PART 1 – GENERAL

A. DESCRIPTION OF WORK

1) This specification covers all work necessary to furnish and install a sewage by-pass pumping system. The Contractor shall provide all labor, materials and equipment necessary to install a by-pass pumping system to divert sewage flow around manhole and pipe sections in which work is to be performed, including applicable permits, Maintenance of Traffic and restoration to better or equal conditions as related to by-pass pumping.

2) The COMMISSION will pay for actual days of which bypass pumping is performed per the Contract Bid Tabulation Bid Item - Bypass Pumping Allowance. The Unit “Per Day” for by-pass pumping shall be continuous running of pumps for no less than 12 hours. The Contractor shall submit to the COMMISSION weekly by-pass logs with dates, times and locations.

3) All work shall adhere to Occupational Health and Safety Administration (OSHA) standards, current edition.


B. SUBMITTALS

1) The Contractor shall submit a by-pass pumping plan and design describing means and methods to divert sewage flows to the COMMISSION for review and approval prior to proceeding with any type of manhole or pipe liner installation.

2) The by-pass plan and design shall be adequately sized to handle peak flow conditions.

3) The by-pass plan and design shall include redundant pumps.

4) The COMMISSION requires all Customers to be notified a minimum of 5
calendar days of any anticipated flow interruptions. It is the Contractor’s responsibility to make said Customer notifications.

PART 2 – CONSTRUCTION

A. BY-PASS PUMPING

1) Installation of the manhole and/or pipe liner shall not begin until the Contractor has installed a fully operating by-pass pumping system, with redundant pumps.

2) A sewer plug shall be inserted upstream of the manhole or pipe section to be lined. The plug shall be designed such that all or any portion of the upstream flow can be released once the lining operation is completed.

3) The sewer flow through the pipe begin by-passed shall be reduced to maximum limits stated below. After the work has been completed, the flow shall be restored to normal.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Maximum Depth of Flow of Pipe Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>6” - 10”</td>
<td>20%</td>
</tr>
<tr>
<td>12” - 24”</td>
<td>25%</td>
</tr>
<tr>
<td>&gt; 24”</td>
<td>30%</td>
</tr>
</tbody>
</table>

4) Once the lining process has begun, the plugs and by-pass pumping shall be maintained until the resin/felt tube composite is fully cured, cooled down, laterals are reinstated and the pipe is videoed.

5) When the depth of flow in the manhole or pipe being lined is above the maximum allowable for the proposed work, then the Contractor shall reduce the flow to the level shown below by manual operation of pump stations, plugging or blocking of the flow or by pumping and bypassing of the flow as acceptable to the COMMISSION.

6) For manual operation of pump stations, the Contractor shall coordinate such operations with COMMISSION.

7) Plugging or blocking of the flow shall only be allowed when the Contractor can demonstrate that the upstream gravity collection system can accommodate the surcharging without any adverse impact.

8) The depth of flow in manhole or pipe shall not exceed that shown for the respective pipe sizes and for the operations indicated.
UTILITIES COMMISSION  
CITY OF NEW SMYRNA BEACH, FLORIDA  

ITB #06-19  
SANITARY SEWER REHABILITATION – SYSTEMS 10 & 11  

SECTION 02730 – BY-PASS PUMPING SPECIFICATION  

B. FLOW CONTROL PRECAUTIONS  

1) When a sanitary sewer manhole and/or pipe is plugged, blocked or bypassed, the Contractor shall take sufficient precautions to protect the public health, Customer flooding or damage and damage to the existing gravity sanitary sewer system.  

2) Should flooding or damage occur due to the Contractor’s by-pass pumping system, it will be the Contractor’s responsibility to resolve at no cost to the COMMISSION.  

3) The Contractor will be responsible for supplying vac trucks for additional by-pass pumping support to control sewer flow in the manhole and pipe. The vac truck will be considered a “redundant” pump.  

4) When a sanitary sewer manhole and/or pipe is plugged, blocked or bypassed, the Contractor shall monitor the conditions upstream of the plug and shall be prepared to immediately start bypass pumping, if needed. Any liquid or solid matter which is bypass pumped from the gravity sanitary sewer system shall be discharged to another sewer manhole or appropriate vehicle or container only. No such liquid or solid matter shall be allowed to be discharged, stored, or deposited on the ground, swale, road, stormwater drainage system or open environment.  

5) The Contractor shall protect all pumps, conduit and other equipment used for bypass pumping from traffic.  

6) The Contractor will be responsible for clean-up, disinfection, agency notifications and remediation of any liquid or solid matter spilled, discharged, leaked or otherwise deposited to the open environment from the gravity sanitary sewer system as a result of the Contractor’s by-pass pumping system at no cost to the COMMISSION.  

END OF SECTION
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

PART I – GENERAL

A. DESCRIPTION OF WORK
B. REFERENCE SPECIFICATIONS AND STANDARDS
C. PERFORMANCE WORK STATEMENT (PWS)

PART 2 – PRODUCTS

A. MATERIALS
B. FABRIC TUBE
C. RESIN
D. STRUCTURAL REQUIREMENTS
E. PRODUCT SUBMITTALS

PART 3 – CONSTRUCTION

A. PREPARATION AND CLEANING
B. BY-PASS PUMPING
C. INSTALLATION OF LINER
D. COOL DOWN
E. FINISH
F. MANHOLE AND LATERAL CONNECTIONS
G. CIPP REPAIR/REPLACEMENT

PART 4 – FINAL COMPLETION

A. TESTING
B. INSPECTIONS
C. AS-BUILTS
D. WARRANTY
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

PART 1 – GENERAL

A. DESCRIPTION OF WORK

1) This specification covers all work necessary to furnish and install CIPP to rehabilitate sanitary sewer pipe. The Contractor shall provide all labor, materials and equipment necessary, including but not limited to, pipe cleaning, pipe preparation, root removal, removal & disposal of material(s) generated from pipe cleaning/preparation/root removal, manhole connections, pre-lining video (after pipe is cleaned/prepped), reinstatement of all existing lateral connections, sealing all manhole wall and lateral reinstatement connections, post-lining video (after lining and lateral reinstatements), testing and clean-up.

