

SECTION 336090

GROUTING LATERAL CONNECTIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to test, grout and retest all sewer services. Service connection cleaning, testing and grouting shall be as described in this Section. All equipment shall enter the service connections from within the main sewer.
- B. The annular space between host pipe and liner as well as the first joint within 18 inches of the service connection point shall be sealed with chemical grout specified in this Section.

1.2 QUALITY ASSURANCE

- A. Sealing shall be performed by a crew under the direct supervision of a superintendent who has a minimum of two years documented experience in the sealing procedures as specified herein and as considered standard in the sewer rehabilitation industry. Submit documentation of this experience with references for approval prior to the start of work.

PART 2 - PRODUCTS

2.1 DESCRIPTION OF WORK

- A. Clean (including roots, etc.), grout and test each service connection as required. Furnish and use such equipment as is necessary to conduct all of the work specified in this Section (except protruding taps and broken pipe replacement) from inside each service connection. Access to each service connection shall be from within the main sewer from the nearest sewer manhole. No access allowed from private properties.

2.2 SEALING MATERIALS

- A. General

1. Mixing, handling, and application of chemical sealing materials shall be in strict accordance with the manufacturer's recommendations.

2. While being injected, the chemical sealant must be able to react/perform in the presence of water.
3. The cured sealing material must prevent the passage of water through the pipe joint and the annular space to a distance of 18 inches into the lateral. The sealing material must withstand submergence in water without degradation, remain flexible after curing, and must be able to withstand freeze/thaw and wet/dry cycles without adversely affecting the seal.
4. The cured sealant must be chemically stable and resistant to acids, alkalis and organics normally found in sewage, and must not be biodegradable.
5. Residual sealing materials must be easily removable from the sewer line to prevent reduction or blockage of sewage flow.
6. Handling, formulation and storage of the sealing gel compound shall be in strict conformance with the manufacturer's recommendations. The uncured gel shall be delivered to the site in unopened containers, with the date of manufacture clearly indicated. No uncured gel manufactured more than six months prior to the date of application shall be utilized. Any uncured gel compound determined to be more than six months old shall be immediately removed from the site. Once a container of uncured gel has been opened it shall be used as soon as practically possible. If the container of gel is not used within 24 hours of being opened, ensure that the gel has not been contaminated. Any contaminated gel shall be removed from the site and disposed of.

B. Acrylic base gel chemical sealing material shall have the following characteristics:

1. A minimum of 10% acrylic base material by weight in the total sealant mix. A higher concentration (%) of acrylic base material may be used to increase strength of set during injection.
2. The ability to tolerate some dilution and react in moving water during injection.
3. A viscosity of approximately two (2) centipoise, which can be increased with additives.
4. A constant viscosity during the reaction period.
5. A controlled reaction time from five (5) seconds to six (6) hours.

6. The ability to increase mix viscosity, density, and gel strength by the use of additives.
 7. Acrylic base gel chemical sealing material shall be Avanti AV-118 or equal.
- C. Urethane base gel chemical sealing material shall have the following characteristics:
1. One part urethane prepolymer thoroughly mixes with between five (5) and ten (10) parts of water weight. The recommended mix ratio is one part urethane prepolymer to eight (8) parts of water (11% prepolymer).
 2. A liquid prepolymer having a solids content of 77% to 83%, specific gravity of 1.04 (8.65 lbs./gal.) and a flash point of 20 degrees F.
 3. A liquid prepolymer having a viscosity of 600 to 1200 centipoise at 70 degrees F that can be pumped through 500 feet of hose with a 1000 psi head at a flow rate of one (1) ounce per second.
 4. Water used to react the prepolymer shall have a pH between 5 and 9.
 5. A cure time of 80 seconds at 40 degrees F, 55 seconds at 60 degrees F, and 30 seconds at 80 degrees F, when one (1) part prepolymer is reacted with eight (8) parts of water only. Cure time shall be adjustable by the use of additives to the reaction water.
- D. Icoset shall be added to all chemical grout installed under this contract. The application shall be in accordance with the manufacturer's recommendations.
- E. Chemical grouts shall contain no acrylamide.
- F. A representative of the grout manufacturer shall be on site for one day at the start of the project to assure that all requirements are met.

PART 3 – EXECUTION

3.1 GENERAL

- A. Prior to sealing the connection, the Contractor shall thoroughly clean the interior of the lateral of debris and foreign matter. Cleaning is to be adequate for seating a lateral packer in the mainline and inserting and seating an inflatable sealing bladder in the lateral. The lateral shall be cleaned of obstructions and roots on the length to be sealed.
- B. The Contractor shall be prepared to bypass pump the sewage flow as

part of his operation where the sealing procedures require such diversion. Where the sealing equipment is designed to allow the passage of flow, the flow shall be limited to that as recommended by the equipment manufacturer.

