 psi |
|  | Flexural Modulus | 250,000 psi |

**208.02.4 - Pre-Qualification**

1. Insituform, Inc., Suncoast Infrastructure, Inc. and National Liner are pre-qualified installers of CIPP and their liner materials are pre-approved.
2. Pre-approval of products and installers is required to be classified as Commercially Acceptable.
3. To be considered Commercially Acceptable, the product and the installer must demonstrate full compliance with the requirements outlined below. Products and installers deemed Commercially Acceptable will be allowed to bid as specified.
4. For a product to be considered Commercially Acceptable, a minimum of 500,000 feet or 2,500 line sections of successful wastewater collection system installations in the U.S. must be documented to assure commercial viability. In addition, the Product shall have been in successful service within the wastewater collection system of the Owner (or some other city, town or county within the United States of America for a minimum of two years.)
5. Other installers of CIPP wishing to be pre-qualified to install CIPP must submit a request package to the Owner no later than 10 days prior to the Bid Date.

**208.02.5 - Material Test and Pipe Design**

1. Material Tests- Independent material tests for compliance with this specification all be made according to the applicable ASTM standards. A certificate of compliance shall be provided for all materials furnished under this specification.
2. Liner thickness shall be designed by Contractor to support all dead loads, live loads and groundwater loads imposed. Contractor shall submit design calculations to Engineer prior to fabrication.

**208.03 - EXECUTION**

**208.03.1** The Owner shall provide free access to water hydrants for cleaning, inversion and other work items requiring water. Owner shall provide rights of access along existing easements and streets. Any additional access paths that have been negotiated by the Owner are shown on the plans. Contractor is responsible for providing appropriate traffic control for his operations throughout this project.

**208.03.2** Sewers shall be cleaned of all debris, roots and other materials that would prohibit access to the sewer lines, video inspection equipment and installation of the CIPP liner. Cleaning is defined as normal, heavy, and mechanical cleaning. Normal cleaning will consist of two passes of high-pressure cleaning equipment. Heavy cleaning will consist of additional passes as necessary and includes root removal. Mechanical cleaning will consist of the use of specialized attachments specifically designed to remove built-up materials on the inside of the host pipe that cannot be removed by normal cleaning equipment.

* + 1. Removal of protruding taps shall be required where taps would prohibit the access of the video equipment or proper installation of the CIPP tubing.

**208.03.4** Reverse setups will only be allowed for blockages that require external repair prior to CIPP installation. All other blockages must be removed from the host pipe by means of standard cleaning equipment or mechanical cleaning equipment.

**208.03.5** The Contractor will be required to locate buried manholes as directed by the Engineer. Location of manholes, by whatever means or technology that the contractor chooses to use, shall include uncovering the manhole, exposing and removing the cover. Modifications such as demolition and reconstruction will be made at the direction of the City Engineer or his Authorized Representative.

**208.03.6** The Contractor shall be responsible for providing vacuum cleaning equipment to remove and dispose of materials cleaned from the host pipe and the manhole/catch basins inverts. All solids shall be removed at the downstream manhole of the section being cleaned. Passing material from one sewer segment to another will not be permitted. The Contractor is responsible for obtaining all necessary permits and/or permission for the disposal of the materials removed at an approved location. Contractor shall submit to the Owner’s Representative the appropriate documentation regarding disposal sites and formal agreements with the site owner a minimum of 72 hours prior to commencement of the work.

* + 1. CCTV Inspection- Sewers to be lined with CIPP shall be CCTV inspected with a 360 degree pan and tilt color camera. An assessment of the sewers shall be made in accordance with the NASSCO PACP reporting format and coding standards.
    2. Identification and Premeasurement of Lateral Connections – At each connection the operator will stop and turn the camera lens toward the lateral, thereby inspecting the first 8 to 12 inches of the connection. If there is still a doubt as to whether or not the connection is live, additional “dye and flush” tests shall be preformed. Owner’s representatives will review this process live or review the video tapes to verify and approve which laterals are to be reinstated. All laterals will be directly measured from the back wall (opposing wall) of the basis manhole, typically the downstream manhole.
    3. Cleaning shall be provided as necessary to ensure proper inversion of the cured-in-place-pipe.
    4. Bypass of Flow (for Sanitary Sewer Mains only) - The Contractor shall bypass the sanitary sewerage around the sections of sewer to be lined. The bypass shall be made by plugging an existing upstream manhole and if necessary pumping the sewerage into the downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow.

