

SECTION XXXXXX – TECHNICAL SPECIFICATIONS FOR INSTALLATION OF
CURED IN PLACE MANHOLE (CIPM) LINER SYSTEMS FOR MANHOLES,
WETWELLS, AND OTHER SANITARY SEWER STRUCTURES

1.00 PART 1 -- GENERAL

1.01 SCOPE

- A. This specification designates general requirements for rehabilitation of existing sanitary sewer manholes, wetwells, lift stations and other sanitary sewer structures by a cured-in-place (CIPM) liner method.
- B. The CIPM is a non-porous, multi-layer structural system for rehabilitation of structures such as manholes, pump stations, and wet wells. It provides an impervious water and sewer gas resistant membrane in between the layers of structural fiberglass. Therefore, the liner system is ideal for correcting H₂S gas deterioration, infiltration, and exfiltration problems in structures of most any shape or size.

1.02 PRE-QUALIFICATION OF PRODUCTS AND INSTALLERS

- A. The Owner will only approve experienced installers utilizing proven Commercially Acceptable sewer rehabilitation products. In order to be considered Commercially Acceptable, the Product and Installer must demonstrate compliance with the following requirements.
- B. Bid proposals must be labeled clearly on the outside of the bid envelope, defining the product(s) and installer being proposed. Only bids using pre-approved products and installers will be opened and read. Bids submitted on products or from installers that have not been pre-approved will be returned unopened.
- C. The following products and installers are classified Commercially Acceptable and are pre-approved for use on this project:
 - 1. Triplex® Liner System by McNeil Technologies; Suncoast Infrastructure, Inc.
 - 2. Poly-Triplex Liner by Envirocort Technologies; Pre-Approved Installer
- D. Documentation for other products and installers seeking pre-approved status must be submitted to the Engineer no less than two (2) weeks prior to bid date to ensure adequate consideration.
- E. Pre-approval of products and installers shall be classified as Commercially Acceptable. To be considered Commercially Acceptable, the product and the installer must demonstrate full compliance with the requirements outlined below. Only products and installers deemed Commercially Acceptable will be allowed to bid as specified.

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- F. All additional products and installers that are pre-approved by the Engineer shall be identified in an addendum issued prior to the bid date.
1. For a PRODUCT to be considered Commercially Acceptable, a minimum of 250,000 square feet must have been successfully installed in wastewater collection systems in the U.S. to insure commercial viability. Also, the PRODUCT shall have been in service within the wastewater collection system of the Owner (or some other city, town, or county within the United States of America) for a minimum of twenty (20) years.
 2. For an INSTALLER to be considered as Commercially Acceptable, the INSTALLER must satisfy all insurance, financial, and bonding requirements of the Owner, must be trained and certified by the Manufacturer, and must have had at least fifteen (15) years active experience in the commercial installation of CIPM products. In addition the INSTALLER must have successfully installed at least 50,000 square feet of CIPM products in the wastewater collection systems.
- G. The minimum lining thickness (weight) shall be as described in the following table:

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Structure Condition	Structure Material	Non-Structural Structural	Liner Weight
New	Precast	Non-Structural	56 oz. per SY (Depth <=29')
New	Brick	Non-Structural	56 oz. per SY (Depth <=29')
A	Precast	Non-Structural	56 oz. per SY (Depth <=29')
A	Brick	Non-Structural	56 oz. per SY (Depth <=29')
B	Precast	Structural	56 oz. per SY (Depth <=29')
B	Brick	Structural	56 oz. per SY (Depth <=29')
C	Precast	Structural	68 oz. per SY (Depth <=38')
C	Brick	Structural	68 oz. per SY (Depth <=38')

NOTE: For depths greater than shown in this table, contact manufacturer.

1.03 REFERENCES

- A. The following standards are hereby incorporated into these specifications by reference:
1. ASTM D695 – Compressive Strength of Rigid Plastics
 2. ASTM – The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
 3. NACE – The published standards of the National Association of Corrosion Engineers (NACE International), Houston, TX.

1.04 SUBMITTALS

- A. All submittals shall be submitted in accordance with the applicable portions of these specifications.
- B. The Contractor shall submit the following information to the Engineer for approval prior to beginning the installation of the protective lining system.
1. Manufactures data sheets for the liner materials
 2. Third party test results verifying the physical properties of the liner materials meet or exceed the requirements of these specifications.
 3. Installer’s procedures for preparing the surface of the structure and installing the liner system.

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4. Documentation that the Installer of the liner system has been trained and certified by the Manufacturer and meets the experience requirements of these specifications.

2.00 PART 2 – PRODUCTS

- 2.01 The lining system shall be a cured-in-place liner method for use in new or existing manholes, wetwells, liftstations, treatment plants, and other structures. All products to be used on this project must be pre-approved by the Engineer prior to the bid date.
- 2.02 In order to be considered as an equal, a product must meet or exceed the minimum physical characteristics as published by the manufacturer and must have a minimum corrosion resistance suitable for environments pH of 0.5 or higher.
- 2.03 Other manufactures or products seeking pre-approval must submit the following documentation to the Engineer a minimum of two weeks prior to bid date. This time frame allows the Engineer ample time to determine if the proposed product is an acceptable alternative.
 - A. Documentation that the proposed product meets the above minimum physical characteristics including results of testing performed by a bonded, third party testing company.
 - B. An affidavit attesting to the successful use of the product as a protective coating for concrete or masonry structures for a minimum continuous period of five (5) years in wastewater conditions recognized as corrosive or otherwise detrimental to concrete and masonry.
 - C. A verifiable list of references that document the successful installation and use of the Product in a minimum of 300,000 square feet of sanitary sewer structures.
- 2.04 MATERIALS – CIPM LINING SYSTEM
 - A. Liner shall be of the type that allows rehabilitation of a concentric, eccentric, or flat top round structure without removing the access hatch frame, top section or corbel.
 - B. The minimum compressive strength, as measured by ASTM D695 shall be 12,000 psi.
 - C. The fibrous body will be impregnated with a modified epoxy resin. For additional liner thickness, additional layers of resin and fiberglass will be incorporated.
 - D. Where indicated on the schedule, the inverts shall be lined.

