SECTION 817

CHEMICAL GROUTING

I. GENERAL

1.1 DESCRIPTION OF WORK

A. The Work specified in this Section includes all labor, materials, accessories, equipment and tools necessary for chemical grouting for sealing and air testing sanitary sewer pipe joints.

B. Products shall conform to Section 200.

C. The Contractor shall perform all required permanent landscape restoration of disturbed areas on private property and within locality or VDOT right-of-way upon completion of the grouting to the satisfaction of the Owner.

1.2 SUBMITTALS

Submittals shall be made by the Contractor in accordance with the procedures set forth in Section 105 - Control of Work, and as described below.

A. Chemical Joint Sealing Materials

B. Chemical Root Inhibitor

II. EXECUTION

2.1 GENERAL

A. Joint Testing

See Section 816 - Sewer Pipe Joint Testing

B. Leak Sealing

Sources, or possible sources, of infiltration within the sewer system, are to be sealed to eliminate infiltration. Such sources are to be identified by visual confirmation of an active leak (documented on CD or DVD), or by failure of a joint test. Grouting shall provide a watertight joint.

The application of the sealing grout within the pipe shall be by means of remote-controlled equipment designed to be positioned at the specific joint or crack to be sealed and to apply the grout under sufficient pressure for the grout to pass through the opening and fill voids outside the pipe as well as the opening in the pipe wall. The method of sealing used shall not damage the pipe or change pipe alignment, and the original cross sectional area shall not be permanently reduced or changed.

C. Void pressure data shall be transmitted electrically and without the use of the test medium or hoses. All test monitoring shall be above ground and in a location to allow for simultaneous continued observation of the television monitor and test monitoring equipment by the Contractor. The Owner shall witness the testing operation.

D. Sewer line joint testing shall be accomplished before and after the grouting operation in accordance with Section 816 - Sewer Pipe Joint Testing.

2.2 JOINT SEALING EQUIPMENT

The basic equipment shall consist of a closed circuit television system, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipe. The packer shall be a cylindrical case of a size less than pipe size, with the cables at either end used to pull it through the line. The packer device shall be constructed in such a manner as to allow a restricted amount of sewage to flow at all times. Generally, the equipment shall be capable of performing the specified operations in lines where flows do not exceed the maximum line flows as specified in Section 812 - Bypass Pumping. When the packer is inflated, two widely spaced annular bladders shall be formed, each having an elongated shape and producing an annular void around the center portion of the packer.

2.3 JOINT SEALING PROCEDURE

A. In the preparation and application of the sealing grout, the recommendations of the manufacturer of the grout materials shall be followed.

B. Each time a new batch of grout chemicals is mixed, the gel time should be checked. A small quantity of the chemicals should be taken from the ends of the packer hose and mixed in a paper cup and witnessed by the Owner. The gel time should be within the range specified by the manufacturer. If the grout does not gel per the manufacturer's recommendations, the Contractor shall discard the batch and create a new batch at the Contractor's expense.

C. Barrel Test: A test cylinder shall be constructed by the Contractor to simulate the barrel of a sewer pipe, so the grouting equipment can be tested above ground. This allows the test cylinder to be positioned where the pressure reading on both the test cylinder gauge and the void pressure monitoring gauge can be continuously observed together during the test. The reading on both gauges should be the same throughout the test. This test will also verify whether or not the packer is capable of holding adequate pressure under ideal conditions

During the test, the packer sleeves shall be inflated to the pressure recommended by the manufacturer. Then, the test medium (either air or water) is to be injected into the packer void until the maximum pressure used to test the actual pipe joints is reached. This pressure is to be held for at least one minute to verify that the packer will hold pressure. After one minute the shutoff valve should be opened to simulate a leak. Both gauges should quickly return to zero. This test shall be repeated at least three times in the presence of an Owner's representative. No actual test/seal operations will be performed until the equipment has been demonstrated to pass this test.

D. Joint sealing shall be accomplished by forcing chemical sealing materials into or through infiltration points by a system of pumps, hoses, and sealing packers. Jetting or driving pipes from the surface that could damage or cause undermining to the pipe lines, will not be allowed.

Excavating the pipe, which would disrupt traffic, undermine adjacent utilities and structures, will not be allowed. The packer shall be positioned over the area of infiltration by means of a metering device and the closed circuit television in the line. It is important that the procedure used by the Contractor for positioning the packer be accurate to avoid over-pulling the packer and thus not effectively sealing the point of infiltration. The packer sleeves shall then be expanded using precisely controlled pressures. The pneumatically expanded sleeve or elements shall seal against the inside periphery of the pipe to form a void area at the point of infiltration, now completely isolated from the remainder of the pipe line. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures which are in excess of groundwater pressures. The pumping, metering, and packer device shall be integrated so that the proportions and quantities of materials can be regulated in accordance with the type and size of the leak being seated.

E. Upon completing the sealing of each individual joint, the packer shall be deflated; with the void pressure meter reading zero pressure, then reinflated and tested in accordance with Section 816 - Sewer Pipe Joint Testing. Should the void pressure meter not read zero, the Contractor shall clean his equipment of residual grout material or make the necessary equipment repairs to provide for an accurate void pressure reading. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive payment.

F. All testing shall be performed by the Contractor in the presence of the Owner. It shall be the responsibility of the Contractor to completely seal every leak authorized for sealing to the extent determined by the Owner. If, in the Owner's opinion, it is not necessary to continue with a particular leak, the crew shall move to the next joint or leak. The Contractor shall remove any small excess sealing grout inside the sewer line. Contractor shall operate his equipment with care and shall be responsible for any damage to the sewer system or other facilities caused by his operations, and shall repair such damage at his expense and without delay as instructed by the Owner.

2.4 CLEANING

Cleaning as indicated in Section 810 - Sewer Line Cleaning, is required for all grouted lines.

2.5 TELEVISION SURVEY

Television survey, as indicated in Section 811 - Television Inspection, is required for all grouted lines.

2.6 WARRANTY PERIOD

At the end of eleven months, 5% of the joints grouted will be re-tested, by direction of the Owner. If 15% of the joints re-tested fail, the entire project will be re-tested and sealed at the Contractor's expense. Cost of the re-testing shall be included in the original joint sealing unit cost (at no additional cost to the Owner).

III. MEASUREMENT FOR PAYMENT

A. Measurement for payment for grouting and verification testing of pipe will be based on the volume (in gallons) of grout pumped per joint in accordance with the Contract Documents and Section 817.

B. Unit prices will constitute full payment for all setups, testing, maintenance, transportation, labor, work, materials or any other costs associated with chemical grouting of the sewer joints. No additional payment shall be made for verification testing of any joints. This cost shall be included in the sealing of joints.

End of Section