

Section 450

Sewer Pipe Rehabilitation with Cured in Place Pipe (CIPP) Systems

451.0 GENERAL DESCRIPTION

Sewer pipe rehabilitation with cured-in-place pipe systems (CIPP) shall be performed in accordance with the provisions of the latest published edition of the MnDOT Standard Specifications and the City Engineers Association of Minnesota Standard Specifications, 2023 Edition, except as modified herein.

All materials must be domestically manufactured in the U.S.A.

451.1 SCOPE OF WORK

This Contract consists of Cured-in-Place Pipe (CIPP) lining of sanitary sewer main, lateral reinstatements, trimming of protruding taps, pressurized pipe (force main) lining, traffic control, bypass pumping, residential notifications, and all appurtenances required to completely reline the sections of existing sanitary sewer pipe as shown on the drawings or included in these specifications.

Due to the condition of the host pipe the new CIPP shall be designed as a fully structural pipe, not relying on the remaining strength of the host pipe to withstand long-term external loading and internal pressure.

452.0 SUBMITTALS

452.1 PROVIDED WITH BID

Bids must be labeled clearly on the outside of the envelope and meet all of the requirements described in the INSTRUCTIONS TO BIDDERS.

- a) The parameters used to design the liner section.
- b) The diameter, wall thickness and type of material to be used. Pipe strength determination shall include calculations based on new material properties and long-term properties.
- c) The manufacturer's certificates of compliance with provisions of the referenced standards and these specifications.
- d) A copy of the license or certificate verifying the manufacturer's or licensor's approval of the Contractor to install their product.
- e) Manufacturer's product literature and application and installation requirements for materials used in the liner.

452.2 PROVIDED AT THE PRECONSTRUCTION MEETING OR 10 DAYS BEFORE INSTALLATION BEGINS (FOR REVIEW AND APPROVAL)

- a) Traffic control plan.
- b) Sewage bypass plan.

The Contractor shall provide and otherwise develop a plan for bypass pumping. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. This plan shall be approved by the Engineer or Owner before work begins on the section(s) requiring bypass.

c) Procedural plan.

1. Air Inversion and Steam Cure Method

If the Contractor will utilize air inversion and steam cure method for CIPP installation, a typed document must be submitted in an outline format describing their procedure for executing steam cure. The procedure described in the typed document must include, but shall not be limited to, a discussion of the Contractors:

- a. Steam cure safety methods, and
- b. Cool-down period activities that follow the post-cure period that will prevent thermal shock to the CIPP liner.
- c. Management of possible odor build-up in homes.

2. Water Inversion and Cure Method

If the Contractor will utilize water inversion and cure method for CIPP installation, a typed document must be submitted in an outline format describing their procedure for executing this method. The procedure described in the typed document must include, but shall not be limited to, a discussion of the Contractors:

- a. Safety methods in the event of water spillage onto the ground surface and resulting possible icing conditions, and
- b. Management of possible odor build-up in homes.

3. UV Cured Method

If the Contractor will utilize UV cure for CIPP installation, light train sensor readings shall provide output documenting the cure along the entire length of the installed CIPP. The cure procedure shall be in accordance with the manufacturer's recommendation.

a. Safety Plan

The Contractor shall provide a confined space entry plan and identify designated safety supervisory personnel to the Engineer. The plan shall include confined space entry training certification of each employee assigned to the project.

- b. A sample of public notices, door hangers, and other materials to be used by the Contractor for public communications purposes.
- c. Progress schedule (bar chart).
- d. Superintendent's 24-hour emergency telephone numbers.
- e. An emergency contact list of three (3) people who could be called at any time in an emergency. This list will be forwarded to the St. Louis

Park Police Dispatcher. All three people shall be capable and have the authority to operate the necessary equipment.

- f. An odor control plan shall be submitted by the Contractor, which will ensure that the project-specific odors will be minimized at the project site and the surrounding area. Part of the plan will include methods for removing odors from residents' homes.

