

ITEM 936

SMOKE TESTING, CLEANING, AND TELEVISION INSPECTION OF SANITARY GRAVITY SEWER LINES

936.1 General: Work covered by this Specification consists of furnishing all labor, materials, equipment, transportation, supervision, and performing all work necessary for smoke testing, cleaning, and closed-circuit television inspection of gravity sanitary sewers and manholes as specified in preceding Special Provision or as indicated on the Plans. Do not smoke test until a minimum of three days has elapsed after a rain. "Clean" as used in this Specification, means removal of all sand, grease, roots, and other solid or semi-solid materials from gravity sanitary sewer(s). "Manholes section," as used in this Specification, means length of sewer connecting two manholes or length of sewer connecting a manhole and a cleanout; also called "Sewer Segment." This item applies to all sewer line segments indicated on Plans to be rehabilitated, replaced, or to receive point repairs, or to be investigated for purposes of determining condition of sewers.

936.2 Smoke Testing Equipment and Procedures:

- A. Smoke Testing Blower: Portable with a minimum capacity of 1,200 cubic feet per minute (cfm). Equip with carrying handles, fiberglass manhole cover plate, underside rubber seal, and snap cover for depositing smoke bomb into manhole.
- B. Smoke Bombs: By chemical reaction generate white or gray colored smoke, which leaves no residue. Bombs to be nontoxic and nonexplosive. Provide bombs capable of producing 25,000 cubic feet of smoke in three minutes. In addition to the type mentioned above, Smoke No. 3C (5-7 minute, nonexplosive) as manufactured by Superior Signal Co., Inc., may be used.
- C. Other Testing Equipment: Provide sand bags, sewer plugs, or other suitable devices to block upstream and downstream manholes in order to isolate section(s) being tested.
- D. Smoke Testing Notification: Provide written notice to all area residences or other buildings that will be effected by the smoke testing 24 hours prior to proposed testing. Give ample notice to Police and Fire Departments of intent to smoke test and location of the sewer segment being tested.
- E. Smoke Testing Procedures: Smoke test all sewer segments scheduled for "Point Repair" immediately prior to making excavation for repair. Smoke test all sewer segments scheduled for "Sliplining or Pipebursting" after sealing polyethylene line in manholes and after all service line reconnections have been made, but prior to backfill.

1. Smoke Test for Point Repair Location: Situate smoke blower over a manhole so that two sewer segments may be tested, if needed, from one blower position. Smoke test crew to record on approved forms locations and severity of all smoke leaks, including smoke visibly observed out of roof vents, yard drains, storm sewer inlets, etc. If for any reason, such as stopped up sewer, sewer sag, etc., smoke does not travel completely through a given sewer segment, then after cleaning use a squeegee to remove all water from sags and then resmoke test sewer segment being investigated.

2. Smoke Test for Sliplined or Pipeburst Sewers: Smoke test taps and liner or line in one manhole section at a time in order to prevent having a large number of open excavations for service line reconnections and/or insertion pits. Isolate manhole section to be tested from adjacent sections to prevent smoke from migrating into sewer segments not being tested and to provide a concentration of smoke in sewer segment being tested. Introduce smoke into both upstream and downstream manholes. Monitor sewer segment for smoke leaks by checking service line reconnection and line or liner beginning at manhole where smoke is being introduced (either upstream or downstream as applicable), and moving toward other manhole. Note all leaks observed. Move smoke blower to manhole at other end of sewer segment being tested and repeat smoke testing procedures including monitoring for leaks.

936.3 Gravity Sanitary Sewer Cleaning:

- A. Equipment: Use truck-mounted high velocity cleaning equipment. Equip truck with a minimum of 500 feet of one-inch I.D. high pressure hose, 1,000 gallon water tank, auxiliary engines, pumps, hydraulic driven hose reel, two or more high velocity nozzles, and all other apparatus required for thorough cleaning of existing sanitary sewer lines. Provide nozzles with a capacity of 60 gals/min. at a working pressure of 950 to 1,000 psi. Nozzles to produce a scouring action from 15 degrees to 45 degrees in all sewer lines designated to be cleaned. Nozzles to also be capable of producing a long distance solid stream. Provide water tank constructed of such material, which will safely hold corrosive or caustic cleaning or sanitizing chemicals. Locate controls for the high velocity cleaning equipment so as to permit above ground operation.

- B. Cleaning Procedure: Cleaning equipment to traverse sewer line from upstream manhole or cleanout to downstream manhole; i.e., from higher elevation to lower elevation. Take such precaution as necessary to protect sewer lines and connecting service lines from damage. Utilize such procedures as required to prevent flooding of any public and/or private property. Provide suitable sand trap, weir, or dam in downstream manhole of section being cleaned so that dirt, sand, rocks, grease, sludge, and other solids or semi-solids are trapped. Passing material removed by cleaning operation from one manhole section to another downstream section is not permitted. Remove materials from downstream manhole of section being cleaned by mechanical or hand means and place in tank truck or trailer for transportation to disposal site. Tank truck or trailer to be water-tight with no visible leakage. After sewer segment has been cleaned, Contractor shall take necessary action to dewater sags, if they exist, before televising.
- C. Disposal of Material Removed by Cleaning: Dumping or spilling of sewage, solids, or other debris removed from sewer segment cleaned onto streets, into ditches, catch basins, storm sewers, or other sanitary sewers not permitted. Dispose of materials removed off-site at state licensed solid waste sanitary landfill. Transport must be by TCEQ licensed or permitted vehicle. Log of transportation and final disposal verification receipts shall be kept and given to OWNER.

