

SECTION 083
SPECIFICATIONS –LATERAL CONNECTION REPAIR USING CIPP

Lateral connection repairs using cured-in-place pipe (LCR) shall refer to the repair of connections to sewers at locations of tees, wyes and tap connections using cured-in-pipe (CIPP) materials and methods. Excavation of sewers, in whole or in part, is not employed in the completion of LCR repairs.

Approved systems for the completion of LCR repairs will include a single-piece polyester fiber tube that is saturated with approved resin and are characterized as a brim-style hat profile. A LCR that has a brim-style hat profile is one that includes a flexible or semi-rigged flange that provides a watertight seal between the LCR and the internal surface of the downstream sewer; systems that include a main sheet that wraps around the internal circumference of the downstream sewer are not considered to have a brim-style hat profile. Hydrophilic caulk must be used on the backside of LCR flanges to enhance seals.

Additionally, approved systems for the completion of LCR repairs will not require access to sewer service laterals from locations upstream of the connection to be repaired. Such access will not be provided; therefore, approved LCR systems will not require access to sewer service laterals except from within connecting downstream sewers.

Finally, unless otherwise specified by the Engineer on project plans, LCR repairs will extend into sewer service laterals only to a location upstream of the first joint upstream of the connection. When a LCR is being constructed at a sewer tee or wye, the LCR will only extend upstream of the joint between the spigot of the first sewer lateral pipe and the bell on the private-side of the tee or wye. When a LCR is being constructed to repair a tap connection to the sewer, the LCR will extend just upstream of the first joint within the sewer lateral piping.

Alternative methods of LCR construction shall be allowed only with approval of the Engineer prior to the receipt of proposals for the completion of the specified work.

1.0 Specifications

All aspects of LCR including, but not limited to, preparation of existing sewers, design, construction and testing shall be in accordance with the latest editions of ASTM F2561 and all documents referenced therein except where superseded by these Specifications. When there is a conflict between these Specifications and any documents referenced herein, these Specifications shall govern.

Discrepancies between ASTM F2561 include, but may not be limited to, the following: one, lateral pipes will not be accessible from lateral cleanouts; two, LCR repairs will not encompass the circumference of the downstream, public sewer but rather be limited to the before mentioned, flanged, seal; three, cleaning and inspection of sewers will not be governed by NASSCO guidelines but rather by these Specifications; four, for each constructed LCR, the wall thickness at every point of the constructed and cured LCR, as determined by samples collected and tested in accordance with the latest versions of ASTM F2561, ASTM D5813 and ASTM 3567, shall be not less than the design thickness approved by the Engineer; and, five, for each constructed LCR, the flexural modulus of any and all constructed and cured LCR, as determined by samples collected and tested in accordance with the latest versions of both ASTM F2561 and ASTM D790, shall be not less than 400,000 psi. Regarding Items Four and Five above, results of testing performed on any given sample shall not be less than the minimums cited.

2.0 Scope of Work

The work required by the Project shall consist of furnishing all labor, tools, materials and equipment necessary to perform the following work in accordance with both these Specifications and those referenced. The work shall

include the following: prior to construction of LCR repairs, providing to the District all documents required by these Specifications including, but not limited to, manufacturers' recommendations and certifications; if necessary, obtaining water from a local water company or the provision of water by the Contractor; notification of all affected households, businesses, etc.; the construction, maintenance and removal of all required traffic control; the provision of sewer access necessary for the construction of LCR repairs in accordance with these Specifications; the inspection and recording of inspection images prior to the commencement of any sewer cleaning operations; the inspection and recording of inspection images after the completion of any sewer cleaning operations; the inspection and recording of inspection images prior to the commencement of LCR construction; the performance of sewer cleaning necessary for the construction of LCR; the performance of any lateral inspections performed by the Contractor; the provision to the District of design information for each LCR as required in these Specifications including any necessary revisions as required by the District; the provision by the Contractor of notices of intent to manufacture LCR if manufactured outside of the area of work; the construction of uncured LCR, including all construction costs, material costs and, if manufactured outside of the area of work, transportation costs; LCR construction, including construction of the assembly necessary for the placement of the LCR within the sewer pipe in question as well as its transport to the location of the repair; the inversion of the LCR into the sewer service lateral in question; the curing of the LCR; the construction, maintenance and deconstruction of any necessary flow-controls; the performance of required testing of materials or constructed LCR including the provision to the District of notifications and testing results; the reestablishment of sanitary service after LCR construction; the inspection of constructed LCR as well as recording of inspection images; and the provision of recorded inspection images to the District.