**208.03.11** Resin Impregnation of CIPP Tube - The Contractor shall designate a location where the tube shall be impregnated or “wet out” with resin, using distribution rollers and a “single-source” vacuum to thoroughly saturate the tube’s felt fiber prior to installation. The impregnated tube shall be free of pinholes, resin voids and other defects. If the cured-in-place-pipe is impregnated at the manufacturing plant, it shall be delivered to the job site in a refrigerated truck and remain refrigerated prior to the installation to prevent premature curing.

* + 1. Inversion of CIPP Tube - The impregnated tube shall be water or air inverted through an existing manhole or other approved access until it has fully traversed the designated line length and the inversion face breaches the target manhole or termination point.
    2. Thermocouples shall be placed at the top, and if possible, the bottom interface of both ends of the liner for monitoring the temperatures during the cure cycle.
    3. CIPP Processing (Curing and Cool Down) - The cure cycle and cool down will be dictated with consideration of the actual field conditions and shall be per the manufacturer’s recommendations. The curing temperatures shall be monitored at the boiler truck’s water inlet and outlet lines. The temperature reading from the truck shall be compared to the thermocouples to ensure that sufficient heat is being supplied to the system.
    4. Once the pipe has reached exotherm, cool water or air shall be slowly introduced into the rehabilitated pipe. The temperature shall be cooled inside of the pipe to below 100 degrees F. The cool down process will also be affected by actual field conditions, and may have to be modified in cases of severe weather conditions or below normal ground temperatures.
    5. Termination and Sealing at Manhole Outlets - Termination of the cured-in-place-pipe at the manhole is completed by trimming the inverted pipe end back within approximately 2 inches of the outlet. The liner shall seal the annular space and hydraulic cement shall be used to finish the liner invert connection.
    6. Testing - Leakage testing shall be conducted prior to the reinstatement of laterals and shall be performed under the supervision of the Owner or his authorized representative. The Contractor shall furnish all equipment and personnel necessary to conduct an acceptance test.
    7. Internal Reconnection of Laterals - Lateral connections shall be reinstated robotically whereby a camera and robotic cutter are put into the newly rehabilitated line. Each lateral is identified by a dimple in the cured-in-place pipe and/or through pre-installation measurements. Initially, each lateral shall be relieved by cutting a 2 to 3 inch diameter hole to ensure that no services will be interrupted and there will be no risk of backed up lines. Once this is accomplished, each lateral shall be fully reopened to at least 90% percent of its original size.
    8. Final Inspection - Upon completion of installation, sewers shall be CCTV inspected, providing both a video recording (DVD) and distance log which identifies all service connections and openings.

**208.04 - MEASUREMENT**

* + 1. Cleaning of sewers and drains shall be absorbed in unit cost of the CIPP installation and will not be a separate pay item.
    2. Removal of Protruding Taps will be measured per each.
    3. No separate measurement will be made for reverse setups. Reverse setups will be considered an absorbed item.
    4. Uncovering and gaining access to any buried manholes, catch basins, and inlets shall be an absorbed cost.
    5. No separate measurement will be made for the NASSCO Defect Report and exhibits. They shall be considered an absorbed item.
    6. Reconnection of laterals shall be made per each.
    7. Bypass pumping is not a separate pay item. Cost to be an absorbed item.
    8. CIPP will be measured per linear foot for each diameter pipe through which it is installed. CIPP of complete reaches (manhole to manhole, inlet to inlet, catch basin to catch basin, etc.) shall be measured from center to center.

**208.05 - PAYMENT**

**Basis of Payment.** This work will be paid for at the contract unit prices per unit specified, complete in place, which shall be full compensation for completing the work. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

Payment will be made under:

907-208-A: \_\_\_" Cured-In-Place-Pipe -per linear foot

907-208-B: Remove Protruding Tap -each

907-208-C: Reconnection of Lateral -each