

DIVISION 13

SPECIAL CONSTRUCTION

SECTION 13514

REHABILITATION OF UNDERGROUND SEWERS

PART 1 GENERAL

1.1 WORK INCLUDES

- A. Cleaning of sewer pipe system.
- B. Sewer pipe system inspection by closed-circuit television.
- C. Lining sewer pipe.
- D. Reinstatement of service laterals.

1.2 REFERENCES

- A. ASTM D5813 – Cured-in-Place Thermosetting Resin Sewer Pipe)
- B. ASTM F1216 – Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
- C. ASTM F1743 – Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

1.3 SUBMITTALS

- A. Submit in accordance with Section 01330.
- B. Shop Drawings:
 - 1. Submit for lining materials
 - 2. Indicate liner dimensional information for each pipe size.
- C. Product Data: Submit manufacturer's information on liner material and resins including Material Safety Data Sheets (MSDS).
- D. Report
 - 1. After completion of work, furnish to owner DVD's showing location of improvements, pipe condition before and after lining improvements as well as bound television inspection forms. **These DVDs are to be provided to the owner within two weeks of project completion.** Television inspection forms should include:
 - a) Date and time that inspection is performed.
 - b) Identification of operator.
 - c) Location.
 - 1) General Location.
 - 2) Upstream manhole number.
 - 3) Downstream manhole number.
 - 4) Paved, unpaved or other.
 - d) Pipe information.
 - 1) Pipe diameters.

- 2) Materials.
- 3) Length, total.
- 4) Length between joints.
- 5) Depth.
- e) Defects in system.
 - 1) Location.
 - 2) Comments.
- f) Location of laterals.
- g) Space for inspector to draw sketch, if necessary.
- h) DVD number and index.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01700 - Execution Requirements: Closeout procedures.

1.5 WARRANTY

- A. Work warranted for period of one year after final completion and final written acceptance of entire project by Engineer.
 - 1. Locate and re-seal all renewed leakage during warranty period.
- 2. Contractor not responsible for leaks developing from structural failure of pipeline from settlement not attributable to his operations.

PART 2 PRODUCTS

2.1 CLEANING SEWERS

- A. Equipment:
 - 1. Provide all equipment necessary for proper rodding, bucketing, brushing and flushing of sewers. **Provide heavy cleaning as required at no additional compensation.**
 - 2. Obtain water hydrant meter from the City of St. Charles; pay for water used at no additional compensation. **The largest diameter water hydrant meter supplied by the City shall be 1" and can be obtained for a refundable deposit of \$575.00.**
- B. Cleaning: Defined as cleaning not requiring more than five (5) passes through the line with high-pressure jetting equipment.
 - 1. Balls, scooters, high-pressure water jetting equipment, brushes, swabs, bucket machines, scrapers, and augers permitted.
- 2. When bucket machines and buckets are used, provide properly sized flexible cable to prevent breakage when hanging cleaning equipment within sewer lines.
- C. Heavy Cleaning: Defined as cleaning required where it has been determined that large deposits of debris or root growth exists within the sewer lines and cleaning would require more than five (5) passes through the line with high-pressure jetting equipment.
 - 1. Bucket machines, scrapers and augers permitted.
 - 2. When bucket machines and buckets are used, provide properly sized flexible cable to prevent breakage when hanging cleaning equipment within sewer lines.