The Contractor shall make all provisions for the supply of all water needed for the Project, including, but not limited to, that water necessary for sewer line preparation and LCR construction. If necessary, the Contractor shall make arrangements with local water suppliers to provide the necessary water. All costs associated with the supply of water including those resulting from the supply of labor and security by the water suppliers shall be the Contractor's responsibility and shall be made part of proposals as directed in Section 009 of these Specifications.

3.0 Information

Recordings of prior internal, sewer inspections are provided as an informational courtesy only are not intended to provide a complete or an accurate description of the condition of the sewers prior to the required construction of LCR. Determination of the condition of the sewers to receive LCR shall be the responsibility of the Contractor. Regarding the conditions of the sewers to receive LCR, discrepancies between that shown on sewer inspections provided and that discovered during sewer inspections required as part of this contract shall not be the basis for claims for additional compensation.

Underground conditions at and near the site(s) of the work to be performed have not been investigated. The Contractor shall be responsible for determining underground conditions to the extent that he or she deems necessary for the successful performance of the work as shown on the Plans and called for in the Specifications. The Contractor shall assume all risks and shall claim no additional compensation for both unforeseen underground conditions and incorrect determinations of the impact of underground conditions on the completion of the work.

The Sanitary District has not inspected the conditions of private plumbing or private sewers to determine their adequacy for the prevention of either odor migration or sewer backups resulting from either preparations for or installations of CIPP to be installed as part of this project. GPSD shall not be liable for damages caused by deficiencies in private sewers or private plumbing; the Contractor shall determine the adequacy of private sewers and private plumbing for the prevention of damages caused by the activities of the Contractor.

Unless provided in the Plans or Specifications, the District no knowledge of the dimensions of sewer service

connections to receive constructed lateral connection repairs. If information about the dimensions of sewer service connections is provided in the Plans or the Specifications, deviations between the actual dimensions of sewer service connections and the nominal dimensions represented in the information provided can be expected. Dimensions that are provided, if any, are nominal and shall not be taken as explicit dimensions for the size of a proposed LCR. The Contractor shall be exclusively and solely responsible for determining the dimensions of lateral connection repairs to be constructed.

4.0 Public Notification

All residences and businesses that may be affected by work performed in the construction of LCR shall be notified both by mail and by delivery of a notification. Mailed notifications are to be mailed via first-class mailing at least two (2) weeks before any work commences at a site. Work shall begin no later than three (3) weeks after public receipt of mailed notifications. A second notification shall be delivered at least forty-eight (48) hours before commencement of work at a site.

Every business and residence that may be affected by traffic disruptions, disruption of sanitary service, odor problems, etc., shall be notified of the following: an explanation of the work to be performed; when the work is anticipated to commence; where the work is to be performed in reference to local streets; the name and office telephone numbers of Contractor representatives; the nature of the inconvenience(s) anticipated to be experienced by the resident/business owner; the anticipated duration of the repair; that the work is being performed on behalf of the Greater Peoria Sanitary District; and a Sanitary District contact and telephone number as provided by the District. Information included in the notifications regarding Contractor representatives shall include both the name and twenty-four (24) hour telephone number of the Contractor's supervisor at the work site(s) and the name and business telephone number of a Contractor representative who is responsible for the administration of the project from the location of the offices of the Contractor. Additionally, an advisement shall be included stating that the business/resident should make sure that the traps in the affected buildings are functioning properly.