2) The Contractor shall provide necessary maintenance of traffic and by-pass pumping per the Contract Bid Tabulation.

3) The Contractor shall provide necessary warranty and documentation of required experience per the Contract Bid Submittal Requirements and as specified herein.

4) The COMMISSION requires all Customers to be notified a minimum of 5 calendar days of any anticipated flow interruptions. It is the Contractor’s responsibility to make said Customer notifications.

5) The CIPP shall be continuous, jointless and structurally sound liner from manhole to manhole. All existing and confirmed lateral connections shall be internally reinstated/re-opened. The Contractor will be responsible for sealing all manhole wall and lateral reinstatement connections.

6) The COMMISSION will pay for installed materials only per the Contract Bid Tabulation Bid Item Unit Cost.

7) All work shall adhere to Occupational Health and Safety Administration (OSHA) standards, current edition.


B. REFERENCE SPECIFICATIONS AND STANDARDS

1) This specification references the following American Society for Testing and Materials (ASTM) Standard Specifications, American Water Works Association (AWWA) Specifications and their reference standards, which are made a part hereof by such reference and shall be the latest edition and revision thereof. All work shall comply with the reference standards unless specifically stated otherwise in this Specification.

   • ASTM D5813 - Standard Specification for Cured-in-Place Thermosetting
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

Resin Sewer Pipe

- ASTM F1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
- ASTM F1743 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-In-Place Installation of Cured-In-Place Thermosetting Resin Pipe
- ASTM D543 - Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents
- ASTM D792 - Standard Test Methods for Density and Specific Gravity of Plastics by displacement
- ASTM F2019-03 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-In-Place Thermosetting Resin Pipe (CIPP)

C. PERFORMANCE WORK STATEMENT (PWS)

1) The Contractor shall submit, to the COMMISSION, a Performance Work Statement (PWS) at the pre-construction meeting, which clearly defines the CIPP product delivery in conformance with the requirements of these contract documents. Unless otherwise directed by the COMMISSION, the PWS shall at a minimum contain the following:

a. Clearly indicate that the CIPP will conform to the project requirements as outlined in the Description of Work and as delineated in these specifications.

b. Where the scope of work is specifically delineated in the contract documents, a detailed installation plan describing all preparation work, cleaning operations, pre-video inspections, by-pass pumping, maintenance of traffic, installation procedure, method of curing, lateral reinstatement, quality control, testing to be performed, final video inspection, warranties furnished and all else necessary and appropriate for a complete CIPP liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.

c. Contractor’s description of the proposed CIPP lining technology, including a detailed plan for identifying all existing lateral connections and maintaining all Customer sewer service during CIPP installation.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

d. A description of the CIPP materials to be furnished for the project. Materials shall be fully detailed in the submittals and conform to these specifications and/or shall conform to the pre-approved product submission.

e. The name and experience of each lead individual performing work on this Contract shall be submitted with the PWS.

f. Engineering design calculations, in accordance with the Appendix of ASTM F1216, for each length of liner to be installed including the thickness of each proposed CIPP. It will be acceptable for the Contractor to submit a design for the most severe line condition and apply that design to all of the line sections. These calculations shall be performed and certified by a, qualified, Professional Engineer. All calculations shall include data that conforms to the requirements of these specifications or has been pre-approved by the COMMISSION.

g. Proposed manufacturers technology data shall be submitted for all CIPP products and all associated technologies to be furnished.

h. A detailed description of the Contractor’s proposed procedures for removal of roots/blockages in the pipe that may be encountered during the cleaning process.

i. A detailed public notification plan shall be prepared and submitted including detailed staged notification to Customers affected by the CIPP installation.

PART 2 – PRODUCTS

A. MATERIALS

1) The CIPP System must meet the chemical resistance requirements of theses contract documents. All materials, shipped to the project site, shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled accordance with the CIPP manufacturer’s recommendations to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing, or ultra-violet (UV) degradation. On site storage locations, shall be approved by the COMMISSION. All damaged materials shall be promptly removed from the project site at the Contractor’s expense and disposed of in accordance with all current applicable agency regulations.
B. FABRIC TUBE

1) The fabric tube shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass or fiberglass and meet the requirements of ASTM F1216, ASTM F1743, ASTM D5813 & ASTM F2019.

2) The fabric tube shall be capable of absorbing and carrying resins, constructed to withstand installation pressures and curing temperatures and have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections. The Contractor shall submit certified information from the felt manufacturer on the nominal void volume in the felt fabric that will be filled with resin.

3) The wet-out fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.

4) The fabric tube shall be manufactured to a size and length that when installed will tightly fit the internal circumference, meeting applicable ASTM standards or better, of the original pipe. Allowance shall be made for circumferential stretching during installation. The tube shall be properly sized to the diameter of the existing pipe and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. The Contractor shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Contractor shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin, to ensure that the tube will have sufficient length to extend the entire length of the run. The Contractor shall also measure the inside diameter of the existing pipe in the field prior to ordering liner so that the liner can be installed in a tight-fitted condition.

5) The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

6) No material shall be included in the fabric tube that may cause de-lamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the felt fabric and the activated resin containing a colorant.

7) The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. The hue of the color shall be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.

8) Seams in the fabric tube, if applicable, shall meet the requirements of ASTM D5813.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

9) The outside of the fabric tube shall be marked every 5 feet with the name of the CIPP manufacturer, manufacturing lot and production footage.

10) The minimum length of the fabric tube shall be that deemed necessary by the installer to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process.