2.2 TELEVISION INSPECTION

A. Equipment:

1. Camera and Monitor: Color camera with rotating lens to look up laterals, capable of transmitting and receiving minimum 600 resolution lines picture; minimum 17 inch monitor located inside mobile TV studio; remote control for brilliance and focus and camera movement. The camera shall be specifically designed and constructed for sewer inspection. The camera shall be operative in conditions of 100 percent humidity. Focal distance shall be adjustable through a range from 1-inch to infinity. The camera shall be mounted on skids suitably sized for each pipe diameter to be investigated. Lighting for the camera shall minimize reflective glare. Camera and lighting quality shall be suitable to provide a clear, continuously in-focus picture of the entire inside peripheries of the sewer pipe for all conditions encountered during the work.
2. DVD: High quality color in DVD format.
 - a) Recorder: Capable of recording sound and video information; with speed and electronics standard with electronics industry.
 - b) Playback: Video playback model suitable for DVD used.
3. Mobile Studio: Above-ground, large enough to accommodate up to 4 people for viewing while inspection is in process; with control panel operated by skilled technician; accessible to Owner or Owner's Representative at all times.
4. **Provide all electrical wiring and power source; pay for electrical power.**
5. Footage meter or means of locating camera with continuous display on TV DVD. The remote reading footage counter shall be accurate to at least 0.20 feet over the length of the particular section being inspected and shall be mounted over the television monitor.
6. **Camera operator to stop, turn, slowly orbit 360 degrees and look up each lateral encountered.**

B. Flow through sewer shall be less than 25% of maximum flow when televising sewer, not to exceed 3".

1. If required, Contractor will use plugs or flow control devices to achieve above requirements without detrimental effects to laterals, sewer system, or sewer service.

C. Provide televising for one sewer section at a time.

1. If entire sewer section cannot be televised from one manhole, inspection shall be attempted from other end.

D. Sewer defects or infiltration source shall be identified on tape recording and TV inspection form, and accurate distances from center of manhole shall be provided for each sewer defect or infiltration source, and each lateral.

E. If camera can not pass a protruding lateral or similar obstruction, notify Owner or Engineer immediately. Attempt to TV from other end if possible.

F. All property disturbed by work shall be restored to original state.

G. Any out-of-focus video recordings or portions thereof shall be rejected and the section re-televised at the Contractor's own expense.

2.3 CURED-IN-PLACE-PIPE (CIPP)

A. Manufacturers:

1. Insituform
 2. In-Liner
 3. National Liner
 4. Substitutions to be considered in accordance with Section 1600.
- B. The liner tube shall consist of one or more layers of absorbent non-woven felt fabric meeting the requirements of ASTM F1216, latest revisions.
- C. The liner tube shall be constructed to withstand installation pressures and curing temperatures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
- D. The wet out tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the calculated minimum design CIPP wall thickness.
- E. The liner tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe.
- F. The outside layer of the tube shall be coated with an impermeable, flexible membrane that will contain the resin and allow the resin impregnation (wet out) procedure to be monitored.
- G. No material shall be included in the liner tube that may cause delamination or peeling in the cured CIPP. No dry or unsaturated layers shall be evident.
- H. The wall color of the interior pipe surface of CIPP after installation shall be relatively light reflective color so that a clear examination with closed circuit television inspection equipment may be made.
- I. The liner tube shall be chemically resistant to withstand exposure to domestic sewage per the requirements of ASTM F1216.
- J. The liner tube shall provide a watertight seal between the liner pipe and sewer.
- K. The resin system shall be a corrosion resistant polyester or vinyl ester system that includes all required catalysts that when cured within the tube, create a composite that satisfies the requirements of ASTM F1216 and ASTM D5813.

PART 3 EXECUTION

3.1 NOTIFICATION

- A. Keep Owner and Engineer informed as accurately as possible as to when work commences and how it will proceed.
- B. Prior to commencing any work, give the Owner and Engineer a minimum 48 hours advance notification.
- C. Coordinate with Owner for location of abandoned laterals; abandoned laterals need not be reinstated if notified by Owner.

D. Jobs shall only be lined during light rains, as many sections have heavy infiltration.

3.2 CLEANING

A. Perform cleaning required for installation of lining material.

B. Provide 95% removal of dirt, stones, debris, roots and other materials from the sewer to be cleaned.

C. Root cut as necessary at no additional compensation. Verify with Owner or Engineer.

D. Verify with Owner or Engineer that heavy cleaning is necessary before heavy cleaning.

E. Perform heavy cleaning, including root cutting, required for installation of lining material at no additional compensation.

