SECTION 33 01 30.74

ULTRAVIOLET (UV) CURED LINER

PART 1 – GENERAL

1.01 TRENCHLESS PIPELINE SPOT REPAIR

A. UV cured liner is a repair to an existing pipeline, normally without excavation, by the installation of a resin-impregnated flexible felt tube or fiberglass laminate, tightly fitted and cured in the shape of the host pipe and bonded to original pipeline. The tube or laminate shall wrap the host pipeline inner circumference 100%.

B. When cured, the liner shall bond and produce a water-tight seal against the original host pipe. The resin may either be a polyester, vinyl-resin or epoxy. The adhesive agent shall be an epoxy or epoxy paste applied to the outside of the sectional liner laminate.

C. When cured, the liner shall taper flat at the ends and produce the thinnest wall possible to mitigate flow constriction, and be capable of supporting overlapping liners for future pipeline rehabilitation.

D. Prior to installing the liner, the Contractor shall submit a detailed operational plan for the inspection and proposed cleaning for the City Representative's approval. After inspection and cleaning, the Contractor shall proceed with installing the sectional repair.

1.02 CORROSION REQUIREMENTS

A. The finished liner shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic waste and shall meet the chemical resistance requirements represented in ASTM D-543.

B. The liner product shall be compatible with the host pipeline material and other lining system materials utilized in pipeline rehabilitation.

1.03 SUBMITTALS

A. Method, procedure, or information per the specifications to provide either an adhesive, water-tight seal to the host pipeline or a mechanical seal between the cured sectional liner and host pipeline.

B. Technical procedure or information regarding the control and mitigation of shrinkage and wrinkling during installation and cure.

C. Wet-out procedures or information if wet-out at the manufacturing plant.

D. Current certification by manufacturer to install the system proposed in accordance with the specifications herein. Certification shall indicate the Contractor has been licensed or certified by the manufacturer for a minimum of two (2) years.

E. Copy of previous physical properties test for the proposed technology in accordance with the specifications herein that meet the minimum requirements as identified herein.

F. Copy of the chemical resistance test for the proposed technology in accordance with the specifications herein.

PART 2 – PRODUCTS

2.01 MATERIALS

A. UV cured liner material shall be fabricated from either a non-woven felt or fiberglass laminate or combination thereof. The liner manufacturer shall supply either technical procedure or information to control or mitigate shrinkage and wrinkling during install and cure.

B. UV cured liner material shall be fabricated or cut to neatly fit the internal circumference of the host pipeline. When cutting the material to fit, the laminate shall overlap a minimum of 2-inches and cure monolithically per manufacturer's recommendations.

C. UV cured liner shall use either a polyester resin, vinyl ester resin, or epoxy-resin. The watertight seal shall either be an adhesive epoxy compound or mechanical seal.

D. The material shall be factory-impregnated with resin (wet-out) by the material manufacturer and the wet-out material shall be packed suitable for transport to the field for install. The resin shall be in a state to resist wash off during transport/ install and shall be capable of install during wet and/or live flow conditions.

PART 3 – EXECUTION

3.01 PREPARATION

A. The Contractor shall carry out its operations in strict accordance with all applicable OSHA standards and jurisdictional-agency guidelines. Particular attention is drawn to those safety requirements involving entering confined spaces.

B. It shall be the responsibility of the Contractor to remove any internal debris from the pipeline which may adversely affect the install or cure of the liner.

C. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks and obstacles by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the liner, and it shall be noted so that these conditions can be corrected. A color video and suitable log shall be kept for later reference.

D. UV cured liner system shall be capable of operating in low-flow conditions and during excessive flows, the facility owner or Contractor, when necessary, shall provide a bypass system around the section or segment of pipeline where UV cured liner is to be installed. The bypass can be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. The bypass systems shall be approved in advance by the City Representative.

E. It is required that any affecting service laterals be inactive during the time of installation. This is normally accomplished by turning off the homeowner's services or requesting that the homeowner relinquish its services during the required period of installation.

F. Either the Facility Owner or Contractor shall clear the line of obstructions that will prevent the insertion of the liner material. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment and that will prevent the installation of the liner then the Contractor shall inform the City Representative prior to the commencement of the work.

3.02 INSTALLATION

A. The resin impregnated tube shall be folded/ wrapped per manufacturer’s instructions and loaded on a pressure apparatus for transport and install.

B. The pressure apparatus, either attached to a robotic device or pulled in by winch, shall be positioned with a television camera to the location of the defect. The pressure apparatus shall include a bladder which shall inflate in the mainline pipe, effectively seating the repair against the host pipe.

C. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to expand the resin impregnated sectional liner against the original host pipeline.

D. The pressure shall be adjusted per manufacturer’s requirements to hold the laminate against the host pipeline. Care shall be taken during the install to not over-stress the tube.

3.03 CURING

A. After pull in is completed, recommended pressure is maintained on the impregnated tube for the duration of the curing process.

B. UV cured liner shall be cured in place by the manufacturer's suggested resin technology, using either a polyester resin, vinyl ester resin, or epoxy-resin with a watertight seal shall comprised of either an adhesive epoxy compound or rubberized seal.

C. Curing method shall be compatible with the resin selected. The initial cure shall be deemed to be completed when UV cured liner has been exposed to the UV light, heat source or held in place for the time period specified by the manufacturer.

D. The finished liner shall be free of dry spots, lifts and de-lamination. The repair shall not inhibit the closed circuit television post video inspection of the pipeline. Frayed ends of the liner repair shall be removed prior to acceptance.

3.04 COMPLETION

A. Contractor shall maintain a visible, written log of all activities in accordance with manufacturer's recommendations and shall include time of insertion, bladder pressure requirements, required cure time, and actual cure time duration.

B. After the work is completed, the Contractor will provide the Owner with a digital imagery or video showing the completed work including the restored conditions.

C. Upon acceptance of the installation work, the Contractor shall reinstate the Site affected by its operations.

D. During the warranty period, any defects which will affect the integrity of strength of the liner shall be repaired at the Contractor's expense in a manner mutually agreed upon by the Manufacturer, Owner and Contractor.

3.05 PHYSICAL PROPERTIES

A. The structural performance of the finished pipe shall be adequate to accommodate all anticipated loads throughout a 50-year design life. No cured-in-place pipe rehabilitation technology will be allowed that requires bonding to the existing pipe for any part of its structural strength.

B. The cured repair shall conform to the minimum structural standards as follows:
Flexural Modulus of Elasticity tested per ASTM D-790: 725,000 psi
Flexural Strength at Break (fiber stress) tested per ASTM D-790: 6,500 psi
Tensile Strength at Break tested per ASTM D-638: 9,000 psi

END OF SECTION