936.4

Closed-Circuit Television Inspection:

- A. Equipment: Consist of self-contained, pan and tilt pipe inspection camera and monitoring unit connected by coaxial cable. Camera shall be capable of panning 275° and rotating 360° for close up viewing of service connections and problem areas. Camera shall be of such size as to ensure passage through a six-inch diameter sewer, of waterproof construction and provides a continuous, clear picture showing entire inside periphery of pipe. Provide modified camera for taking pictures from television monitor screen. Take pictures, when requested, with Polaroid film using a fixed mounting assembly and latching device. Furnish television equipment with measurement reading device that accurately indicates location of camera within sewer. Design measurement reading device for reading distance with ground level meter reading in feet and tenths of feet.
- B. Procedures: Perform television inspection, after thorough cleaning, on one line segment at a time. Isolate sewer segment being televised from remainder of sewer system by use of line plugs in influent sewers entering upstream manhole. Perform inspection by pulling television camera through line along axis of pipe. Move camera forward or backward, according to sewer conditions, in order to adequately examine pipe defects or probable pipe defects.

- C. Reverse Set-up: In event there is a structural interference in sewer segment being televised that prevents camera from traversing entire length of sewer segment, then back camera out of lines and attempt to televise line by entering camera from lower manhole. If entire length of sewer segment cannot be televised due to more than one obstruction notify OWNER's Representative. Upon notification and examination of available information, a determination of procedures to follow will be made as expeditiously as possible. If passage of television camera throughout entire length of sewer segments resulted from inadequate cleaning, then remove camera, reclean sewer segment, and retelevis. Recleaning and retelevising is at Contractor's expense.
- D. TV Camera and Film: Camera to continuously record condition of sanitary sewers on colored film or tape and be of such size for viewing on standard VCR machine or DVD machine.

936.5 By-Pass Pumping: Provide by-pass pumping during smoke testing, cleaning, and television inspection in accordance with Specification Item.

936.6 Records:

A. Smoke Testing:

1. As each manhole section is tested, keep records showing location of manhole section being tested, type of test being performed, results of test, and general notes as to any other pertinent information discovered. Furnish two complete sets of records for all testing.
2. Record, on an **approved** form, locations of escaping smoke from sewer line using distance from nearest manhole as reference so that leaks can be located at later date.
3. In addition, provide an indication, on an **approved** form, as to severity of smoke leak (utilizing light, medium, or heavy designation) based on amount of escaping smoke on private property. Record house address along with the type of failure associated with escaping smoke and include a colored photograph of escaping smoke along with an indication of severity of smoke leak. Provide colored 3-inch x 4-inch photograph, which clearly shows location of escaping smoke on photograph. Classify type of failure associated with escaping smoke. Classification includes, but not limited to, leak in service line, clean-out plug missing, clean-out plug broken, clean-out plug leaking, roof drain connected to sewer,

surface drain connected to sewer, discontinued service line, no smoke from vent stack, smoke inside building, and conditions of manholes.

- B. Gravity Sanitary Sewer Cleaning: Keep record of cleaning performed. Use an **approved** printed form showing name of OWNER, date, manhole section cleaned, manhole section location, sewer size, length of section, type of cleaning performed, and any special remarks concerning condition of sewer.
- C. Television Inspection:
 - 1. Maintain television and work report in log form during television inspection. Indicate on log exact location of each leak discovered by television inspection. Include distance from reference manhole and position of leak as referenced to pipe axis. Record location of service connections, together with a statement of opinion as to whether or not service connection is leaking. Indicate by notations if crushed or broken pipe and any irregularities of pipe alignment or grade. Also show each point of leakage that is repaired. Furnish two copies of each report to Engineer.
 - 2. In addition to logs and other records specified hereinabove, furnish a complete VHS format video-taped record, or video computer disk, on good quality media, of all lines televised. Provide continuous audio recording that reflects footage during televising operations. At completion of each recording, video tapes become property of OWNER. Include costs incurred in connection with the video-tape operation in unit price bid for televising.

936.7 Obligations of OWNER: OWNER furnishes, at no cost to the Contractor, following items during, construction.

- A. OWNER only has right to access in dedicated street's rights-of-way, utility easements and/or sanitary sewer easements. Contractor responsible for obtaining consent of private property owners when ingress and egress is required through private property; i.e., from street's rights-of-way to rear lot utility easements. When private property is utilized for ingress and egress, Contractor to provide, prior to acceptance, release from private property owners indicating that any and all damages have been resolved satisfactorily and there are no unresolved claims.
- B. Assistance in locating and exposing known manhole covers and know cleanouts. OWNER forces will not open nor replace manhole covers

and/or cleanouts. Contractor is reminded that a portion of these sewers may be found to be in very poor conditions at top of sewer. Exercise extreme caution in these sections during cleaning and televising to prevent further damage, and in order to maintain sewer service.

- C. OWNER will provide water and transit meter for Contractor's use. Contractor shall be responsible for coordinating with OWNER to obtain water. Water usage will not be charged to Contractor, however, Contractor is required to meter usage. OWNER reserves right, in event of shortage of potable water, to limit or deny Contractor use of water until shortage is remedied. Contractor shall provide double back-flow preventer at hydrant location when obtaining water.

936.8 Measurement and Payment:

- A. Smoke Testing: No separate measurement or payment for work performed. Include cost of same in Contract unit price for bid item of which it is a component.
- B. Cleaning: Measure by **linear foot** from center of manhole to center of manhole along pipe of size cleaned. Pay for "Cleaning" at Contract unit price bid for size and length measured. Root removal will be considered incidental to "Cleaning".
- C. Closed-Circuit Television: Measure by **linear foot** from center of manhole to center of manhole along pipe of size televised. Pay for "Closed-Circuit Television" at Contract unit price bid for size and length measured unless specified otherwise in these Specifications. Post television inspection of rehabilitated lines is included in rehabilitation costs as incidental.

END OF ITEM 936