F. Deliver waste material to City of St. Charles Main Wastewater Treatment Facility or landfill.

1. Remove all solids that may tend to settle out downstream.

G. All property disturbed by work shall be restored to original state at no additional compensation.

3.3 TELEVISION INSPECTION

A. Perform closed-circuit television inspection before installation of lining material. Camera operator to stop, turn, **slowly orbit 360 degrees** and look up each lateral encountered.

B. After the sewer lining is complete as required, the Contractor shall reestablish service connections to 100% of the original opening. Service reinstatement shall be done without excavation from the interior of the pipe by means of a television camera and a remotely controlled cutting device. The edges of the service cut-ins shall be smooth and even. There shall be no rough or jagged edges. The entire circumference (360*) of the sewer service reinstatement shall be televised and recorded on the post-lining recording. Over-cutting, under-cutting or exposed gravel shall not be permitted.

C. The video operator must have at least one year of experience in televising sewer mains.

D. Flow through the sewer shall be no greater than one-third of the pipe diameter.

1. If required, Contractor shall use plugs or flow control devices to achieve above requirements without detrimental effects to laterals, sewer system or sewer service.

E. Provide televising for one sewer section at a time.

1. If entire sewer section cannot be televised from one manhole, inspection shall be attempted from other end.

F. Contactor shall avoid any pauses over 30 seconds.

G. If camera cannot pass a protruding lateral or similar obstruction, notify Owner or Engineer immediately. Attempt to TV from other end.

- H. The Contractor shall turn over original DVD's with TV inspection report after completing work to receive pay requested. Inspection reports and DVDs are to be completed and submitted in sequence.
- I. Any out-of-focus video recordings or portions thereof shall be rejected and the section re-televised at the Contractor's own expense.
- J. The entire televised inspection process shall be available to be performed in the presence of the City's Representative.
- K. All property disturbed by work shall be restored to original state at no additional compensation.

3.4 SEWER PREPARATION

- A. Removal all protruding laterals, mineral deposits, roots, debris necessary for repair of sewer. **Work shall be considered incidental to the cost of cleaning and lining sanitary sewers.**
- B. If obstruction cannot be removed by conventional sewer cleaning, notify the Owner or Engineer.

3.5 LINING SEWERS

- A. Installation shall be in accordance with ASTM F1216 and ASTM F1743 and manufacturer's recommendations.
- B. Notify sewer users 24 hours in advance of construction by door-to-door announcements.**
- C. Coordinate with Owner to determine which inactive service laterals do not need reinstatement.
- D. Provide for flow around sections of pipe designated for lining.
- E. Repair broken or misaligned pipe at manhole wall with seal compatible with liner.
- F. Resin Impregnation
 - 1. 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 potential loss of resin during installation through cracks and irregularities in the original pipe wall, as applicable.
- G. Tube Insertion
 - 1. The wet out tube shall be positioned in the pipeline using the inversion method as defined in ASTM F1216. The tube shall be inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
- H. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. A cool-

down process shall be conducted that complies with the resin manufacturer's specification.

- I. Reconnect all existing live service connections without excavation by means of television camera and cutting device; re-establish to minimum 90 percent capacity.
Over cuts, under cuts and exposed gravel shall be deemed unacceptable
- J. Install within reasonable amount of time so that residents will be minimally inconvenienced
- K. All property disturbed by work shall be restored to original state at no additional compensation.
- L. **Repair all sewers damaged by operations. Any repair such as top hats or resin patching must be pre-approved by the owner**

3.6 PUMPING, BYPASSING AND DEWATERING

A. The CONTRACTOR must submit a bypass pumping plan to the City of St. Charles Sewer Division for their approval prior to commencing any work on this project.

B. Dewater when groundwater table is such that dewatering is required to perform operations.

C. Provide all flow controls.

1. Costs for plugging or blocking, pumping, bypassing and dewatering are incidental to this Contract.

END 13514



ST. CHARLES

S I N C E 1 8 3 4

**CITY OF ST. CHARLES
2 EAST MAIN STREET
ST. CHARLES, ILLINOIS 60174
PHONE: 630.377.4400**