**SPECIAL NOTE FOR CURED-IN-PLACE PIPE LINING**

**PART 1 -- GENERAL**

* 1. **REQUIREMENTS**

1. It is the intent of this specification to provide for the reconstruction of pipelines by the installation of a resin‑impregnated flexible tube which is formed to the original conduit and cured to produce a continuous and tight fitting Cured‑In‑Place Pipe (CIPP). Cured-In-Place Pipe shall be designed for storm water application.
2. The work specified in this Section includes all labor, materials, accessories, equipment, and tools necessary to install and test cured‑in‑place (CIPP) pipe lining as shown on the Drawings and as specified herein.
   1. **SUBMITTALS**
3. The CONTRACTOR shall submit shop drawings and other information to the ENGINEER for review.
4. With the bid, the following submittals are required:

Documentation as outlined herein under paragraph 1.06 A, including installation references of projects that are similar in size and scope to this project. The submittal shall include, at a minimum, the client contact name, phone number, and the diameter and footage of pipe rehabilitated. Documentation for product and installation experience must be satisfactory to the ENGINEER.

1. After contract award, the following submittals are required.
   1. The CONTRACTOR shall submit design data and specification data sheets listing all parameters used in the CIPP design and thickness calculations based on ASTM F1216 or F2019 and D2412 for “fully deteriorated gravity pipe conditions.” All CIPP liner design calculations shall be sealed and signed by a registered professional Engineer in the Commonwealth of Kentucky. Submit P.E. certification form for all CIPP design data. Submit detailed installation procedures, lining production schedule and location, testing procedures and schedule, quality control procedures, liner curing procedures including heat-up and cool-down rates, curing temperature and duration, and shipping and storage requirements, schedule, and procedures. Detailed design calculations as specified herein under paragraph 2.01 Q.
   2. Various test results as specified herein under Section 2.03.
   3. Documentation as specified herein for the Cure Report under Paragraph 3.08 A.
   4. Documentation as specified herein for the Television Survey under Paragraph Section 3.10 Television Survey.
2. Curing log, including temperatures, pressures, and times during the curing process to document that a proper cure has been achieved. Curing log is to be submitted immediately after the curing is complete for each line segment that is rehabilitated.
   1. **RELATED WORK SPECIFIED ELSEWHERE**

A. Special Note for Pipe Cleaning

1. Special Note for Pipe Liner Acceptance Testing
   1. **REFERENCE STANDARDS**

A. American Society for Testing and Materials (ASTM)

1. ASTM D638 – Standard Test Methods for Tensile Properties of Plastics.

2. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1. ASTM D2412- Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
2. ASTM D2990 – Standard Test Methods for Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics.
3. ASTM F1216 ‑ Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
4. ASTM F1743 – Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
5. ASTM F2019 – 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)
6. ASTM E1252 - Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis
7. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.
   1. **QUALIFICATIONS**
8. The CONTRACTOR performing the CIPP lining work shall be fully qualified, experienced, and equipped to complete this work expeditiously and in a satisfactory manner and shall be certified and/or licensed as an installer by the CIPP manufacturer. Only commercially proven products and installers with substantial track records will be approved. In addition, the Contractor shall meet the following requirements:
9. The CONTRACTOR shall have minimum of 10,000 LF of CIPP successfully installed of similar diameter and using the specific method of installation and curing being used.

2. The CONTRACTOR shall submit a certified statement from the manufacturer that he/she is a certified and/or licensed installer of CIPP lining.

3. A minimum of three clients that the CONTRACTOR has performed this type of work for, including names, phone numbers, linear footage, and a description of the actual work performed.

4. The CONTRACTOR’S superintendent who will perform the work under this section must have at least 3 years of experience and have successfully installed at least 5,000 linear feet 24-inch diameter or greater of the proposed product and curing method.

B. The CONTRACTOR shall also be capable of providing crews as needed to complete the work without undue delay.

C. The ENGINEER shall approve or disapprove the CONTRACTOR and/or manufacturer based on the submitted information and a follow up interview, if warranted.

D. Inspection of the liner may be made by the representative of the ENGINEER after delivery. The liner shall be subject to rejection at any time on account of failure to meet any of the requirements specified, even though sample liner may have been accepted as satisfactory at the place of manufacture. Liner rejected after delivery shall be marked for identification and shall be removed from the job site at once.

* 1. **GUARANTEE**

A. All CIPP lining placed shall be guaranteed by the CONTRACTOR and manufacturer for a period of one year from the date of final acceptance. During this period, defects discovered in the CIPP lining, as determined by the ENGINEER, shall be removed, and replaced in a satisfactory manner by the CONTRACTOR at no cost to the ENGINEER. The ENGINEER may conduct an independent television inspection, at his own expense, of the lining work prior to the completion of the one-year guarantee period.