11) The nominal fabric tube wall thickness shall be constructed, as a minimum, to the nearest 0.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 0.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation shall be sufficient to fill all of the felt voids for the nominal felt thickness.

C. RESIN

1) The resin shall be a corrosion resistant polyester or vinyl ester resin and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216, ASTM F1743 or F2019, 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 will comply with or exceed the structural and chemical resistance requirements of this specification.

D. STRUCTURAL REQUIREMENTS

1) The physical properties and characteristics of the finished liner will vary considerably, depending on the types and mixing proportions of the materials used, and the degree of cure executed. It shall be the responsibility of the Contractor to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein:

   a. The CIPP shall be designed as per ASTM standards. The CIPP design shall assume no bonding to the original pipe wall.

   b. The design engineer shall set the long term (50 year extrapolated) Creep Retention Factor at 33% of the initial design flexural modulus as determined by ASTM D790 test method. This value shall be used unless the Contractor submits long term test data (ASTM D2990) to substantiate a higher retention factor.
c. The CIPP material shall, at a minimum, meet or exceed the structural properties, as listed below.

MINIMUM PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Cured Composite Per ASTM F1216</th>
<th>Cured Composite Per Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Modulus of Elasticity</td>
<td>ASTM D790</td>
<td>250,000 psi</td>
<td>Contractor Value</td>
</tr>
<tr>
<td>(Short Term)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexural Strength (Short Term)</td>
<td>ASTM D790</td>
<td>4,500 psi</td>
<td>Contractor Value</td>
</tr>
</tbody>
</table>

2) The required structural CIPP wall thickness shall be based, as a minimum, on the physical properties of the cured composite and per the design of the Professional Engineer and in accordance with the Design Equations contained in the appendix of the ASTM standards, and the following design parameters:

- Design Safety Factor - 2.0 (1.5 for pipes 36” or larger)
- Creep Retention Factor - 33%
- Ovality - 2% or as measured by field inspection
- Constrained Soil Modulus Per AASHTO LRFD Section 12 and AWWA Manual M45
- Groundwater Depth - As specified or indicated on the Plans
- Soil Depth (above the crown) - As specified or indicated on the Plans
- Live Load - Highway, railroad or airport as applicable
- Soil Load (assumed) - 120 lb/cu. Ft.
- Minimum service life - 50 years

3) The Contractor shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved CIPP system. Certified material test results shall be included that confirm that all materials conform to these specification and/or the pre-approved system. Materials not complying with these requirements will be rejected.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

E. PRODUCT SUBMITTALS

1) The Contractor shall submit the following information:
   - Manufacturer’s certification that the materials to be used meet the referenced standards and these specifications.
   - License or certificate verifying Manufacturer’s/Licensor’s approval of the installer.
   - Proposed equipment and procedures for accomplishing the work.
   - Tube wet-out & cure method including:
     - A complete description of the proposed wet-out procedure for the proposed technology.
     - The Manufacturer’s recommended cure method for each diameter and thickness of CIPP liner to be installed. The PWS shall contain a detailed curing procedure detailing the curing medium and the method of application.
     - Design calculations for wall thickness designs to be completed by an Engineer proficient in the pipe design.

PART 3 – CONSTRUCTION

A. PREPARATION AND CLEANING

1) Contractor shall perform pre-video inspection of the pipe to be lined. The Contractor shall provide the COMMISSION a copy of the video in digital format for review and approval.

2) The pre-video shall be after the pipe is cleaned.

3) The Contractor is responsible to clear the pipe of obstructions that will interfere with the installation and long-term performance of the CIPP.

4) If the pre-video inspection reveals an obstruction, misalignment, broken or collapsed section or sag that was not identified as part of the original scope of work and will prohibit proper installation of the CIPP, the Contractor may be directed by the COMMISSION to correct the problem(s) prior to lining by utilizing open cut repair methods. The Contractor shall be compensated for this work under a Contract Bid Alternate Bid Item.

5) The Contractor shall be responsible for confirming the locations of all lateral connections prior to installing and curing the CIPP.

6) In the event the status of a lateral connection cannot be adequately defined, the COMMISSION will make the final decision, prior to installation and curing of the liner, as to the status.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

7) The Contractor may, under the direction of the COMMISSION, utilize any of the existing manholes in the project area as installation access points. If a road closure or detour is required due to the location of the gravity sanitary sewer, Contractor must obtain permission from the City of New Smyrna Beach.

8) The Contractor shall remove all internal debris from the pipe that will interfere with the installation and the final product delivery of the CIPP as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Contractor. The Contractor shall dispose of all debris at no additional charge to the COMMISSION. Moving material from manhole section to manhole section shall not be allowed. As applicable, the Contractor shall either plug or install a by-pass pumping system to properly clean the pipe. Precaution shall be taken by the Contractor in the use of cleaning equipment to avoid damage to the existing pipe. The repair of any damage, caused by the cleaning equipment, shall be the responsibility of the Contractor.

9) The Contractor is responsible for construction water. The COMMISSION can supply the Contractor with a Temporary Construction Water Meter (with proper backflow prevention) provided an account is applied and paid for by the Contractor with the COMMISSION’s Billing Department.

B. BY-PASS PUMPING

1) See Specification 02730.

C. INSTALLATION OF LINER

1) Neither the CIPP system, nor its installation, shall cause adverse effects to any of the COMMISSION’s processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Contractor shall notify the COMMISSION and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements.

2) The CIPP liner shall be installed and fully cured prior to installation of a Manhole Liner.

3) The Contractor shall clean-up, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Contractor shall conduct installation operations and schedule clean-up in a manner to cause the least possible obstruction and inconvenience to Customers, traffic, pedestrians, businesses, etc.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

4) The CIPP liner shall be installed and cured in the host pipe accordance with the CIPP manufacturer’s recommendations as described and submitted in the PWS.

