

SECTION 330142 – REHABILITATION OF SEWER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. This section includes the furnishing and installation of all major items listed below:
 - 1. Chemical root treatment.
 - 2. Sewer joint testing.
 - 3. Sewer joint sealing.
 - 4. Preparatory cleaning.

1.3 SUBMITTALS

- A. Manufacturer's Literature: Submit Product Data information for materials to be used on this Project.
- B. Root Treatment, Joint Testing and Joint Sealing:
 - 1. Equipment and Procedure: Engineer's approval.
 - 2. Manufacturer's recommended root treatment and joint sealing methods.
- C. Joint Testing and Grouting Records:
 - 1. Manhole section and item number.
 - 2. Location of joint tested.
 - 3. Testing pressure.
 - 4. Testing results.
 - 5. Failed Joints:
 - a. Location of joint sealed.
 - b. Amount of material required to seal joint.
 - c. Number of injections required to seal joint.
 - d. Test verification results.

1.4 QUALITY ASSURANCE

- A. General: Acceptability of materials and performance shall be determined by Engineer.
- B. Materials: Certification by manufacturer that product meets these Specifications and is approved by EPA.

C. Equipment:

1. Two Part Control Test:

a. Test Cylinder Above Ground: Prior to start of joint testing:

- 1) Construct a test cylinder in which two known leak sizes can be simulated.
- 2) Check equipment verses both known leak sizes. Pressure reading at sealing unit shall be the same as pressure reading at test cell.
- 3) Failure: Equipment shall be repaired or replaced prior to proceeding with joint testing.
- 4) Retest: Upon repair of equipment or if at any time during joint testing that Engineer suspects testing equipment is not functioning properly.

b. Each Sewer Section: Prior to start of joint testing:

- 1) Position equipment on a sound section of sewer pipe between joints.
- 2) Test barrel according to joint testing requirements in Article 3.2.
- 3) Failure: Notify Engineer. Wait for Engineer's modifications before proceeding.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Root control chemicals and chemical grout shall be approved for use by EPA.

2.2 ROOT TREATMENT CHEMICALS

- A. Vaporooter Plus, Sanafoam Vaporooter or equal.

2.3 CHEMICAL GROUT MATERIAL

A. General:

1. Minimum Performance Standards:

- a. Impervious to water penetration.
- b. Flexible after final curing.
- c. Withstand freeze-thaw and wet-dry cycles without change.
- d. Chemically stable and resistant to concentrations of acids, alkalis and organics found in normal sewage.

2. Minimum Application Standards:

- a. Component materials packaged for ease in transportation, field storage and mixing.
- b. Catalyzation shall take place at point of injection into joint.
- c. Able to react in moving water.
- d. Capable of being pumped 500 feet.
- e. Residual material must be removable from sewer to ensure no restriction or blocking of normal sewer flows.

B. Elastomeric Grout:

1. Urethane Foam: 3M Grouting Compound CR-202 or equal.
2. Gel: 3M Sealing Gel CR-250 or equal.

C. Acrylamide Grout: AV-100 (Avanti International); or equal.

PART 3 - EXECUTION

3.1 CHEMICAL ROOT TREATMENT

A. General:

1. Chemical root treatment shall be performed at least 4 weeks prior to cleaning of sewers.
2. Treatment solution shall be of sufficient quantity to fill entire sewer section. Contractor shall investigate possibility of service leads backing up prior to treatment.
3. Damaged Vegetation: Contractor's responsibility.
4. In accordance with approved manufacturer's recommendations.

B. Minimum Solution Concentration:

1. Liquid: 1%
2. Foam: 5%

C. Minimum Contact Time:

1. Liquid: 1 hour
2. Foam: 1 hour

D. Maximum Length of Sewer per Batch of Solution:

1. Liquid: 1600 feet

2. Foam: One sewer section, approximately 400 feet.

3.2 JOINT TESTING

A. General:

1. Sewers shall be cleaned and free of debris and roots prior to testing:
 - a. Testing will not be required on cracked or broken pipe, service leads, sections of pipe between joints and visibly leaking joints.
 - b. Joints with leakage rates of less than 1/8 gallon per minute will not be sealed.