* 1. **DELIVERY, STORAGE AND HANDLING**

A. Care shall be taken in shipping, handling, and storage to avoid damaging the liner. Extra care shall be taken during cold weather construction. Any liner damaged in shipment shall be replaced as directed by the ENGINEER.

B. Any liner showing a split or tear, or which has otherwise received damage shall be marked as rejected and removed at once from the job site.

C. The liner shall be maintained at a proper temperature in refrigerated facilities to prevent premature curing at all times prior to installation. The liner shall be protected from UV light prior to installation. Any liner showing evidence of premature curing will be rejected for use and will be removed from the site immediately.

**PART 2 -- PRODUCTS**

* 1. **CIPP LINING**

1. CIPP lining shall be Insituform by Insituform Technologies, Inliner by Inliner Technologies, Premier Pipe, Blue-Tek by Reline America, or approved equal.
2. The tube shall consist of one or more layers of absorbent non‑woven felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge breaks and missing sections of the existing pipe, and stretch to fit irregular pipe sections. The new jointless pipe‑within‑a‑pipe must fit tightly against the old pipe wall and consolidate all disconnected sections into a single continuous conduit, substantially reducing or eliminating infiltration or exfiltration.
3. The wetout tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness.
4. The tube shall be fabricated to a size that when installed will tightly fit the internal circumference and length of the original pipe with minimal shrinkage, in such a way as to minimize water migration (tracking) between the liner and the host pipe. Allowance should be made for circumferential stretching during inversion, and longitudinal stretching during pull in. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.
5. The minimum tube length shall be that deemed necessary by the Contractor to effectively span the distance between the access points and to facilitate a good, "non-tracking" seal. The Contractor shall verify the lengths in the field before cutting liner to length and otherwise preparing it for installation.
6. The outside layer of the tube (before wetout) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wetout) procedure.
7. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
8. 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.
9. Seams in the tube shall be stronger than the unseamed felt.
10. The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol. The tubes shall be manufactured in the USA.
11. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.
12. The finished pipe in place shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage. All constituent materials will be suitable for service in the environment intended. The final product will not deteriorate, corrode, or lose structural strength that will reduce the projected product life. In industrial areas a liner system using epoxy vinyl ester resin shall be utilized and a polyester resin shall be used in non-industrial areas. The ENGINEER shall determine the type of appropriate resin to be utilized for each line segment.
13. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall. The structural performance of the finished pipe must be adequate to accommodate all anticipated loads throughout its design life.
14. The CIPP must have a minimum design life of fifty (50) years. The minimum design life may be documented by submitting life estimates by national and/or international authorities or specifying agencies. Otherwise, long‑term testing and long‑term in‑service results (minimum ten (10) years) may be used, with the results extrapolated to fifty (50) years.
15. The CONTRACTOR must have performed long‑term testing for flexural creep of the CIPP pipe material installed by his company. Such testing results are to be used to determine the long‑term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D‑790 testing) will be used in design calculations for external buckling. The percentage, or the long‑term creep retention value utilized, will be verified by this testing. Values in excess of 50% will not be applied unless substantiated by qualified third-party test data. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long‑term test with respect to the initial flexural modulus used in design.
16. The minimum required structural CIPP wall thickness shall be based on the physical and structural properties described herein and in accordance with the design equations in the appendix of ASTM F 1216 or F 2019, and the following design parameters:

|  |  |
| --- | --- |
| Design Safety Factor | 2.0 |
| Retention Factor for Long‑Term Flexural Modulus to be used in Design *(as determined by Long‑Term tests described in paragraph 2.03)* | 50 % |
| Ovality\* | 2 % |
| Soil Depth (above crown)\* | Refer to Contract Plans |
| Design Condition | Fully deteriorated |
| *\*Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.* | |

1. The lining manufacturer shall submit to the ENGINEER for review complete design calculations for the liner, signed and sealed by a Professional Engineer registered in the Commonwealth of Kentucky and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure, and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. The existing pipe shall not be considered as providing any structural support. Modulus of soil reaction shall be 1000, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.
2. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly, or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
3. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.
   1. **END SEALS**

A. A watertight seal shall be made at every manhole entrance and exit and all other terminus of the liner. End seals shall be made by using a hydrophilic seal such as Insignia or equal.