452.3 PROVIDED WITH REQUEST FOR FINAL PAYMENT

- a) All flash drives or copies thereof which shall become the property of the Owner. This includes the television identification conducted prior to and after completion of the project installation. Two copies of each to be submitted.
- b) Each flash drive and typed log shall be clearly labeled with its contents.
- c) The typed inspection log for each pipe shall be of both the before and after inspection.
- d) Satisfactory physical properties testing reports for each pipe segment.
- e) Construction logs.
- f) Labor IC134 forms.
- g) Other submittals per General Conditions and Special Provisions.

452.4 LICENSE AGREEMENTS

The Contractor agrees to defend, indemnify and hold harmless the City and the Engineer against all claims, suits, and actions or other damages due to negligence of any person or property arising out of patent infringement by the Contractor or the Contractor's employees, agents, the suppliers, or any tier of subcontractors involved in the work.

453.0 CONSTRUCTION REQUIREMENTS

453.1 NOTIFICATION TO PROPERTY OWNERS

The Contractor is responsible for contacting each home or business connected to the sanitary sewer being lined. They also need to inform them of the work to be conducted and when the sewer will be offline.

A written notice must be delivered to each resident in the project area a minimum of seven (7) calendar days before the start of the project. The notice shall describe the work, schedule, how it affects them, and a local telephone number of the Contractor they can call to discuss the project. The telephone number of the Owner's Project Coordinator and the Owner's 24-hour emergency telephone number shall also be listed.

The Contractor must deliver an additional written notice a minimum of 24 hours in advance to any property whose service pipe is connected to the trunk segment receiving the liner.

If a bypass cannot be set up and it becomes necessary to disrupt service to commercial properties, a written notice shall be delivered to each property a minimum of 72 hours in advance. To avoid disruption to commercial establishments, the Contractor may elect to

complete the work outside of regular work hours. Extension of work hours must be approved by the City. The cost for work scheduled outside of regular work hours shall be incidental to cured-in-place pipe lining.

If the Contractor is unable to restore service within the time stated on the written notice, personal contact will be necessary to notify affected properties of the situation.

A two-week advance schedule will be given to the City prior to any work being started.

453.2 PROCEDURES IN THE EVENT OF A SEWAGE SPILL

In the event of a significant sewage release, the Contractor shall immediately notify the State of Minnesota Duty Officer at the Department of Public Safety at (651) 649-5451 or 1-800-422-0798, and the 24-hour emergency number for Public Works (952)-292-6194.

The Duty Officer will instruct the Contractor on any further notification procedures.

The Contractor shall also take immediate action to prevent sewage from entering any water body or storm sewer by directing any such sewage flow into the existing sanitary sewer system.

453.3 WATER

The Contractor may obtain water at the bulk water filling station located at the Municipal Service Center (7305 Oxford Street). A permit is required and may be obtained at the Municipal Service Center. (fee waived.) Fire hydrant access will not be allowed without permission of the City Utility Superintendent.

The Owner shall provide a location at no cost to the Contractor (e.g., sanitary sewer, etc.) for proper disposal of water after use.

453.4 MANHOLE ACCESS/TREE TRIMMING

It shall be the responsibility of the City to provide locations of all manhole access points. The City shall be responsible for making the manholes accessible for the work.

The Contractor will coordinate any tree trimming that may be necessary with the City. Only City forces will be allowed to perform tree trimming.

453.5 ACCESS, CLEANING AND INSPECTION

Prior to entering any permit-required confined space, the Contractor shall make an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen. This shall be undertaken in accordance with local, state, or federal safety regulations.

The Contractor shall identify the number and location of access points required. The Owner shall provide rights of access to the pipeline. The Contractor shall provide the excavation, pipe work, reconnection, and restoration for access points.

