

PART 1 GENERAL

1.1 SCOPE:

- A. The purpose of this Specification is to describe work related to inspection and elimination of ground water infiltration, via chemical grouting, into the sanitary sewer system from the service connection.
- B. Grout injection shall conform to ASTM F245, current version, unless modified by these specifications.
- C. This Bid Item shall include all supervision, labor, equipment and materials to perform all work necessary to clean, inspect (with closed circuit television), test lateral connections and seal defective service connections in the designated sanitary sewer service lines at locations shown on the drawings.
- D. Qualified and experienced personnel utilizing equipment, in good working order, shall accomplish work and materials that meet the requirements hereinafter specified.
- E. The elimination of ground water infiltration as used in this Specification shall mean the elimination of infiltration of soil and water indicated by inspection via closed circuit television.
- F. A sanitary sewer service connection line shall be the junction of the service connection and the sewer main line.

PART 2 PRODUCTS

2.1 EQUIPMENT:

- A. **LOW PRESSURE HYDRALIC CLEANING EQUIPMENT:** Two types of low pressure cleaning equipment shall be acceptable.
 - 1. The movable dam type: Moveable dam type shall be of equal diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to ensure the total removal of debris and grease.
 - 2. The inflatable element or balling type: Balling type equipment shall be inflated so that a tight contact is made with the pipe wall to restrict the movement of water around the ball and to assure the removal of all debris from the invert of the pipe as well as grease from the pipe wall.
- B. **HIGH-VELOCITY HYRDAULIC CLEANING EQUIPMENT:** Equipment shall be fitted with a minimum of 500-LF of high-pressure hose. High-pressure hose shall have a maximum ID of 1-inch with a selection of two or more cleaning nozzles. Nozzles shall be capable of producing a scouring action from 15⁰ to 45⁰ in all line sizes to be cleaned. Minimum working capacity of the cleaning system shall be 1,000-PSI. System shall also be equipped with a high-velocity gun for washing and scouring manhole walls and floors.

- C. MECHANICAL CLEANING EQUIPMENT: Bucket machines shall be operated in pairs with each machine powered by an engine with enough horsepower to ensure sufficient pulling power. Power rodding machines shall be of a continuous rod-type capable of holding a minimum of 500-LF of rod. The machine shall have a positive rod drive to produce 2,000 pounds of rod pull. Machine shall be outfitted for safe operation and in accordance with current regulations and laws.

2.2 SEALING MATERIALS:

- A. Sealing materials shall be a chemical grout and catalyst system conforming to Avanti® AV-100, or approved equal, and have the ability to accept suspended additives for increased strength. Chemical grout shall further have the following properties;
1. A controllable reaction time, from ten seconds to one hour at temperatures ranging from ambient to freezing.
 2. Shall be a true solution with a viscosity of 1.2 centipoises (a 10% solution), which remains constant until gelatinization occurs.
 3. Shall have the ability to tolerate ground water dilution and react in moving water.
 4. Final reaction shall produce a continuous, irreversible, impermeable stiff gel, which is not rigid or brittle.
 5. Documented, satisfactory performance in similar usage within this region, in the last 3 years, shall be provided for approval prior to use on the project.
 6. Provide the Engineer with a MSDS of chemical grout in the submittal process prior to moving on site and keep a copy with the installation work crew at all times.
 7. Base solution shall include Avanti® AC-50W Root Inhibitor and mixed in proportion specified by the manufacturer.
- B. The Contractor shall supply a representative sample of the grouting material, intended for use, for testing to the Engineer at his request. At the Engineer's request the Contractor shall gather the samples suitable for shipment to a certified laboratory for analysis. Grout samples shall include a certified report of the percentage and amount by weight of AV-100 (or approved equal) and any other additives that have been specified for this project.
- C. Whenever the Bid Schedule request a unit price for Additive Alternate for suspended solids it shall be as follows; base solution shall be varied by addition of a latex emulsion, such as Avanti® AV-257, or approved equal. Mix design to include the additive alternate shall be as recommended by the Manufacturer. The effect of additives shall be determined by testing prior to approval for field application. Acceptance of this Additive Alternate shall be at the discretion of the Owner.

PART 3 EXECUTION

3.1 GENERAL:

- A. Contractor shall ensure all work can be accomplished from above ground and ensure traffic control is adequate to ensure safety of the public and work crews.
- B. All preparations shall be completed to the Engineer's satisfaction prior to proceeding with grout injection.
- C. Contractor shall ensure that no other work is simultaneously in progress upstream or downstream of his operations which may adversely affect the successful completion of this work.

