

SECTION 814 SMOKE TESTING

814-1 SCOPE OF WORK: Sanitary sewer line sections, at locations designated by the Engineer or his authorized representative, shall be smoke tested to locate significant defects which are causing or could cause infiltration/inflow, soil erosion, and degradation to the existing sanitary sewer system or other underground utilities and surface structures.

All new or repaired main line or service lateral connections must be smoke tested and the Engineer will field determine which other new or repaired pipe segments are to be smoke tested prior to backfilling.

814-2 PRODUCTS:

- a. Nontoxic, odorless, non-hazardous, and non-staining smoke generators (bombs or liquid smoke) shall be used to produce smoke for testing.
- b. Smoke shall be blown by a "squirrel cage" or other approved blower located on top of a central manhole. Blower pressure should be adequate to force smoke throughout the isolated line section and to the ground surface through cracks, channels, improper jointing, etc. Minimum blower free fan delivery is 1,500 cfm.
- c. Sand bags and/or plugs with permanently attached identification tags shall be placed at each end of the test section to prevent smoke from escaping through the manholes and adjacent sewer lines.
- d. Color, digital photographs with a minimum resolution of four (4) mega pixels or greater shall be taken of all locations where smoke is observed at the ground surface. The camera shall record a date and time directly onto the photo. Each photographic file generated shall be saved in a _.JPEG file format using the manhole reference number, distance to the upstream manhole, and the physical address as the naming convention. These files will be recorded on a computer compact disk (CD) or digital video disk (DVD) and delivered to the Owner. A sample of a file name in the proper format is:

253-00012_299_12345_Maple.jpeg
Manhole No _ Dist_Hse No_Street _ .file ext.

- e. All data pertinent to the smoke testing will be recorded on the smoke testing log form using the proper inspection coding as provided by the Owner. This form shall be submitted to and remain in the possession of the Owner after a section of line has been tested.

814-3 PREPARATION:

- a. Contractor's testing schedule shall consider the unique conditions of the test site such as (but not limited to):
 1. Cross connected storm/sanitary sewers
 2. Heavy flow sections
 3. Traffic patterns
- b. If work is to be performed in a roadway, the Contractor shall perform necessary traffic control, conform to DPW rules and regulations, and the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD). Lane closures will require a permit from the DPW Traffic Division.

814-4 METHODS:

- a. Only sewer line segments on the upstream and downstream side of the blower shall be tested on a single set-up.
- b. Smoke shall be introduced into a manhole and then blown into the connecting sewer lines.
- c. All visible leaks, including those from collection lines, service laterals, drainage structures, and manholes within the road right-of-way or servitude, shall be recorded on the smoke testing log form. The information listed below shall be included on the log form:
 1. Upstream and downstream manhole numbers
 2. Manhole depths
 3. Direction of flows
 4. Location of sandbags and plugs
 5. Sketch showing leak location and distance and offset from the upstream manhole
 6. Street address nearest the detected leak
 7. Leak type that clearly describes the leak
 8. Smoke quantification
 9. Surface cover
 10. Properly identified color photograph of inflow source shall be attached to reporting form.
- d. Visible smoke on private property shall be photographed and recorded by address.
- e. Public notification and coordination with the City's Police and Fire Departments shall be accomplished according to the following:
 1. At least 7 days prior to the test of any line segment and prior to beginning the testing, the Contractor shall go door-to-door to distribute an Owner approved Homeowner Notification Door Knocker describing the smoke testing.
 2. On the day of test, prior to commencing operations, Contractor shall knock on the doors of all structures potentially impacted by the testing to personally notify occupants. Also Contractor shall notify the appropriate authorities prior to the beginning of any smoke testing and will be responsible for maintaining close coordination with the local Police and Fire Departments regarding the smoke tests.
 3. Contractor shall maintain multiple copies of the MSDS sheets of smoke products on site for to respond to all inquiries.
- f. Smoke tests shall not be performed when the smoke coming out of the ground may be blown away so quickly as to escape visual detection.
- g. Smoke testing shall not be performed during wet weather or saturated ground conditions.
- h. For Physical Inspection Contracts, all smoke testing shall be performed after the sewer lines and manholes have been cleaned and televised.
- i. The Contractor will be solely responsible and held liable for any claims or damages

arising from the lack of public notification, and coordination with the City Police and Fire Departments.

814-5 INSPECTION: The Engineer or his duly authorized representative shall witness all smoke testing, and review smoke testing log forms submitted to the Engineer. The log forms shall be available on the next work day following the performance of the test.

814-6 MEASUREMENT: Measurement for smoke testing to identify leak locations shall be made on a linear foot basis from the center of the upstream manhole to the center of the downstream manhole. Only line segments directly upstream and downstream of the blower are to be tested on a single set-up. The length of the line segments tested per smoke test set-up shall be approximately 600 linear feet.

814-7 PAYMENT: Payment for smoke testing will be full compensation for smoke bombs, liquid smoke, blower usage, sand bagging, plugging, smoke test logs, public notification, and photos in accordance with the Specifications.

No direct payment will be made for smoke testing in conjunction with acceptance testing of sewer point repair or in conjunction with warranty item work.

814-8 PAY ITEMS

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
8140001	Smoke Testing for Leak Identification	Linear Foot