

- 411.3.1 The Contractor shall be thoroughly trained and familiar with handling, mixing, and placing all material. All materials shall be used in strict accordance with manufacturer's recommendations and with the provisions of all OSHA and other safety regulations. Field conditions must be appropriate for and compatible with component mixing for the linings and sealants. All materials shall conform to and be installed according to manufacturer's recommendations and specifications. Contractor shall supply all necessary materials, including storage and transportation to the satisfaction of Engineer. Materials damaged by Contractor shall be replaced at no additional cost to the City. Existing manhole frames and covers being replaced shall become the property of City.
- 411.3.2 **CHEMICAL GROUTING SYSTEMS:** Where the pressurized injection of chemical grout is required, the material supplied shall be a urethane gel or a urethane foam the material supplied shall be; Avanti AV-202 Multigrout (gel/foam) for sealing pre-cast barrel joints, Avanti AV-275 Soilgrout (foam) with AV-276 Soilcat for sealing brick and concrete masonry (CMU) structures, and Avanti Av-290 Fast-Set (foam) for sealing pipe penetrations and pinholes, without exception with properties as follows:
- 411.3.3 General: Chemical sealing materials for use in manhole rehabilitation shall have the following properties and characteristics:
- A) While being injected, the chemical sealant must be able to react/perform in the presence of infiltrating water.
 - B) The cured sealant must be capable of withstanding submergence in water without degradation.
 - C) The cured sealant must prevent the passage of water through the manhole defect.
 - D) The cured sealant must be flexible as opposed to brittle or rigid.
 - E) In place, the cured sealant shall be able to withstand freeze/thaw and wet/dry cycles without adversely affecting the seal.
 - F) The cured sealant must not be biodegradable. Additives may be used to meet this requirement, without affecting long-term strength.
 - G) The cured sealant shall be chemically stable and resistant to concentrations of acids, alkalis, and organics found in normal sewage.
 - H) Packaging of component materials must be compatible with field storage and handling requirements. Packaging must provide for worker safety and minimize spillage during handling.
 - I) In the event that the chemical sealant may be harmful by passing through the unbroken skin, by inhalation of dust, vapor or mist, or by swallowing, the handling and mixing shall be performed with proper equipment and by personnel thoroughly

PART 411 – PIPELINE PRESSURE GROUTING

411.1 SEWER LINE CLEANING

411.1.1 **GENERAL.** All sludge, dirt, rocks, bricks, grease, roots, and other debris shall be cleaned from each section requiring grouting by one of the following appropriate methods:

- A) **Light Deposits.** If color television inspection reveals that only small deposits of debris are present within the segment, cleaning shall be accomplished by using high pressure water jetting equipment.
- B) **Heavy Deposits.** If color television inspection reveals that large deposits of debris or root growth are present within the segment, cleaning shall be accomplished by using bucket machines, high pressure water jetting equipment, scrapers, augers, and root cutters.
- C) **Roots.** Visible evidence of roots from the television inspection shall be noted by CONTRACTOR. All roots shall be mechanically and chemically removed prior to grouting. CONTRACTOR shall apply chemical root eradicant in a manner that will result in a root-free barrier around the outer perimeter of the pipe joint to be grouted. Root eradication plan shall be approved by ENGINEER.
- D) All debris from the cleaning operation shall be removed at the downstream manhole and disposed of at an approved landfill or dump site.
- E) Any damage to the sewer line or joints caused by cleaning equipment shall be repaired at no expense to City.

411.2 JOINT TESTING AND SEALING

411.2.1 **EQUIPMENT: Testing Equipment.** The basic equipment used shall consist of a color television camera, joint testing device and test monitoring equipment. The equipment shall be constructed in such a way as to provide means for introducing the test medium, under pressure, into the void area created by the expanded ends of the joint-testing device and means for continuously measuring the actual static pressure of the test medium at and within the void area only.

411.2.2 Void pressure data shall be transmitted electrically from the void to the monitoring equipment, i.e. via a TV picture of a pressure transducer located at the void. A mixing manifold packer will be required.

411.2.3 All test monitoring shall be above ground and in a location to allow for simultaneous and continuous observation of the television monitor and test monitoring equipment by ENGINEER.

411.3 MATERIALS