1.0 General

It is the intent of this portion of the specification to provide for the rehabilitation and reconnection of service lateral connections (SLC) to rehabilitated sewer lines, without excavation, by installation and ultraviolet (UV) light curing of a resin-impregnated, flexible fiberglass insert with sealing epoxy element in the form of a tube or top seal that will be installed into the existing service lateral utilizing a pressure apparatus and ultraviolet light curing devise positioned in the mainline pipe. Service lateral connections may be a combination of tee's, wye's or break-in taps of varying sized and angle from 30 to 90 degrees. The resin shall be rapidly cured to transform the flexible insert into a hard, impermeable top seal around and in the lateral connection. The SLC product shall extend from the mainline into the lateral connection in a continuous tight fitting, watertight pipe-within-a-pipe to eliminate any visible ground water leakage and future root growth at the lateral to mainline connection. SLC product system shall be compatible with the mainline and/or lateral pipe or liner. If, within the warranty period, the SLC product installed in the sewer system is not acceptable due to leakage or any other defects, although originally accepted, the contractor shall repair or replace the affected portion at no cost to the customer. It is understood that if the contractor fails to do such work as required, the contractor shall be responsible for said costs of repair or replacement.

2.0 Material Requirements

1. The finished SLC product shall be an ECR (E-glass corrosion resistant) fiberglass laminate impregnated with an UV-light reactive Polyester resin which when cured is chemically resistant to domestic sewage over the expected life time of the rehabilitated pipe.
2. The SLC product shall be compatible with the lining system utilized for the main and/or lateral sewer lines.
3. This specification references the American Society for Testing and Materials (ASTM) standards that are made part hereof by reference and shall be the latest edition and revision.

   D543 Testing Method of Plastics to Chemical Reagents
   D578 Standard Specifications for Glass Fiber Strands
   D1600 Abbreviations of Terms Relating to Plastics
   D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

4. Reference is further made to NASSCO Standard: Recommended Specification for Sewer Collection Systems Rehabilitation.

3.0 SLC Product

1. The flexible fiberglass top hat tube insert shall be fabricated to a size that when installed will key into the internal surface irregularities of the lateral joint and neatly fit tight to the internal circumference of the lateral. The top seal tube shall be a laminate made of non-woven fiberglass materials that allow for circumferential stretching and angular alignment with the lateral pipe connection geometry during insertion.

2. The insert laminate shall seal to the inside wall of the sewer main 3 inches around the lateral opening and to the lateral wall 6 inches up into the lateral pipe from the main.
3. Unless otherwise specified, the installer shall furnish a specially formulated polyester resin and catalyst system compatible with the SLC process that provides cured physical strength at least to the same level as required for the lateral liner if specified.
4. A secondary epoxy-sealing component shall be used to form a sealing bond between the SLC product and the host lateral and main pipe walls.

4.0 Physical Properties

1. The cured SLC shall conform to the minimum standard listed below:

Flexural Modulus Of Elasticity	ASTM D 790	800,000 psi minimum

5.0 Line Preparation

1. Prior to installing the SLC product the area around the lateral sealing surface in both the main and lateral shall be inspected. Waste product build-up, hard scale, roots, lateral cutting debris or resin slugs must be removed using high pressure water jetting or in-line cutters.
2. Break-in connection and /or lateral pipe protruding into the mains shall be ground back to no more than a 1/8-inch protrusion into the mainline.
3. Built-up deposits on the main and lateral pipe walls shall be removed. The removal shall reach at least one foot beyond the SLC product to allow the bladder to inflate tightly against the pipe walls ensuring a smooth transition from SLC product to the existing pipe wall.
4. In relined pipes the lateral must be opened 95 percent or more and edges finished without “teeth”. Over-cuts shall not exceed one inch beyond the internal diameter of the lateral.
5. The contractor shall be responsible, if needed, for bypassing of sewage during the installation of the SLC product. In cases where the temporary backup of sewage is accepted as a replacement for bypassing, the contractor is responsible for all damage caused by the backup.
6. The lateral seal installation contractor is not responsible for the overall cleaning of the main or lateral lines prior to seal installation unless specified in the contract.