The proposed format of all correspondence from the Contractor, to the public, shall be reviewed, and approved, by the Engineer before mailed delivery. Only after execution of the contract, the District, upon request, may supply a partial listing of those contacts that are to receive said notifications. It is to be understood by the Contractor that such a list is not intended to be a complete listing of those persons required to receive notification. Complete public notification is to be the exclusive responsibility of the Contractor.

The Contractor shall promptly notify the Sanitary District of each distribution of notifications including the location of the notified residents and businesses.

5.0 Sewer Line Preparation

Sewer line preparation for LCR construction shall be performed in accordance with ASTM F2561 except those portions superseded by these Specifications. When in conflict, the Project Specifications shall govern. Additionally, sewer line preparation for LCR construction shall be performed in accordance with and subsection 3.0 of Section 093 except those subsections pertaining to the supply of water. However, cleaning of the bookend manholes shall not be required. The Contractor shall select an approved method of preparation that will minimize the potential for damage to the host pipe, any connections or private property.

The Contractor shall inspect and capture all resulting images of sewers to receive a LCR immediately before and immediately after the performance of any and all sewer preparation activities. Sewer inspection and image capture shall be in accordance with these Specifications. All recorded images shall be promptly provided to the Sanitary District.

Line obstructions including, but not limited to, solids, roots and protruding service connections shall be removed by the Contractor prior to the construction of LCR if said obstructions are in conflict with the LCR to be constructed or if they will impede, in any way, the movement of the assembly constructed to transport the LCR. Loss of resin caused by contact with either the internal surface of the host pipe or line obstructions will not be allowed.

The Contractor shall take care not to cause damage to the host pipe during sewer line preparation. Any damage caused during the performance of the work shall be the responsibility of the Contractor and repaired exclusively at the Contractor's expense. Prior to the commencement of repairs, both the scope and repair methods shall be approved by the Engineer.

6.0 Sewer Line Inspection

The purpose of sewer line inspection is to inspect and record the condition of the sewers in question, establish the locations of sewer services and verify parameters such as the diameter of receiving sewers. Sewer line inspections shall be performed in accordance with subsection 4.0 of Section 093 of these Specifications, titled Television Inspection, Videotaping and Recording, except that portion related to compensation.

Sewer laterals may be inspected; however, costs thereof shall be included in the costs of LCR installation. The Contractor shall record all images of sewer lateral inspections and submit them to the Engineer for approval. Recorded images shall be the property of the District and include accurate documentation of time, date and the location of all inspection cameras all in accordance with the requirements detailed in Section 093 of these Specifications. Recorded images of lateral inspections shall also include documentation of the inspected sewer lateral including the position of the lateral inspection device relative to mainline sewer inspection device.

LCR repairs shall be designed based upon accurate measurements of the host sewers. The conformity of installed LCR to their host pipes shall not be compromised by inaccurate or imprecise measurements. If the District questions the accuracy of dimensions obtained by the Contractor, the Contractor shall repeat the measurements as often as necessary to obtain satisfactory information without claim for additional compensation or delay. If the Engineer determines that any method of measurement used by the Contractor yields inaccurate or generally questionable information, the Contractor shall seek and utilize another method during subsequent measurements.

7.0 Sewer Flow Control

Sewer flow control shall be provided by the Contractor where required by the Engineer and the manufacturers of the LCR and its components and constructed, maintained and deconstructed in subsection 2.0 of Section 093 of these Specifications.

8.0 Lateral Connection Repairs Using Cured-in-Place Pipe (LCR)

LCR construction shall be in accordance with the following subsections.

8.1 Submittals by the Contractor

Prior to the commencement of any LCR construction, the Contractor shall be required to provide information to the Engineer as detailed in these Specifications. The Contractor shall be required to provide information about all components of LCR to be constructed and installed as part of the Project including, but not limited to, liners, resins and initiator systems; submittals shall include manufacturer installation guidelines, technical information about each liner, resin and initiator to be used as part of the Project and manufacturer certifications that the materials are in compliance with these Specifications. The Contractor

shall submit certifications from manufacturers of each and every LCR component that each of their components to be used by the Contractor is compatible with each and every other LCR component that the Contractor intends to couple with their products. The Contractor shall also provide certifications by the component manufacturers that their materials are appropriate for the specific applications intended by the Contractor; if necessary, such certifications shall specify which applications, as represented by the repair numbers included with the Project plan sheets, are inappropriate for specific LCR component materials. Finally, the Contractors shall also submit certificates from the manufacturers of proposed resins to be used that indicate the date of manufacture of each resin. Manufacturer certifications shall be signed by representatives of the manufacturers with authority to provide such analysis and conclusions.