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3.00 PART 3 – EXECUTION

3.01 INSTALLER QUALIFICATIONS

- A. All products must be installed by an Installer that has been trained and certified by the manufacturer.
- B. The Installer must provide verifiable documentation of the successful installation of 50,000 square feet of cured-in-place manhole liners in sanitary sewer structures.

3.02 QUALITY ASSURANCE

- A. Installer shall initiate and enforce quality control procedures consistent with applicable ASTM standards.
- B. Installer shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Installer shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

3.03 SAFETY

- A. Installer shall perform his work in a manner to protect the health and safety of all workmen and the public.
- B. All work shall be in accordance with standard industry safety practices.
- C. All work, including entry into confined spaces shall be performed in strict compliance with current OSHA regulations.

3.04 PRE-LINING INSPECTION

- A. The Installer's vehicles and equipment must be able to access the structures to be coated under their own power.
- B. Active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated
- C. In general, the OWNER assumes responsibility for the structural integrity of existing structure. Before beginning work, the structure shall be visually inspected and any areas of apparent structural damage shall be reported to the OWNER for restoration.

3.05 SURFACE PREPARATION – CIPM LINER

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- A. Voids and irregularities in the structure interior walls and benches shall be patched with cementitious patching/plugging compounds as manufactured by Tamms, Inc., or approved equal.
- B. Channel reconstruction cement shall be speed-crete as manufactured by Tamms, Inc., formed Portland cement concrete of 4,000-psi compression strength, or approved equal.
- C. Unlined flow channel. Install a bridge or flow through tube and cut the liner bottom near the flow line in the channel to expose the flow channel and give access to the pipes. Plug the pipes entering the structure through the wall and trim the pipe opening to restore flow.
- D. Lined flow channel. Plug the pipes entering the structure and line the flow channel to the edge of the pipe. Trim all pipe openings and restore the flow.
- E. Wet well bottoms. Wet well bottoms, as a minimum shall be lined to one foot below the lowest level. A wooden false floor shall be placed at the liner termination level to support the inflation bladder. Alternatively, the bottom may be lined and the bottom section removed to avoid building a false floor.
- F. All surfaces of the structure shall be cleaned with a high-pressure water-jet sprayer with an operating pressure of at least 3,500 psi. Pressure wash the structure to remove all dirt, grease, sand, and surface contaminants on the wall and floor leaving a clean damp surface.
- G. Badly deteriorated and pitted pre-cast structures and brick round structures, with missing bricks and grout, shall be repaired to form a smooth compatible surface for the liner.
- H. The interior wall surfaces shall be air-dried. The relative humidity of the wall surfaces shall be less than 100% of the ambient environment. The structure may not show damp surfaces prior to the application of the lining.
- I. The stopping of active hydrostatic infiltration shall be accomplished by using Tamms cementitious products Speed Crete and Powder X, as manufactured by Tamms Industrial, Division of LaPorte Construction Chemicals, Mentor, Ohio, Hydro-gel by prime resins, or approved equal.
- J. Water infiltration can also be stopped using expansion type grouts such as Seal Guard™, Sikafix H-H, 3M, or Avanti.

3.06 INSTALLATION – CIPM LINER

- A. Installation shall be by a certified installer that is qualified by the liner manufacturer. The Installer shall include the furnishing of all materials, equipment, tools, and labor as required for the rehabilitation of the structures selected, including the installation of the interior liner.
- B. The installation of the approved liner system shall be in strict accordance with the manufacturer's instructions. This shall include the preparation, installation, inflation, curing, and finishing operations required for the completion of the round structure rehabilitation process.

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- C. The structural liner shall be manufactured to the shape of the structure. The fibrous portion of the liner shall be saturated with a modified epoxy resin, then pressurized, and cured in-place.
- D. The liner shall be installed and cured in place via controlled curing by heat and pressurization in the structure to complete the curing process.
- E. The lining of the structure shall cover the shape and contour of the existing structure. The liner shall be installed and substantially bond to the interior structure substrate. The liner shall be free of open joints or openings other than pipe inlets, outlets and the access hatch opening.

3.07 QUALITY ASSURANCE

- A. Installer shall initiate and enforce quality control procedures consistent with applicable ASTM standards.
- B. Installer shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Installer shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

3.08 TESTING AND INSPECTION

- A. The Engineer and Installer shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by Installer.

4.00 PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Measurement for new and rehabilitated manholes shall be per square foot and shall be measured as the total area receiving the liner.

4.02 PAYMENT

- A. PAYMENT

Payment will be made under:

Structural Liner Manhole Rehabilitation - per SF