5) The CIPP liner shall be constructed of materials and methods, that when installed, shall provide a continuous, jointless and structurally sound liner from manhole to manhole able to withstand all imposed static and/or dynamic loads, and free of all defects that will affect the long term life and operation of the pipe.

6) CIPP installation shall be in accordance with the applicable ASTM standards with the following modification:
   a. The wet-out tube shall be positioned in the pipe using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.

7) Prior to installation and in accordance with the CIPP manufacturer’s recommendations remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.

8) Curing shall be accomplished by utilizing the appropriate medium in accordance with the CIPP manufacturer’s recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles. The CIPP manufacturer’s recommended cure schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.

9) The CIPP liner shall not be installed through a manhole. Each liner shall begin and end at a manhole.

D. COOL DOWN

1) The Contractor shall cool the liner in accordance with the CIPP manufacturer’s recommendations as described and outlined in the PWS.

2) Temperatures and curing data shall be monitored and recorded, by the Contractor, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP manufacturer’s recommendations.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

E. FINISH

1) The installed CIPP shall be continuous over the entire length of a pipe section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and de-lamination. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.

2) Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Contractor’s expense, in accordance with the procedures submitted under Part 3, G. CIPP Repair/Replacement.

3) The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal.

4) If any of the lateral connection leak water between the host pipe and the installed liner, the connection at the host pipe interface shall be sealed to provide a water tight seal.

3) If the wall of the CIPP leaks, it shall be repaired or removed and replaced with a watertight liner in accordance with the CIPP manufacturer’s recommendations.

F. MANHOLE AND LATERAL CONNECTIONS

1) A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole walls and at lateral connections in accordance with the CIPP manufacturer’s recommendations.

2) The maximum a lateral can be plugged is 8 hours. Lateral connections may not remain plugged overnight.

3) Laterals shall be internally reinstated unless indicated otherwise in the contract documents.

4) Lateral reinstatement 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 lateral connections are reinstated.

5) All existing and confirmed lateral connections shall be internally reinstated/re-opened to their original shape and capacity (minimum 95%) using a CCTV camera and remote cutting tool. Lateral connections shall not be cut more than 100% of the original shape or capacity.

6) In the event that lateral reinstatements result in openings that are greater than 100% of the original opening, the Contractor shall install a CIPP type repair, sufficiently in size, to repair the over-cut lateral opening, at no additional charge to the COMMISSION.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

7) The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris. All over-cut lateral connections will be properly repaired to meet the requirements of these specifications.

8) Pipe coupons resulting from lateral reinstatements shall be collected at the downstream manhole prior to leaving the site. At no time shall coupons be left in the gravity sanitary sewer system.

G. CIPP REPAIR/REPLACEMENT

1) Occasionally installation of will result in the need to repair or replace a defective CIPP. The Contractor shall outline specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair/replacement procedures shall be accordance with the CIPP manufacturer’s recommendations and shall be submitted as part of the PWS.

2) Defects in the installed CIPP that will not affect the operation and long term life of the product shall be identified and defined.

3) Repairable defects that may occur in the installed CIPP shall be specifically defined by the Contractor based on manufacturer’s recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these contract specifications.

4) Un-repairable defects that may occur to the CIPP shall be clearly defined by the Contractor based on the manufacturer’s recommendations, including a recommended procedure for the removal and replacement of the CIPP.

PART 4 – FINAL COMPLETION

A. TESTING

1) The Contractor shall have an independent testing lab analyze finished liner regarding the ASTM standards for Tensile Properties, Flexural Modulus, Chemical Resistance and wall thickness (or as specified by the COMMISSION). Samples shall be taken from manhole cutoffs and lateral coupons.

2) A minimum of 1 sample shall be taken of the first segment installed at each location specified in the Contract Bid Documents.

3) A minimum of 2 samples shall be taken for each 2,500 linear feet of liner installed or for each manufacturing lot.

4) The laboratory results shall identify the test sample location as referenced to the nearest manhole and station.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

5) If properties tested do not meet minimum requirements, the liner shall be repaired or replaced by the Contractor, at no cost to the COMMISSION.

6) The installed liner thickness shall be measured for each line section installed. If the liner thickness does not meet these specifications then the liner shall be repaired or removed by the Contractor at no cost to the COMMISSION. The liner thickness shall have tolerance of minus 5% plus 10%. The Contractor may use industry proven, non-destructive methods for confirming the thickness of the installed liner.

7) The Contractor shall furnish removable sizing sleeves, when possible, to collect liner samples, which accurately replicate the hose pipe diameter.

8) All liner testing and repairs to the installed CIPP shall be completed before Final Completion and Final Payment to the Contractor.

B. INSPECTIONS

1) Contractor shall perform a post-video inspection of the lined pipe. The Contractor shall provide the COMMISSION a copy of the video in digital format for review and approval.

2) Immediately prior to conducting the post-video, the Contractor shall thoroughly clean the newly installed liner removing all debris and buildup that may have accumulated.

3) The post-video shall be after the installation of the CIPP and all laterals are reinstated.

4) The post-video will visual inspect the finished liner as follows:
   a. Shall be continuous over the entire length of the installation and shall be free of significant visual defects, damage, deflection, holes, leaks and other defects.
   a. Shall maintain the overall hydraulic capacity of the original pipe diameter. In those cases where full capacity cannot be achieved after liner installation, the Contractor shall submit a request to waive this requirement, together with the reasons for the waiver request. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

2) The post-video shall be submitted to the COMMISSION within ten (10) working days of the liner installation. The data shall note the inspection date, location of all reconnected side sewers, debris, as well as any other defects in the liner, including, but not limited to, gouges, cracks, bumps, or bulges.
SECTION 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

3) If post installation inspection documentation is not submitted within Ten (10) working days of the liner installation, the COMMISSION may at its discretion suspend any further installation of CIPP until the post-installation documentation is submitted. As a result of this suspension, no additional working days will be added to the contract, nor will any adjustment be made for increase in cost.