Prior to the commencement of LCR installation, the Contractor shall also submit installation and curing instructions from applicable resin and liner manufacturers. Instructions shall include installation guidelines intended to avoid damage to liners. Such details must be authorized by a representative of the manufacturer with knowledge to provide such guidance. Referencing the repair numbers from the Project plan sheets, all curing details shall be explicit about which details are applicable for specific LCR installations.

For all materials being used in the performance of the work, each of the Contractor's crews shall have with them at all times material safety data sheets (MSDS) for all materials in which such information is required. MSDS sheets shall be available for inspection at all times and copies shall be provided by the Contractor to the Engineer and to each fire department with jurisdiction at the locations of LCR installations.

For each LCR to be constructed, the Contractor shall submit to the Engineer for approval design calculations that include proposals of the dimensions including the minimal thickness and diameter. Each design submittal shall reference the applicable repair number from the Project plan sheets. Design submittals shall be complete and demonstrate conformance with these Specifications including all design calculations, assumptions and values of parameters. Also included shall be the proposed thickness of the LCR to be constructed which shall not be less than the minimal-design thickness resulting from design calculations. Once submitted by the Contractor, the Engineer will review these submittals and either approve or provide questions or comments; if not approved, the Contractor must address questions or comments and resubmit designs for further review. It is recommended that the Contractor commence construction of LCR including materials supply and liner impregnating only after the approval of design by the Engineer. The Contractor shall proceed at his own risk prior to receipt of approval; the Contractor shall not claim compensation for costs of either work performed or materials used in the construction of the unapproved LCR.

If manufactured at a location other than the site of LCR installation, prior to the commencement of installation of each LCR, at the site of each LCR installation, the Contractor shall provide the Engineer or his Representative a manifest for each and every LCR to be installed at the site. The identifying repair numbers of impregnated LCR shall be clearly marked on each liner at the time and place of construction of the impregnated and uncured LCR. Manifests shall include information such as the repair number representing the destination of the uncured LCR, the date of resin impregnation of the LCR, design information such as the dimensions of the manufactured liner including its length, diameter and thickness, identification of the material components of the LCR including the tubing, resin and initiator systems and a signature of an authorized representative of the manufacturer of uncured LCR. On the manifest, information about material components of the LCR shall include manufacturer information that allows tracking of the components from supplier to the construction of the LCR.

If manufactured at a location other than the site of LCR installation, at least one week prior to construction of the uncured LCR, the Contractor shall give notice in writing to the Engineer of his intention to commence the manufacture or preparation of materials to be specifically used in the work performed as part

of this Project including the impregnation of liners. Such notice shall contain a request for inspection, the location of manufacture, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture or he will notify the Contractor that inspection will be waived. The Contractor shall allow District personnel unscheduled and complete access to the locations of manufacture of materials including uncured LCR for the purpose of performing inspections to assure compliance with these Specifications. The Contractor shall notify the Engineer as soon as possible but no less than two business days prior to any deviations from the Contractor-supplied scheduled of construction.

8.2 Materials

The materials used both in the preparation and installation of LCR shall conform to the following specifications and ASTM F1216.

Materials including resins, pigments, dyes or colorants shall be chosen such that coloring of the installed LCR will not interfere with visual inspection of the pipe. The Engineer shall have exclusive authority to approve or disapprove of the color of installed LCR; generally, lighter colors such as white are acceptable.