* 1. **STRUCTURAL REQUIREMENTS FOR MAIN LINES**

1. Resin shall be impregnated by vacuum application or approved equal. If reinforcing materials (fiberglass, etc.) are used, the reinforcing material must be fully encapsulated within the resin to assure that the reinforcement is not exposed, either to the inside of the pipe or at the interface of the CIPP and the existing pipe.
2. The design for the CIPP wall thickness will be based on the following strengths, unless otherwise submitted to and approved by the ENGINEER.

|  |  |  |
| --- | --- | --- |
| Property | Test Method | Cured Composite  per ASTM F1216 |
| Flexural Modulus of Elasticity | ASTM D‑790 | 250,000 psi |
| Flexural Stress | ASTM D‑790 | 4,500 psi |

* 1. **TESTING REQUIREMENTS**

1. Chemical Resistance ‑ The CIPP shall meet the chemical resistance requirements of ASTM F1216 or F2019. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
2. Prior to any liner installation, the CONTRACTOR shall submit technical data sheets showing the physical and chemical properties and infrared spectrum analysis per ASTM E1252 (chemical fingerprint) of the proposed resin system as modified for the cured-in-place process. Additionally, copies of the certificates of analysis for resin used on the project must be made available to the ENGINEER.
3. The CONTRACTOR shall provide resin samples as directed by the ENGINEER during the duration of the project and infrared spectrography chemical fingerprints shall be run and compared to the submitted fingerprint to verify the resin used is the resin submitted for use on this project. These analyses shall be conducted at the ENGINEER’s expense.

D. In the case of liner installation performed under this contract, CIPP samples shall be prepared, and physical properties tested in accordance with ASTM F1216, F2019, or ASTM F1743, Section 8, using either method proposed.

* 1. Where the diameter is less than or equal to 15-inches, the samples shall be restrained type samples made by extending the liner through a form with a diameter as close as possible to the existing pipeline. The formed sample shall be provided with insulation to contain cure heat as well as a heat sink such as sandbags for cool down.
  2. Where the diameter is greater than 15-inches, a plate sample shall be prepared. The test sample shall be fabricated from the material taken from the liner and cured in a clamped mold with the resin used in the liner construction placed in the down tube.
  3. Each sample shall be large enough to provide at least five total specimens for testing. One thickness, flexural strength, and flexural modulus shall be conducted in accordance with ASTM F1216, ASTM D790, and ASTM D2290 for each segment. The material must meet the initial strength requirements of ASTM F1216, Table 1.
  4. These samples will be tested to verify compliance with the installed material specifications and shall be paid for through the testing allowance on the bid form. The CONTRACTOR shall produce these test samples for each pipe segment installed, defined as a contiguous length of insertion. Liners which do not pass these material tests will be rejected. The cost for sample collection shall be included in the bid price for the cured in place pipe.
  5. Test specimens shall be marked in indelible ink with the appropriate lateral or main section, work order number, date of installation, and orientation to the top of the pipe (direction of up) so the results can be correlated to the field work performed. All test results shall use this designated labeling as a reference.
  6. The extraction and labeling of test specimens shall be done in the presence of the ENGINEER. The ENGINEER and CONTRACTOR shall, upon completion of sample extraction and labeling, both sign a chain-of-custody form that shall subsequently accompany the sample at all times and shall ultimately be received and signed at the testing laboratory. Test reports shall include a copy of the chain-of-custody form with all signatures to ensure that reported test results are for the correct sample.
  7. The flexural properties must meet or exceed the values specified herein.
  8. Wall thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743.
  9. Visual inspection of the CIPP shall be by closed-circuit television.

**PART 3 -- EXECUTION**

**3.01 CLEANING/SURFACE PREPARATION**

1. It shall be the responsibility of the CONTRACTOR to clean the pipeline and to remove all internal debris out of the pipeline in accordance with the Special Note for Pipe Cleaning.

**3.02 JOINT, CRACK, ANNULAR SPACE, AND LINER END CHEMICAL SEALING**

1. Prior to cured-in-place liner installation, all active leaks of a magnitude to compromise the integrity of the liner shall be stopped using chemical grout, at no additional cost to the ENGINEER.
2. Materials used on this Project shall have the following properties: react quickly to form a permanent watertight seal; resultant seal shall be flexible and immune to the effects of wet/dry cycles; non-biodegradable and immune to the effects of acids, and alkalis; component packaging and mixing compatible with field conditions and worker safety; extraneous sealant left inside pipe shall be readily removable; and shall be compatible with the CIPP liner resin system utilized. The chemical sealing materials shall be acrylic resin type and shall be furnished with activators, initiators, inhibitors, and any other materials recommended by the manufacturer for a complete grout system. Sealing grout shall be furnished in liquid form in standard manufacturer's containers. Sealing grout shall be AV-100 manufactured by Avanti International or approved equal.
3. The Contractor shall modify his equipment as necessary to seal the leaks, however both his equipment and sealing method must meet the approval of the ENGINEER prior to use. Extreme caution shall be utilized during leak sealing (pressure) operations in order to avoid damaging the already weakened sewer pipe. If any damage occurs, it shall be repaired at the CONTRACTOR’s cost and to the satisfaction of the ENGINEER. Excessive pumping of grout which might plug a service lateral shall be avoided. Any service laterals blocked by the grouting operation shall be cleared immediately by the Contractor.