4) Bypass pumping or plugging from the upstream manhole shall be utilized to minimize sewer from entering the pipe during the post-video inspection. In the case of bellies in the line, the pipe shall be cleared of any standing water to provide continuous visibility during the inspection.

5) Where leakage is observed through the wall of the pipe, the Contractor shall institute additional testing including but not limited to air testing, localized testing and any other testing that will verify the leak-proof integrity of the installed liner to the satisfaction of the COMMISSION.

C. AS-BUILTS

1) As-Built drawings/reports and pre & post inspection videos shall be submitted to the COMMISSION for review and approval for Final Completion contract date. As-Built drawings will include the identification of the work completed by the Contractor and shall be prepared on one set of Contract Drawings provide to the Contractor at the onset of the project.

2) As-Built drawings shall be kept on the project site at all times, shall include all necessary information as outlined in the PWS or as agreed to by the COMMISSION and the Contractor at the start of the Contract and shall be updated as the work is being completed, and shall be clearly legible.

D. WARRANTY

1) The Contractor shall provide necessary warranty and documentation of required experience per the Contract Bid Submittal Requirements and as specified herein.

2) The CIPP manufacturer shall warrant the liner to be free from defects in raw materials for a minimum of one (1) year, or as specified in the Contract Bid Submittal Requirements, from the date of installation and Final Completion by the COMMISSION.

3) The Contractor shall warrant the CIPP installation for a minimum of one (1) year, or as specified in the Contract Bid Submittal Requirements, from the date of installation and Final Completion by the COMMISSION.
SEASON 02740 – CURED-IN-PLACE PIPE (CIPP) SPECIFICATION

4) During the CIPP manufacturer and Contractor warranty period, any defect found that may materially affect the integrity, strength, function and/or operation of the pipe shall be repaired at the Contractor’s expense in accordance with procedures included in Part 3, G. CIPP Repair/Replacement at no cost to the COMMISSION.

5) The COMMISSION may inspect all or portions of the lined pipe during the warranty period and if found that any of the liners have developed abnormalities since the time of Final Completion, the abnormalities shall be repaired and/or replaced as defined in Part 3, G. CIPP Repair/Replacement at no cost to the COMMISSION.

END OF SECTION
PART I – GENERAL
A. DESCRIPTION OF WORK
B. REFERENCE SPECIFICATIONS AND STANDARDS
C. PERFORMANCE WORK STATEMENT (PWS)

PART 2 – PRODUCTS
A. GENERAL
B. ACRYLIC OR ACRYLATE BASE GROUT
C. URETHANE BASE GROUT
D. CEMENTITIOUS RECONSTRUCTION FOR MANHOLE RESTORATION
E. HYDRAULIC WATER PLUGS
F. SPRAY ON EPOXY LINER
G. STRUCTURAL REQUIREMENTS
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PART 3 – LINER INSTALLATION
A. GENERAL
B. PREPARATION AND CLEANING
C. BY-PASS PUMPING
D. GROUT
E. CEMENTITIOUS RECONSTRUCTION
F. EPOXY LINER
G. MANHOLE INVERT RECONSTRUCTION
H. MANHOLE BENCH/CHANNEL REHABILITATION
I. MANHOLE LINER REPAIR/REPLACEMENT

PART 4 – FINAL COMPLETION
A. TESTING
B. INSPECTIONS
C. AS-BUILTS
D. WARRANTY
PART 1 – GENERAL

A. DESCRIPTION OF WORK

1) This specification covers all work necessary for sanitary sewer manhole rehabilitation. The Contractor shall provide all labor, materials and equipment necessary for sanitary sewer manhole rehabilitation, to include but not limited to, cleaning, surface preparation/repair and final coat/liner.

2) The Contractor shall install a continuous, jointless and structurally sound liner specialty coating or lining for the interior surfaces of sanitary sewer manholes.

3) The Contractor shall provide necessary maintenance of traffic and by-pass pumping per the Contract Bid Tabulation.

4) The Contractor shall provide necessary warranty and documentation of required experience per the Contract Bid Submittal Requirements and as specified herein.

5) The COMMISSION requires all Customers to be notified a minimum of 5 calendar days of any anticipated flow interruptions. It is the Contractor’s responsibility to make said Customer notifications.

6) The COMMISSION will pay for installed materials only per the Contract Bid Tabulation Bid Item Unit Cost.

7) All work shall adhere to Occupational Health and Safety Administration (OSHA) standards, current edition.


B. REFERENCE SPECIFICATIONS AND STANDARDS

1) The Contractor shall furnish, install, and test the structures coatings as specified herein. All references to Industry Standards (ASTM, ANSI, etc.) shall be the latest revision unless otherwise stated.

   • American Society for Testing and Materials (ASTM)
   • C78, Standard Test Method for Flexural Strength of Concrete
   • C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
   • C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
   • C307, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings
   • C580, Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
SECTION 02750 – MANHOLE LINER SPECIFICATION

- C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement
- C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete By Slant Shear
- D638, Standard Test Method for Tensile Properties of Plastics
- D792, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D4787, Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
- D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- F2414, Standard Practice for Sealing Sewer Manholes Using Chemical Grouting

C. PERFORMANCE WORK STATEMENT (PWS)

1) The Contractor shall submit, to the COMMISSION, a Performance Work Statement (PWS) at the pre-construction meeting, which clearly defines the Manhole Liner product delivery in conformance with the requirements of these contract documents. Unless otherwise directed by the COMMISSION, the PWS shall at a minimum contain the following:

a. Clearly indicate that the Manhole Liner will conform to the project requirements as outlined in the Description of Work and as delineated in these specifications.