B. Test Medium:

1. Water
 - a. Equivalent liquid not exceeding 2 centipoises under pressure.

C. Test Pressure:

1. 1/2 psi per vertical foot of pipe depth, measured from ground surface to pipe invert.
2. Shall not exceed 10 psi.

D. Test Procedure:

1. Straddle joint with testing device.
2. Expand ends of testing device to isolate joint.
3. Introduce test medium until a pressure not exceeding 2 pounds greater than required test pressure is reached.
4. Regulate test medium to a flow rate where required test pressure is measured.
5. Joint Failure:
 - a. Flow rate of 1 gallon per minute or greater is reached without developing required test pressure.
 - b. Flow rate of 1/8 gallon per minute or greater at the required test pressure.
 - c. Joint shall be sealed according to Article 3.3.

3.3 JOINT SEALING

A. General:

1. Sealing shall take place on the following:

- a. Sewer joints with tested leakage rates exceeding 1/8 gallon per minute or visibly leaking joints.
 - b. Offset joints where proper seating of packer can be obtained.
 - c. Cracks around circumference of the sewer pipe.
2. Longitudinally cracked or broken sewer pipe shall not be sealed unless indicated on Drawings.

B. Sealing Procedure:

1. Positioning Packer: Metering device and closed circuit television camera in the line.
2. Isolate point of infiltration by expanding packer sleeves.
3. Pump sealant materials to point of infiltration at controlled pressure in excess of groundwater pressure.
4. Pumping, metering and packer device shall be integrated so that proportions and quantities of materials can be regulated in accordance with the type and size of leak.

C. Joint Sealing Verification:

1. After sealing joint, deflate packer and move off sealed joint to allow for observation by television camera.
 - a. Joint Free of Residual Grout Material: Proceed with verification test.
 - b. Residual Grout Material on Joint: Wipe clean with packer.
2. Move packer back over joint, void pressure meter reading shall be zero with packer deflated. If void pressure meter reading is not zero, Contractor shall clean equipment of residual grout material or make necessary equipment repairs to provide an accurate void pressure reading.
3. Reinflate packer and test joint according to Article 3.2.
4. Failed Joints: Reseal and retest until joint passes test.

D. Residual Grout Material:

1. Sealed joints shall be left reasonably flush with existing pipe surface.
2. Accumulation of Residual Grout Material: Reclean entire line section and remove at first downstream manhole.

3.4 TESTING AND INSPECTION

A. Observation: By Engineer.

- B. Notification:
 - 1. Joint Testing and Sealing Inspection: Coordinate in accordance with Division 01 Section "General Requirements – Administrative Requirements."
 - 2. Equipment Testing: Contractor arrange with Engineer prior to joint testing and sealing.
- C. Equipment and Manpower: Contractor provide everything required for testing.
- D. Guarantee Test:
 - 1. Prior to expiration of one year guarantee period.
 - 2. Joint testing according to Article 3.2 on those joints repaired by Contractor.
 - 3. Line sections to be selected by Engineer.
 - a. Test shall be made on joints which have been grouted in section selected.
 - b. Failure of Between 10% and 25% of Repaired Joints: Additional equivalent line segment shall be tested at Contractor's expense. Additional testing shall continue until less than 10% failure rate is achieved in a pipe section.
 - c. Failure of More Than 25% of Repaired Joints:
 - 1) Increase crews to pursue testing at same rate as original work, at Contractor's expense.
 - 2) Reimburse Owner for actual cost of Engineer's inspection for guarantee testing.
 - 4. Failed Joints: Regouted according to Article 3.3 at Contractor's expense.

END OF SECTION 330142