- C. The service lateral testing and grouting shall be accomplished by first testing the service lateral joints followed by grouting of all service laterals. Each service lateral, which has been sealed, shall be retested to ensure the effectiveness of the work. Any service laterals, which fail, shall be resealed and retested until it passes the test before moving on to the next service lateral. Testing of joints which are visibly leaking infiltration will not be required.
- D. The equipment shall consist of a closed-circuit television (CCTV) system and a sealing packer device along with the necessary chemical sealant containers, pumps, controls, regulators, valves, hoses, etc. The sealing packer shall be so constructed that it can straddle four (4") to six (6") inch diameter service connections in eight (8") inch to ten (10")-inch main sewer lines. When properly positioned and with the end elements inflated, an inflatable inversion sealing tube shall be extruded up the service lateral thereby isolating a portion of the service lateral containing one or more pipe joints for testing or sealing. The pumping unit, metering equipment, and the packer device shall be designed so that proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.
- E. Testing shall be conducted by properly positioning the packer device in the main sewer line with the inversion tube extruded into the service lateral and performing an air test. This test shall be accomplished by applying a positive air pressure equal to one half pound per ft (1/2 lb/ft) of main sewer line depth into the created void area between the packer device and the extended end of the inversion tube, but not to exceed ten (10 psi) pounds per square inch. After the required test pressure has been displayed on the test meter above ground, the application of the air pressure shall be stopped and a 20 second test period shall commence. The test pressure meter shall be observed during the 20-second test period and should the pressure drop exceed 50 percent of the test pressure, the service lateral shall have failed the test and shall be sealed. Should it not be possible to develop the required air test pressure, then the service lateral shall also have failed the test and shall be sealed.
- F. All lateral service lines shall be sealed internally by the use of the packer device. Either immediately following the air test or after the packer device has been properly positioned in the main line with the inversion tube extended into the service lateral, the lateral shall be sealed by the injection of the chemical sealant. The chemical sealant shall be injected through the packer device into the annular space between the inversion

tube and the service lateral. The injection of chemical sealant shall continue until the chemical fluid back pressure is sufficient to ensure the complete sealing of all the defects along the length of the inversion tube. However, when the effective quantity of grout pumped exceeds one (1) gallon per foot of sealing distance plus three (3) gallons it will be suspected that there is unseen voids outside of the pipe and the applicator shall try to build grout dams by repetitively pumping and curing the grout until the area is dammed off and the refusal pressure is met. The amount of chemical per pump stroke shall be measured from time to time and then the number of pump strokes can be used to measure the amount of chemical delivered to each lateral

- G. Upon completion of the sealing operation, the service lateral shall be retested to ensure the effectiveness of the work. The retesting shall be accomplished using the same procedures previously described. Should the service lateral fail to pass the test, it shall be resealed and retested until the test requirements can be met.
- H. After the service lateral has been successfully sealed and retested the following procedures shall be performed to ensure that the sealing operation did not block the service lateral.
 - 1. The inversion tube shall be removed from the lateral.
 - 2. The packer and elements shall remain inflated or be reinflated.
 - 3. Air shall then be introduced into the service lateral line.
- I. If during the injection of the air, no pressure build up is recorded on the pressure gauge, the service lateral shall be considered free flowing. However, should air pressure build up indicating a partial or total blockage of the lateral it shall then be cleaned to restore proper flow.
- J. Residual sealing materials that extend into the pipe, reduce the pipe diameter, or restrict the flow shall be removed from the joint. The sealed joints shall be reasonably flush with the existing pipe surface. It is the responsibility of the Contractor to verify that the sealing of laterals did not restrain the flow and to remove any grout which would restrain flow. Lateral flow shall be verified after the sealing of each lateral. With the lateral being viewed with the pan and tilt camera, an attempt is made to obtain a water flush by the occupant. If the flow seems abnormal, it is assumed that the building sewer is blocked with grout and must be cleared
- K. Extreme caution shall be utilized during the testing and sealing operations in order to avoid damaging the existing sewer. If any damage occurs, it shall be repaired to the satisfaction of the Engineer or City with

no additional cost to the City.

- L. After the work is completed, the Contractor shall perform a CCTV inspection of each lateral connection sealed and provide the City with a tape and written log and verification of each sealed connection test, retest and acceptance. The videos shall be provided on a portable hard drive device to be retained by the City.

END OF SECTION