b. Where the scope of work is specifically delineated in the contract documents, a detailed installation plan describing all preparation work, cleaning operations, pre-video inspections, by-pass pumping, maintenance of traffic, installation procedure, method of curing, quality control, testing to be performed, final video inspection, warranties furnished and all else necessary and appropriate for a complete the Manhole Liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.

c. Contractor’s description of the proposed Manhole Liner technology, including a detailed plan for maintaining all wastewater service to COMMISSION Customers during installation.

d. A description of the Manhole Liner materials to be furnished for the project. Materials shall be fully detailed in the submittals and conform to these specifications and/or shall conform to the pre-approved product submission.

e. The name and experience of each lead individual performing work on this Contract shall be submitted with the PWS.
SECTION 02750 – MANHOLE LINER SPECIFICATION

f. Proposed manufacturers technology data shall be submitted for all Manhole Liner products and all associated technologies to be furnished.

g. A detailed description of the Contractor’s proposed procedures to patch/repair manhole from Infiltration/Inflow in the manhole that may be encountered during the cleaning process.

h. A detailed public notification plan shall be prepared and submitted including detailed staged notification to Customers affected by the Manhole Liner installation.

PART 2 – PRODUCTS

A. GENERAL

1) The materials to be utilized in the lining of concrete structures shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment.

2) The Manhole Liner must meet the chemical resistance requirements of these contract documents. All materials, shipped to the project site, shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled accordance with the Manhole Liner manufacturer’s recommendations to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing, or ultra-violet (UV) degradation. On site storage locations, shall be approved by the COMMISSION. All damaged materials shall be promptly removed from the project site at the Contractor’s expense and disposed of in accordance with all current applicable agency regulations.

B. ACRYLIC OR ACRYLATE BASE GROUT

- Follow ASTM F2414 and as specified herein.
- Two-part chemical grout mixed at point of injection.
- Minimum 25% acrylic or acrylate base material by volume.
- To increase strength or offset dilution during injection period, use higher concentration of base material as directed by the Manufacturer.
- Controllable reaction time: 30 seconds to 1 hour.
- Viscosity: 1.5 centipoises water.
  - May be increased maximum of 2.5 centipoises water if approved by the COMMISSION
  - Remain constant throughout injection period.
- Tolerates dilution and reacts in moving water.
SECTION 02750 – MANHOLE LINER SPECIFICATION

- Final reaction:
  - Continuous irreversible, impermeable, non-porous still gel in pure form.
  - Stabilized soil in ground that will not become brittle or rigid.
- Gel does not bleed water under stress.
- Dehydrated gel returns to 90% of its original volume and form after prolonged period of low ground water.
- Do not use catalyst containing dimethyl amino propionitrile (DMAPM).
- Use root inhibitor (50% active dichlobenil) when roots are present in manholes.
- Use latex additive for increased tensile strength.
- Tinted to allow detection of grout in drill holes or at leakage locations.

C. URETHANE BASE GROUT

- Follow ASTM F2414 and as specified herein.
- Ratio: One part urethane prepolymer to 1 to 10 parts water by volume (10% to 50% prepolymer).
- Liquid prepolymer:
  - Solids content: 77% to 83%
  - Specific Gravity: 1.04
  - Flash Point: 20 degrees F.
  - Viscosity: 200 to 1,200 centipoises water at 70 degrees F.
- Water for reacting prepolymer: pH of 5 to 9.
- Use manufacturer recommended gel control agent to control cure time as required.
- Final Reaction:
  - Chemically stable, non-biodegradable, flexible gel, impermeable to water at pressures up to 15psi.
- Dehydrated gel returns to 90% of its original volume and form after prolonged period of low ground water.
- Use root inhibitor (50% active dichlobenil) when roots are present in manholes.
- Use latex additive for increased tensile strength.
- Tinted to allow detection of grout in drill holes or at leakage locations.

D. CEMENTITIOUS RECONSTRUCTION FOR MANHOLE RESTORATION

- Quick setting (under 20 minutes), high strength, sulfide resistant, calcium aluminate-based or portland cement material.
- Suitable for troweling or rotary spray application to inside of manhole.
- Use additives to increase corrosion resistance or bond strength at manufacturer’s direction and with COMMISSION approval.
- Initial set time per manufacturer’s recommendation and per project conditions.
- Density when applied: 135 lb/cf +/- 5 lb/cf.
SECTION 02750 – MANHOLE LINER SPECIFICATION

- Compressive strength (ASTM C109) at 1 day.
  - Per manufacturer’s recommendation.
  - Minimum acceptable: 2,000 psi.
- Compressive strength (ASTM C109) at 28 days.
  - Per manufacturer’s recommendation.
  - Minimum acceptable: 5,500 psi.
- Bond Strength (ASTM C882) at 28 days.
  - Per manufacturer’s recommendation.
  - Minimum acceptable: 1,640 psi.
- Flexural Strength (ASTM C78) at 28 days.
  - Per manufacturer’s recommendation.
  - Minimum acceptable: 1,500 psi.
- Shrinkage (ASTM C596) at 28 days: 0 %.

E. HYDRAULIC WATER PLUGS

- Rapid setting to plug active leaks prior to other rehabilitation work.
- Initial Set Time at 70 degrees F: 60 to 90 seconds.
- Final Set Time at 70 degrees F: One hour.
- Compressive Strength (ASTM C109) at 28 days:
  - Per manufacturer’s recommendation.
  - Minimum acceptable: 4,000 psi.
- Length Change (ASTM C157): 0 %.

F. SPRAY ON EPOXY LINER

- Two or three part epoxy coating to protect mason or concrete from chemical attack.
- Minimum Thickness: 125 mils
- Working Time at 70 degrees F: 30 minutes.
- Initial Set time at 70 degrees F: 17 hours.