8.2.1 Resins

Unless specified otherwise by the Engineer, resins to be used in the construction of LCR shall be selected from the following list that may be supplemented with equals approved by the Engineer prior to the opening of proposals: Vipel L010-PPA, epoxy-based vinyl ester, series as manufactured by AOC; and COR72-AA-456 and COR72-AA-646 resins as manufactured by Interplastic Corporation.

For all LCR, initiator systems to be used shall be compatible with the intended resins and certified as compatible by the resin manufacturer.

8.2.2 Liners

Unless advised otherwise by either the resin or liner manufacturer, the following guidelines shall govern the construction of liners. All manufacturer recommendations must be provided in writing on manufacturer-company letterhead and signed by an authorized representative.

Liners shall conform to ASTM-1216, constructed to be multiple-layer felt liners with impermeable coatings, and designed and constructed specifically for LCR repairs. Construction of a LCR must not utilize multiple, overlapping tubes to complete the repair; rather, a single-piece tube shall be utilized. Felts shall be constructed using polyester fibers and coatings shall be constructed using either polyurethane or polypropylene materials.

Liners shall be selected for each specific application. For any given LCR installation, the liner, including its coating, to be used shall be compatible with the approved resin system including initiators, the approved dimensions of the LCR to be installed, the site conditions and the curing method recommended by the resin manufacturer. Impregnation methods shall be in accordance with the recommendations of the liner manufacturer.

Liners shall be constructed such that, for each constructed LCR, the wall thickness at every point of the constructed and cured LCR, as determined by samples collected and tested in accordance with

the latest versions of ASTM F2561, ASTM D5813 and ASTM 3567, shall be not less than the design thickness approved by the Engineer.

8.3 Design of LCR Liners

Design of LCR shall meet the minimum design requirements of ASTM F1216 and all referenced documents therein except as modified by these Specifications. For design considerations, it will be assumed that all sewer connections to be rehabilitated by installation of a LCR exhibit a fully deteriorated gravity pipe condition in accordance with definitions provided in ASTM F1216. Equation X1.3 of ASTM F1216 shall govern the determination of the thickness of LCR to be installed unless specified otherwise by the Engineer; determination of LCR thicknesses using Equation X1.4 of ASTM X1.4 shall not be allowed. Coupled with Equation X1.3, the following guidelines shall govern the design the thickness of all LCR unless specified otherwise in these Specifications: assume a height of water above the pipe (H_w) equal to the height of soil above the top of the pipe (H) (i.e., a minimum water buoyancy factor of 0.67); for any given LCR installation, the height of soil above the top of the pipe (H) shall be the greater of the measurements of the depths of the bookend structures which shall be from the top of the manhole casting at its center to the bottom of the manhole also at its center; assume a soil density of 125 pcf; assume a percent ovality of the host pipe of two (2) percent; assume a factor of safety of two (2); assume a modules of soil reaction of 700 psi; assume a minimum long-term modules of elasticity of 200,000 psi; and assume no impact on LCR due to live loading unless specified by the Engineer.

8.4 Construction and Handling of Uncured LCR

Liners shall be impregnated with approved resins in accordance with both the requirements of ASTM F1216 and the recommendations of the manufacturers; when in conflict, the recommendations of the manufacturers shall govern. If constructed at a location other than the site of the work, impregnated and uncured LCR shall be transported to the sites of work using means and methods approved by the manufacturers of all components. Installation of LCR shall begin within a period of time after impregnation that is acceptable to the component manufacturers; if the initiation of the curing process has begun prior to installation, the uncured LCR shall be rejected and not allowed to be used as part of the completion of the project.

8.5 Installation

Installation of LCR shall proceed only after all necessary preparation has been completed, including the notification of all affected residences and businesses in accordance with these Specifications, cleaning and inspections, necessary and adequate flow controls have been implemented and necessary traffic control measures have been placed and maintained in accordance with these Specifications. The Contractor shall proceed with the insertion of a LCR into a sewer only after the sewer has been inspected for cleanliness and cleaned immediately before the commencement of LCR insertion.

Installation of LCR shall be in accordance with these Specifications, the instructions of both the resin and liner manufacturers and ASTM F1216. When in conflict, instructions provided by the resin and liner manufacturers shall govern.