**3.03 FLOW CONTROL**

1. Flow control shall be exercised as required to ensure that no flowing water comes into contact with sections of pipe under repair.

**3.04 LINER INSTALLATION FOR MAIN LINES AND LATERALS**

1. In presence of ENGINEER, perform a pre-lining CCTV inspection immediately prior to CIPP lining to demonstrate that the pipe is clean and free of roots, grease, sand, rocks, sludge, PACP runners or gushers, pockets of water, or structural impediments that would affect long-term viability of the pipe liner. Obtain ENGINEER’s approval of the acceptability of the existing pipe condition prior to installation of CIPP.
2. The CONTRACTOR shall present to the ENGINEER, for review, a description of his methods for avoiding liner stoppage due to conflict and friction with such points as the manhole entrance and the bend into the pipe entrance. He shall also present plans for dealing with a liner stopped by snagging within the pipe. This information shall be rendered to the ENGINEER in a timely fashion prior to the preconstruction conference.
3. The CONTRACTOR shall immediately notify the ENGINEER of any construction delays taking place during the insertion operation. Such delays shall possibly require sampling and testing by an independent laboratory of portions of the cured liner at the ENGINEER's discretion. The cost of such test shall be borne by the CONTRACTOR and no extra compensation will be allowed. Any failure of sample tests or a lack of immediate notification of delay shall be automatic cause for rejection of that part of the work at the ENGINEER's discretion.
4. On site wet out (if applicable) - The CONTRACTOR shall designate a location where the tube will be impregnated with resin prior to installation. The CONTRACTOR shall allow the ENGINEER and/or ENGINEER to inspect the materials and the "wet‑out" procedure.
5. The materials and processes must be reasonably available for pre‑installation, installation, and post‑installation inspections. Areas which require inspection include, but are not limited to, the following:
   1. Product materials should exhibit sufficient transparency to visually verify the quality of resin impregnation.
   2. Temperature sensing devices, such as thermocouples, shall be located between the existing pipe and the CIPP to ensure the quality of the cure of the wall laminate.

**3.05 LINER INSTALLATION FOR MAIN LINES**

1. (Heat cured) After the inversion is complete, the CONTRACTOR shall supply a suitable heat source throughout the pipeline. The equipment shall be capable of delivering hot water or steam throughout the pipeline to uniformly raise the temperature to a level required to effectively cure the resin. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply or steam. Another such gage shall be placed between the tube and the host pipe at the termination end at or near the bottom to determine the temperatures during cure. Water temperature or steam in the pipe during the cure period shall be as recommended by the resin manufacturer.
2. Initial cure shall be deemed complete when the exposed portions of the tube appear to be hard and sound, and the temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer and may require continuous recirculation of the water to maintain the temperature. The CONTRACTOR shall have on hand at all times, for use by his personnel and the ENGINEER, a digital thermometer or other means of accurately and quickly checking the temperature of exposed portions of the liner.
3. CIPP installation shall be in accordance with ASTM F1216, Section 7, ASTM F1743, Section 6 or ASTM F2019, with modifications as listed herein.
4. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation or approved equal process shall be used. To ensure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be proven.
5. Tube Insertion: The wetout tube shall be positioned in the pipeline using either inversion or a pull‑in method. If pulled into place, a power winch should be utilized, and care should be exercised not to damage the tube as a result of pull‑in friction. 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.
6. Temperature gauges shall be placed inside the tube at the invert level of each end to monitor the temperatures during the cure cycle.
7. Curing shall be in accordance with the manufacturer's recommended cure schedule.
8. Cooldown: The CONTRACTOR shall cool the hardened pipe to a temperature below 100 F before relieving the hydrostatic head. Cooldown may be accomplished by the introduction of cool water into the inversion standpipe to replace water being pumped out of the manhole. Care should be taken in release of static head so that vacuum will not be developed that could damage the newly installed liner.
9. Finish: The new pipe shall be cut off in the manhole at a suitable location. The finished product shall be continuous over the length of pipe reconstructed and be free from dry spots, delamination, and lifts. Pipe entries and exits shall be smooth, free of irregularities, and watertight. No visible leaks shall be present, and the CONTRACTOR shall be responsible for grouting to remove leaks or fill voids between the host pipe and the liner. During the warranty period, any defects which will affect the integrity or strength of the product shall be repaired at the CONTRACTOR's expense, in a manner mutually agreed upon by the ENGINEER and the CONTRACTOR.