G. STRUCTURAL REQUIREMENTS

1) The physical properties and characteristics of the finished liner will vary considerably, depending on the types and mixing proportions of the materials used, and the degree of cure executed. It shall be the responsibility of the Contractor to control these variables and to provide a Manhole Liner which meets or exceeds the minimum properties specified herein.
SECTION 02750 – MANHOLE LINER SPECIFICATION

2) The required structural Manhole Liner total thickness shall be based, as a minimum, on the physical properties of the cured composite and per the design of the Professional Engineer and in accordance with the Design Equations contained in the appendix of the ASTM standards.

3) The Contractor shall submit, prior to installation of the Manhole Liner, certification of compliance with these specifications and/or the requirements of the pre-approved Manhole Liner. Certified material test results shall be included that confirm that all materials conform to these specification and/or the pre-approved system. Materials not complying with these requirements will be rejected.

H. PRODUCT SUBMITTALS

1) The Contractor shall submit the following information:
   - Manufacturer’s certification that the materials to be used meet the referenced standards and these specifications.
   - License or certificate verifying Manufacturer’s/Licensor’s approval of the installer.
   - Proposed equipment and procedures for accomplishing the work.
   - A complete description and manufacturer’s recommended cure method. The PWS shall contain a detailed curing procedure detailing the curing medium and the method of application.

PART 3 – LINER INSTALLATION

A. GENERAL

1) Neither the Liner material, nor its installation, shall cause adverse effects to any of the COMMISSION’s processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant. The Contractor shall notify the COMMISSION and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements.

2) Manhole Liner installation shall not commence until the Cured-In-Place Pipe liner is installed and fully cured.

3) Product shall be spray applied using specialty application equipment.

4) When applying the coating to a manhole interior with small voids, pits or surface abnormalities present, use a resurfacing 10-20 mil application of the specified coating and then a back trowel method to fill and level the surface. Once the resurfacing application has been applied the application of the remaining amount
of the specified minimum coating mil thickness can continue.

5) For manhole interiors that have undergone mild surface deterioration use a resurfacing application of 20%-25% of the specified coatings required minimum mil thickness and then a back trowel method to fill and level the surface. Once the resurfacing application has reached a tack-free state the application of the full amount of the specified minimum coating mil thickness can be applied.

6) For manhole interiors that have undergone severe surface deterioration, the Contractor shall resurface/rebuild the structure with polymer modified cement or cementitious products suggested by the Liner manufacturer.

B. PREPARATION AND CLEANING

1) Contractor shall perform a pre-video inspection of all sewer manholes to be lined. The Contractor shall provide the COMMISSION a copy of the video in digital format for review and approval.

2) The pre-video shall be after the manhole is cleaned.

3) The Contractor is responsible to clear the manhole of obstructions that will interfere with the installation and long-term performance of the Manhole Liner.

4) If the pre-video inspection reveals a deteriorated manhole not identified as part of the original scope of work which will prohibit proper installation of the Manhole Liner, the Contractor may be directed by the COMMISSION to correct the problem(s) prior to lining. The Contractor shall be compensated for this work under a Contract Bid Alternate Bid Item.

5) The Contractor shall be responsible for confirming the locations of all inverts prior to installing and curing the Manhole Liner.

6) Abrasive blasting, shot blasting, high pressure water cleaning, water jetting, or a combination of methods and equipment shall remove all loose mortar, unsound concrete, brick, hard contaminants, localized micro-organisms and gas contaminants from the interior manhole walls, floor and ceiling. Final product shall be cleaned and exposed ready for rehabilitation material.

7) Prior to coating, the manhole must be prepared in a manner that provides a uniform, clean, sound, neutralized surface suitable for the specified coating. The manhole must be free of all contaminants, such as oil, grease, rust, scale or deposits. In general, coating performance is proportional to the degree of surface preparation.

8) Concrete and masonry surfaces must be sound and contaminant-free.
9) After surface preparation is completed, Contractor and the COMMISSION must perform an inspection to identify any manhole deficiencies, if any, for the items listed below:
   - Leaks
   - Cracks
   - Holes
   - Missing Bricks
   - Exposed Rebar
   - Ring and Cover Condition
   - Bench/Channel Condition
   - Invert Condition

10) If any defects are identified, repairs to correct all found deficiencies shall be approved by the COMMISSION.

11) Repair all leaks with a chemical or hydraulic sealant per the Manhole Liner manufacturer’s recommendation.

12) Repair all leaks with non-shrink grout designed for use in field sealing of ground water.

13) Severe cracks shall be repaired using urethane based chemical sealant.

14) Grout and Sealant product to be utilized shall be approved by the COMMISSION prior to installation.

15) Equipment for installation of lining materials shall be high quality grade as recommended by the manufacturer.

16) Re-blasting may be required to remove all abrasive materials after repairs are completed.

17) The Contractor is responsible for construction water. The COMMISSION can supply the Contractor with a Temporary Construction Water Meter (with proper backflow prevention) provided an account is applied and paid for by the Contractor with the COMMISSION’s Billing Department.

C. BY-PASS PUMPING

1) See Specification 02730.
D. GROUT
1) Do not block pipes entering/exiting manhole with grout.
2) Prevent material from entering gravity sanitary sewer collection system.

E. CEMENTITIOUS RECONSTRUCTION
1) Following approved submittals and as specified herein.
2) Mix and handle materials.
3) Apply materials using rotary spray equipment or spray gun.
4) Seal around pipe connections.
5) Prevent material from entering gravity sanitary sewer collection system.
6) Apply material a minimum of ½ inch thick.
7) Trowel and brush for smooth finish.
8) Cure using curing compound when recommended by manufacturer.
9) Do not allow flow in manhole or traffic over manhole, until manufacturer’s minimum cure times have been achieved.