6.0 SLC Product Installation

1. The resin impregnated SLC product shall be loaded on the applicator apparatus, attached to a robotic manipulator devise and positioned in the mainline pipe at the service connection that is to be rehabilitated. The robotic devise together with a television camera will be used to align the

SLC repair product with the service connection opening. Air pressure, supplied to the applicator through an air hose, shall be used to insert the resin impregnated connection repair product into the lateral pipe. The inserted product will then be inspected using a TV camera to confirm the SLC product is correctly positioned and/or centered in the lateral opening prior to curing. (This TV inspection step is necessary to minimize the reworking or dig-up of incorrectly deployed SLC product) The insertion pressure will be adjusted to fully deploy the SLC product into the lateral connection and hold the SLC product tight to the main and lateral pipe walls.

2. The pressure apparatus shall include a bladder of sufficient length in both the main and lateral lines such that the inflated bladder extends beyond the ends of both the lateral tube and main line brim segments of the SLC product pressing the end edges flat against the internal pipe wall thus forming a smooth transition from SLC product to pipe diameters without a step, ridge or gap between the SLC product and the inner diameters of the lateral and mainline pipes.

3. After insertion is completed, recommended pressure must be maintained on the impregnated SLC product for the duration of the UV light curing process.

4. The packer is then deflated, removed from connection and returned to the manhole to repeat the cycle.

5. The finished SLC product shall be free of dry spots, lifts and delamination. The installed SLC product should not inhibit the post installation video inspection, using a closed circuit television camera, of the mainline and service lateral pipes or future pipe cleaning operations.

6. After the work is completed the contractor will provide the customer with an electronic picture and recorded data identifying the location and showing the completed work and restored condition of all the rehabilitated SLCs.

7. During the warranty period any defects with the SLC that affect the performance or cleaning of the lateral connection shall be repaired at the contractor’s expense in a manner acceptable to the customer.

7.0 Deviations

1. Contracts, that include both the relining of the main line and the installation of SLC seal product, require the main line relining contractor identify (size and location), video document and notify the customer per para.7.2 which lateral connections are deemed unfit for the SLC product.

Where the contract is only for installing the SLC product, the installation contractor shall inform the customer of service laterals which cannot be installed per para. 7.2.

2. Service laterals in which a SLC product cannot be installed will be identified, documented, video recorded, and the owner's representative will be informed of the conditions encountered. The contractor will not attempt to install a SLC product in these connections unless directed by the customer's representative.

8.0 Payment Items

The following are work item prices for the job;

1. Removal of roots and soft deposits inside the lateral pipe for a distance of 2 feet up the lateral from the mainline connection. $_____ per lateral
2. Lateral connection preparation including rounding or removing sharp or pointed cutout edges in a relined or break-in lateral opening. $_____ per lateral
3. Removal of protruding lateral pipe tap materials down to within 1/8 inch of mainline sewer wall. Clay and plastic lateral material $_____ per tap
   Concrete lateral material $_____ per tap
   Steel and cast iron material $_____per tap
4. Installation of Top Seal lateral insert per Top Seal installed and accepted, for 8, 10, 12,15,18 and 21 inch mains with 4 or 6 inch lateral connection $_____per Top Seal. Larger mains and special laterals will be quoted as separate priced line items.
5. Mobilization charge. $_____
6. Waiting days outside control of Top Seal installer $_____ per day
7. Short liners installed using Top Seal fiberglass and UV light cured resin system. $_____ per short liner installed.

9.0 Job Site Conditions

The contractor acknowledges that he has reviewed the job site conditions and the videotapes or pictures of the laterals to be rehabilitated using Top Seal inserts. Any exceptions, qualifications or clarifications the contractor has should be included in a bid submittal cover letter. If at a later date during the rehabilitation of the connections it becomes questionable if a SLC can be rehabilitated, then the contractor will inform the customer's representative and a decision as to install or not install a SLC product will be made by the customer's representative.