3.2 SCHEDULING:

- A. Property Owner's of service laterals to be grout injected shall be notified in writing, 48-hours in advance, of any service interruption. Written notice shall be posted on the main entrance door by a door hanger. The notice shall include the following items:
 - 1. Day and date of service interruption.
 - 2. Estimated time duration, in hours, that service will be shut off.
 - 3. Resident is prohibited from discharging all wastewater during the Noticed shutoff.
- B. A written record of these notifications shall be maintained by the Contractor and submitted to the Engineer prior to service shut off.

3.3 SEWER CLEANING AND CLEARING:

- A. Sewer shall be cleared of all obstructions such as solids, roots, grease and like debris. "Clean" as used in this Specification shall be defined as the removal of sufficient materials to render the sewer line to 95% of its original capacity and allow passage of inspection, testing and sealing equipment.
- B. Contractor shall remove all accumulations of debris (see 3.3(A)) to ensure that cracks and breaks can be observed during TV inspection and sealing equipment can successfully isolate joints during testing and/or sealing procedures.
- D. Contractor shall ensure cleaning processes do not harm connected system and adjoining structures and property.
- E. All designated sewer manhole sections shall be cleaned using mechanically powered, hydraulic propelled or high-velocity sewer cleaning equipment as specified. Selection of equipment used shall be based on the condition of the lines at the time the work commences. Equipment and methods selected for cleaning shall be capable of removing all dirt, grease, rocks and other deleterious materials from the sewer lines and manholes.

- F. When lines to be cleaned show evidence of being more than half filled with solids, bucket machines and rodding machines shall be utilized to remove the major portion of the debris before hydraulic equipment is used to complete cleaning operations. Contractor shall also be required to provide and utilize bucket machines and rodding machines in instances to facilitate the removal of roots and heavy grease.
- G. Whenever bucket machines are used, the bucketing process shall be in one manhole section at a time. A bucket of proper size shall be placed in the downstream manhole and pulled toward the upstream manhole until the entire manhole section has been cleaned. Upon completion of the bucketing operation, hydraulically propelled or high-velocity sewer cleaning equipment shall be employed to ensure that all sand, grease and other fine debris materials have been removed.
- H. Whenever hydraulically propelled cleaning tools which depend on water pressure to provide cleaning force and any tool which retards the flow of water in the sewer system are used, the Contractor shall ensure that water pressure created does not cause any damage or flooding to the public or private property being serviced within the system.
- I. No City fire hydrant shall be used without the express permission of the Engineer and only after city crews have installed proper backflow prevention equipment.
- J. All solids or semisolids resulting from the cleaning operation shall be removed from the work site and disposed of in a manner and at a site approved by the Engineer.
- K. The Engineer upon completion and review of the TV inspection shall do final acceptance of the cleaning operation.

3.4 LATERAL SEALING:

- A. A camera shall be used to position the lateral injection packer at the lateral connection.
- B. Bladder plugs shall extend into the service connection for grouting and testing.
- C. Grout injection of cracks shall not overflow to the point such that less than 95% of the laterals original capacity is reduced.
- D. No excess chemical grout shall be disposed of nor allowed in the sanitary sewer system. Excesses shall be disposed of in accordance with current regulations and laws and be approved by the Engineer.

3.5 MEASUREMENT AND PAYMENT:

- A. Payment shall be made per each lateral and shall include all work; grouting, cleaning, inspection and testing for the line item Service Lateral Sealing. Grout with all specified additives will be bid as add alternate bid item. Alternate may or may not be awarded.
- B. All costs for collection and analysis of test samples shall be borne by the Contractor and shall be considered incidental to the other items of work in this project.

- C. When requested by the Bid Proposal as a line item the Additive Alternate will be paid at the unit price indicated in the Contractor's Proposal. Award of the Additive Alternate will be at the discretion of the Owner.

PART 4 TESTING

4.1 LATERAL TESTING:

- A. Each lateral connection shall be isolated by inflated bladders, expanded securely against pipe walls in the mainline. The service line bladder shall extend into the service lateral a minimum of 1-FT beyond the repair.
- B. Grout injection repair shall then be tested as follows;
1. Apply 0.5 psig air pressure per vertical foot of pipe depth and hold for the following lateral service pipe sizes;

4 inch	2 minutes
6 inch	3 minutes
8 inch	4 minutes
10 inch	5 minutes

- C. Provide a VHS tape or DVD format to the Engineer of all repairs with distance, MH numbers and date clearly shown.

END OF SECTION