The Contractor shall remove all internal debris out of the pipeline that will interfere with the installation. Pipes shall be cleaned by the Contractor, as needed, with high-velocity jet

cleaners, mechanically powered equipment, cable-attached devices or fluid-propelled devices (e.g., pipe pigs). It will be the responsibility of the Contractor to dispose of all debris removed from the pipe. Any hazardous waste material encountered during this project shall be considered a changed condition.

Verification of readiness to install liner shall be performed by experienced personnel trained in locating services, breaks, obstacles, etc., this may include pipe mandrels or other devices up to and including closed-circuit television or man entry. The interior of the sewer main shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the impregnated tube. A videotape or suitable log shall be kept for reference. It will be the Owner's responsibility to remove any unforeseen obstructions that may prevent liner installation. Owner may direct Contractor to remove these obstructions and reimburse under the terms of the contract.

Any external water leaking back into the existing sewer main shall be kept to a minimum so as not to interfere with the proper installation and cure of the CIPP liner

The Contractor shall field verify the length of sections to be cleaned and lined.

The Contractor shall isolate or remove any air release valves from force main section prior to liner installation.

The Contractor shall flush the host pipe with clean water to remove any loose debris from the pipe surface. Wherever practical, remove all standing water from the inside surfaces of the cleaned main by passing a sufficient number of oversized foam swabs through the force main or use a progressive expansion method to remove standing water.

The Contractor shall remove and dispose of any waste or debris generated by the cleaning operation.

453.6 WRINKLES

Wrinkles in finished liner that cause backwater of one inch or more, or reduce hydraulic capacity of pipe (wrinkles which exceed 5 percent of pipe diameter) are unacceptable and shall be removed and repaired at Contractor's cost.

Wrinkles in finished liner pipe that reduce structural stability of pipe are unacceptable.

453.7 REINSTATEMENT OF SANITARY SEWER SERVICE CONNECTIONS

The Contractor shall certify a minimum of two (2) complete working cutter units plus spare key components are present on the site before each inversion.

Reinstatement of sanitary sewer service connections shall be incidental to the cost of the project and no additional compensation will be made.

If the Contractor is unable to re-establish the service connection from inside the pipe and excavation is necessary, no additional payment will be made for excavations for the

purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

Services not re-established shall be approved in writing by the Engineer. The Contractor shall be responsible for costs incurred from failure to restore an active service.

453.8 REINSTATEMENT OF SANITARY SEWER DROP

It is the intent of these specifications that the sanitary sewer drop be reopened without excavation, utilizing a remotely controlled cutting device, monitored by a video TV camera.

The connections shall be opened to no less than 90% capacity. Cutout edges shall be free of debris or burrs that would restrict wastewater flow.

The Contractor shall certify a minimum of two (2) complete working cutter units plus spare key components are present on the site before each inversion.

After sewer lining is complete, the Contractor shall re-establish all sanitary sewer drops.

The Contractor must capture and remove all CIPP cutout material from drops at the closest downstream manholes. The Contractor shall be responsible for future costs incurred by the Owner in locating and removing stray CIPP materials (from this project) found downstream of the project locations. The Contractor shall also be responsible for costs incurred by the Owner for cleanup or restoration if stray CIPP materials (from this project) cause sewer backups.

If the Contractor is unable to re-establish the drop from inside the pipe and excavation is necessary, no additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

Reinstatement of sanitary sewer drops shall be incidental to the cost of the project and no additional compensation will be made.

453.9 TRIMMING OF PROTRUDING SERVICES

The Contractor shall trim all existing protruding taps as necessary to satisfactorily complete liner installation.

The Owner shall be notified when any protruding taps are encountered that the Contractor believes will interfere with the CIPP.

The Contractor shall make available pre-CIPP TV inspection media showing all protruding taps for Owner review and approval prior to performing the trimming work.

Trimming of protruding services shall be incidental to the cost of the project and no additional compensation will be made.

453.10 MANHOLE INVERT ADJUSTMENTS

The Contractor shall reconstruct benches and channels in manholes with grout to match new invert elevations to satisfactorily complete liner installation.