Immediately after installation including complete sewer service reinstatements, LCR shall be inspected to the satisfaction of the Engineer prior to ending bypass pumping. Installation shall not be complete until such inspection has been completed.

The thickness of all installed and cured LCR shall be equal to or greater than that designed and approved by the Engineer. Both installation methods and LCR components shall be selected and constructed to

comply.

8.6 Re-establishing Sanitary Services

If disrupted, the reestablishment of sewer services shall be completed within twenty-four (24) hours after service discontinuation. Sewer service reestablishments shall be performed by removing ninety five (95) percent to one-hundred (100) percent of the installed LCR within the limits of the sewer service openings provided by the host sewer.

During the reestablishment of sewer services, the Contractor shall take care not to damage the host sewer including tees, sewer lateral piping or mainline sewer piping. All or part of host sewers to receive LCR might be constructed of PVC-based materials. Cutting methods and equipment shall be chosen to minimize contact between cutting tools and the host sewer. Cutting, drilling or penetrating host sewers will not be allowed. During the performance of a sewer service reestablishment, the Contractor shall immediately stop all cutting, drilling or brushing operations if it is suspected that their operations are causing damage to the host sewer. All service cutouts shall be captured and removed prior to their entry into the downstream sewer.

Openings in the installed LCR shall be made smooth and generally conform to the shape and dimensions of the original opening within the host sewer. Jagged cut edges shall not be allowed. Cut edges shall be made smooth and conformant with the shape and dimensions of the original openings by the Contractor's brushing of cut edges.

Service reestablishment by excavation including methods shall not be allowed unless approved by the Engineer.

8.7 Inspection and Testing of Installed CIPP

Inspection and testing of installed LCR shall be as required in ASTM F1216 except as modified below. The Contractor shall be responsible for the collection of samples performed in consultation with the party responsible for testing. All aspects of testing, including sample collection, sample transport, testing performance and the reporting of results shall be in accordance with the applicable standards.

All testing is to be performed by a third-party laboratory approved by the Engineer; furthermore, the laboratory shall be accredited by the American Association for Laboratory Accreditation (A2LA) to perform the applicable tests referenced within the latest version of ASTM F1216. Evidence of the qualifications and experience of the testing party shall be submitted by the Contractor to the Engineer before work commences. Results of tests performed are to be the property of the Engineer, exclusively. The results of testing shall be made available to the Engineer as soon as possible so that he may determine the acceptability of the work. Results shall be submitted in a format acceptable to the Engineer.

At least two samples shall be taken from each inversion unless the testing-party requires more samples to perform the specified testing. Unless otherwise specified by the Engineer within the Project plans, testing shall be performed on samples taken from each constructed LCR.

The flexural modulus of installed LCR as determined using sampling and testing methods required in ASTM F1216 shall meet or exceed 400,000 psi and not the minimum value specified in that ASTM Specification.

Unless specified by the Engineer on the Project plan sheets, gravity pipe leakage testing shall not be required.

Determination of the wall thicknesses of constructed LCR shall be performed; however, for each constructed LCR, the wall thickness at every point of the constructed and cured LCR, as determined by samples collected and tested in accordance with the latest versions of ASTM F2561, ASTM D5813 and ASTM 3567, shall be not less than the design thickness approved by the Engineer.

If the Engineer finds the results to be unsatisfactory, the Engineer shall choose the method(s) that will be used to correct any unaccepted work. The costs of correction shall be solely that of the Contractor.

9.0 Manhole Access

The Contractor shall be responsible for making accessible all manholes into which access is necessary for the installation of LCR as specified. Making manholes accessible in advance of LCR installation shall be performed in accordance with subsections 5.0 and 6.0 of Section 093 of these Specifications, titled Television Inspection, Videotaping and Recording, except that portion related documentation and lamphole and flush tank locating.

Work performed in preparation of LCR installation, including making manholes accessible, shall not be performed too far in advance of LCR installation. The Contractor shall be paid only once per manhole for making a manhole accessible.

END OF SECTION