F. EPOXY LINER
1) Mix and apply material.
2) Sagging of material is not permitted.
3) Seal around pipe connections.
4) Cure.
7) The final Manhole Liner shall be a continuous, jointless and structurally sound and shall be completely free of pinholes or voids.
8) Total thickness of the liner shall be a minimum of 125 mils.
9) All defects identified such as pinholes, low film millage, etc. shall be repaired with same material and to same thickness as required of original installation.
10) A permanent identification number and date of work performed shall be affixed to the structure in a readily visible location.
11) Provide final written report to COMMISSION detailing the location, date of report, and description of each Manhole Liner installed.
12) The Contractor shall clean-up, restore existing surface conditions and structures, and repair any of the Manhole Liner determined to be defective. The Contractor shall conduct installation operations and schedule clean-up in a manner to cause the least possible obstruction and inconvenience to Customers, traffic, pedestrians, businesses, etc.
G. MANHOLE INVERT RECONSTRUCTION
   1) The Contractor shall be compensated for this work under a Contract Bid Alternate Bid Item.

H. MANHOLE BENCH / CHANNEL REHABILITATION
   1) The Contractor shall be compensated for this work under a Contract Bid Alternate Bid Item.

I. MANHOLE LINER REPAIR/REPLACEMENT
   1) Occasionally installation of will result in the need to repair or replace a defective Manhole Liner. The Contractor shall outline specific repair or replacement procedures for potential defects that may occur in the Manhole Liner. Repair/replacement procedures shall be accordance with the Manhole Liner manufacturer’s recommendations and shall be submitted as part of the PWS.
   2) Defects in the installed Manhole Liner that will not affect the operation and long term life of the product shall be identified and defined.
   3) Repairable defects that may occur in the installed Manhole Liner shall be specifically defined by the Contractor based on manufacturer’s recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of these contract specifications.
   4) Un-repairable defects that may occur to the Manhole Liner shall be clearly defined by the Contractor based on the manufacturer’s recommendations, including a recommended procedure for the removal and replacement of the Manhole Liner.

PART 4 – FINAL COMPLETION

A. TESTING
   1) The Contractor shall supply the COMMISSION with certification that the installed Manhole Liner material has been sampled and tested by the manufacturer in accordance with the provisions of this specifications.
   2) If properties tested do not meet minimum requirements, the liner shall be repaired or replaced by the Contractor, at no cost to the COMMISSION.
SECTION 02750 – MANHOLE LINER SPECIFICATION

3) The installed liner thickness shall be measured for manhole liner installed. If the liner thickness does not meet these specifications then the liner shall be repaired or removed by the Contractor at no cost to the COMMISSION. The liner thickness shall have tolerance of minus 5% plus 10%. The Contractor may use industry proven, non-destructive methods for confirming the thickness of the installed liner.

4) The Contractor shall furnish liner samples, when applicable.

5) All testing and repairs shall be completed before Final Completion and Final Payment to the Contractor.

B. INSPECTIONS

1) Contractor shall perform a post-video inspection of each lined manhole. The Contractor shall provide the COMMISSION a copy of the video in digital format for review and approval.

2) Immediately prior to conducting the post-video, the Contractor shall thoroughly clean the newly installed liner removing all debris and buildup that may have accumulated.

3) The post-video will visual inspect the finished liner as follows:
   a. Shall be continuous over the entire length of the installation and shall be free of significant visual defects, damage, deflection, holes, leaks and other defects.
   a. Shall maintain the overall hydraulic capacity of the original manhole. In those cases where full capacity cannot be achieved after liner installation, the Contractor shall submit a request to waive this requirement, together with the reasons for the waiver request. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

2) The post-video shall be submitted to the COMMISSION within ten (10) working days of the liner installation. The data shall note the inspection date, location of all reconnected side sewers, debris, as well as any other defects in the liner, including, but not limited to, gouges, cracks, bumps, or bulges.

3) If post installation inspection documentation is not submitted within Ten (10) working days of the liner installation, the COMMISSION may at its discretion suspend any further installation of CIPP until the post-installation documentation is submitted. As a result of this suspension, no additional working days will be added to the contract, nor will any adjustment be made for increase in cost.

4) Bypass pumping or plugging from the upstream manhole shall be utilized to minimize sewer from entering the pipe during the post-video inspection.

5) Where leakage is observed, the Contractor shall institute additional testing
including but not limited to air testing, localized testing and any other testing that will verify the leak-proof integrity of the installed liner to the satisfaction of the COMMISSION.

C. AS-BUILTS

1) As-Built drawings/reports and pre & post inspection videos shall be submitted to the COMMISSION for review and approval for Final Completion contract date. As-Built drawings will include the identification of the work completed by the Contractor and shall be prepared on one set of Contract Drawings provide to the Contractor at the onset of the project.

2) As-Built drawings shall be kept on the project site at all times, shall include all necessary information as outlined in the PWS or as agreed to by the COMMISSION and the Contractor at the start of the Contract and shall be updated as the work is being completed, and shall be clearly legible.

D. WARRANTY

1) The Contractor shall provide necessary warranty and documentation of required experience per the Contract Bid Submittal Requirements and as specified herein.

2) The Manhole Liner manufacturer shall warrant the liner to be free from defects in raw materials for a minimum of one (1) year, or as specified in the Contract Bid Submittal Requirements, from the date of installation and Final Completion by the COMMISSION.

3) The Contractor shall warrant the Manhole Liner installation for a minimum of one (1) year, or as specified in the Contract Bid Submittal Requirements, from the date of installation and Final Completion by the COMMISSION.

4) During the Manhole Liner manufacturer and Contractor warranty period, any defect found that may materially affect the integrity, strength, function and/or operation of the manhole shall be repaired at the Contractor’s expense in accordance with procedures included in Part 3, I. Manhole Liner Repair/Replacement at no cost to the COMMISSION.

5) The COMMISSION may inspect all or portions of the lined manholes during the warranty period and if found that any of the liners have developed abnormalities since the time of Final Completion, the abnormalities shall be repaired and/or replaced as defined in Part 3, I. Manhole Liner Repair/Replacement at no cost to the COMMISSION.