**3.06 FIELD QUALITY CONTROL**

A. Field acceptance of the liner shall be based on the ENGINEER’s evaluation of the installation including TV video and a review of certified test data for the installed pipe samples.

1. Groundwater infiltration of the liner shall be zero.

2. There shall be no evidence of splits, cracks, breaks, lifts, kinks, delaminations, or crazing in the liner.

3. If any defective liner is discovered after it has been installed, it shall be removed and replaced with either a sound liner or a new pipe at no additional cost to the ENGINEER.

**3.07 ACCEPTANCE**

1. The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, and the like. No pinholes, cracks, thin spots, dry spots, or other defects in the liner will be permitted. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections. Cut‑ins and attachments at service connections shall be neat and smooth.
2. Defects, which, in the opinion of the Engineer, will affect the liner’s structural integrity, strength, hydraulic performance, future maintenance access, and overall line performance, shall be repaired or the sewer replaced at the Contractor’s expense. Any lined section of segment (from manhole to manhole) exhibiting these defects will be rejected for payment until such time repairs have been made to the defective liner to the satisfaction of the Engineer. The following methods of repair shall be implemented by the Contractor to resolve defects unless otherwise approved by the Engineer:

| **Defects** | **Repair Method** |
| --- | --- |
| Annular space or infiltration at lateral opening | Re-seal with structural grout or point repair |
| Damaged lateral caused by overly ground tap | Repair with structural grout or point repair |
| Annular space or infiltration at manhole wall and liner termination | Re-grout liner termination |
| Cracked, missing pipe or voids caused by the cleaning operation | Repair with structural grout, thicken liner, or point repair |
| Dropped pipe or shape loss caused by the cleaning operation | Point repair |
| Wrinkles or ridges in liner greater than 5% of the pipe diameter | Grinding allowed if not part of structural component of liner. If grinding would require removal of structural component, then Contractor must make point repair |
| Re-installed bulkheaded tap or inactive service connection | Re-seal with structural grout or point repair |
| Lined over debris | Point repair |
| Soft spots or lifts in the liner | Point repair |
| Final liner thickness less than required thickness bid | Replace inadequate liner |

**3.08 WET-OUT AND CURE REPORT**

1. The CONTRACTOR shall submit "wet out" and "cure" reports documenting the specific details of the liner's vacuum impregnation and saturation with resin and the CIPP installation of the liner. A report shall be generated for each liner installation. A copy of all "wet out" and "cure" records shall be made available to the ENGINEER upon request and shall be turned over to the ENGINEER on a weekly basis and prior to request for payment. If the "wet out" and "cure" reports are not presented prior to a payment request for a repair work order, payment for the work will not be made and the request will be rejected. At a minimum, this report shall include, in addition to CONTRACTOR and Contract identification:
   1. Line identification and location
   2. Wet-out date
   3. Sample identification(s) and technician
   4. Installation (in sewer) date
   5. Host sewer pipe inside diameter
   6. Liner thickness
   7. Liner length
   8. Liner and resin batch numbers
   9. Resin type
   10. Wet out length
   11. Roller spacing
   12. Vacuum setting
   13. Quantity of resin and catalyst utilized
   14. Wet out technicians
   15. Time wet out started and completed
   16. Applicable remarks
   17. (Heat cure) Boiler and liner heating fluid pressure and temperature versus time log during cure period
   18. (UV cure) Pressure and temperature versus time log and light train speed during cure period.
   19. Cool down report

**3.09 CLEANUP**

1. After the liner installation has been completed and accepted, the CONTRACTOR shall cleanup the entire project area and return the ground cover to the original or better condition. All excess material and debris not incorporated into the permanent installation shall be disposed of by the CONTRACTOR.

**3.10 TELEVISION SURVEY**

1. Television survey, including Preconstruction Survey, Post Construction Survey, and Warranty Survey, shall be in accordance with Special Note for CIPP Acceptance Testing. Television survey shall be done for all cured‑in‑place lining and shall be completed within 2 weeks of liner installation.

**PART 4 – PAYMENT**

Payment for Cured-in-Place Pipe Liners will be made per linear foot as S CIPP LINER (SIZE IN INCHES). Payment at the unit bid prices shall be considered full compensation for all work, equipment, and incidentals necessary to install the pipe liners in accordance with this note.