454.0 GRAVITY PIPE LINING STRUCTURAL REQUIREMENTS

The physical properties used in the design submittal shall be clearly identified. At a minimum, the CIPP shall have the following physical properties:

Property	ASTM test method	Minimum value*
Initial Flexural Modulus of Elasticity	D790	400,000 psi
Initial Flexural Strength	D790	4,500 psi

*Values are for design conditions @ 75°F (25°C)

Liner thickness requirements:

8" CIPP: Minimum Nominal Thickness = 6.0 mm. (5.1 mm cured)

9" CIPP: Minimum Nominal Thickness = 6.0 mm. (5.1 mm cured)

12" CIPP: Minimum Nominal Thickness = 7.5 mm. (6.3 mm cured)

21" CIPP: Minimum Nominal Thickness = 12 mm. (10.2 mm cured)

LMK Insignia End Seals shall be provided at each manhole connection and shall be incidental to the cost of the project and no additional compensation will be made.

455.0 PRESSURIZED PIPE (FORCE MAIN) LINING

455.1 STRUCTURAL REQUIREMENTS

The physical properties used in the design submittal shall be clearly identified. At a minimum, the CIPP shall have the following physical properties:

Property	ASTM test method	Minimum value*
Initial Flexural Modulus of Elasticity	D790	300,000 psi
Initial Flexural Strength	D790	7,000 psi
Initial Tensile Strength	D638**	6,500 psi

*Values are for design conditions @ 75°F (25°C)

**For materials that do not allow sufficiently accurate hoop/weft testing per ASTM D638, initial tensile strength may also be substantiated by short-term burst testing results.

455.2 PROJECT PLANNING

The Contractor shall provide adequate notice to the Owner prior to mobilization.

The Contractor shall excavate down to force main, disassemble the force main, and disassemble the drop at the manhole. Contractor will clean and televise the force main before lining. Once cured, the lining will be tested and televised again. Contractor shall assemble the force main, backfill and compact the area that was excavated. Contractor

shall use a trench box to minimize the excavation area and use j-barriers to protect the excavation area. J-barriers, traffic control and street restoration will be paid separately. All other work will be included with the lining bid.

455.3 PRESSURE TESTING FOR WATER-TIGHTNESS FOR PRESSURIZED MAINS

Pressure testing for water-tightness shall be provided on all CIPP sections of the force main and shall be completed after inspection.

Hydrostatic pressure test on the lined main shall be performed following the guidelines of ASTM F1216. The test section shall be subjected to a hydrostatic pressure of no more than 100 psi for the rehabilitated line segment.

As noted in ASTM F1216, the allowable leakage during the pressure test shall be 20 U.S. gallons per inch of internal pipe diameter per mile of pipe per day (GIDMD), providing that all the air has been evacuated from the line prior to testing and the structural pipe lining system has cooled down to ambient temperature.

After the one-hour test, the quantified makeup water shall be extrapolated to the 24-hour rate for comparison purposes. Any visible leakage at termination points shall be eliminated. If not feasible or possible at the time of the test, the termination point leakage shall be kept to a minimum, collected and then deducted from the actual makeup water rate. If the loss at test pressure exceeds the allowable, the Contractor shall endeavor to identify the source of the loss and minimize it in a manner acceptable to the Owner. Trapped air can significantly affect internal pressure and may require extensive continued testing until stabilization occurs. The pressure test for water tightness shall be deemed acceptable if that actually measured during the one-hour test (which has been extrapolated to a 24-hour day rate) is equal to or less than the allowable makeup water rate of 20 GIDMD.

456.0 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

All items will be measured separately according to design designation as indicated in the pay item name and as may be detailed and defined in the Drawings, Specifications, or Special Conditions.

Payment for construction of sanitary sewer facilities will be made as detailed in the method of measurement and as shown in the Contract Documents or detailed in the Special Conditions. Payment shall include all costs of furnishing and installing the complete facility as required by the Drawings, Specifications, and Special Conditions.