

SECTION 336065

GRAVITY SEWER SYSTEM SMOKE TESTING

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish all labor, materials, equipment and incidentals required and smoke test those sewers designated and submit all corresponding field data forms identifying potential sources of inflow discovered as a result of smoke testing.
- B. Undertake a physical survey concurrent with smoke testing for the purpose of identifying sources of infiltration/inflow (I/I).

1.2 SUBMITTALS

A. SUBMIT THE FOLLOWING:

1. Schedule of smoke testing work as well as notifying the Engineer, Owner, and Owner's Fire Chief of the time and location of all smoke testing prior to commencing.
2. Manufacturer's data sheets on the smoke candles and the blower to be used on the project.
3. Proposed field data gathering and observation forms prior to the start of the work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The "Smoke Candles" used in smoke testing shall be acceptable for both indoor and outdoor use, shall be non-contaminating and shall leave no residue to stain clothing or the interior of buildings.

2.2 EQUIPMENT

- A. The air blower used to force smoke the into sewer pipe shall have a minimum capacity rating of 1,500 cfm and a maximum capacity rating not to exceed 3,750 cfm.
- B. A metal basket shall be used to hold and retrieve the smoke candles.

PART 3 – EXECUTION

3.1 TESTING

- A. Sewer sections shall be smoke tested by setting the blower at the up-stream manhole and blowing the smoke to the down-stream manhole.
- B. Isolate the sewer line section to be tested by installing sewer plugs to shut off the flow completely in the sewer system up-stream of the sewer section to be tested.
- C. Install an inflatable sewer plug in the down-stream sewer section and inflate the down-stream sewer plug after a heavy concentration of smoke arrives.
- D. Testing Locations
 - 1. Residential Areas
 - a. Up to three reaches not exceeding a total of 500 linear feet of sewer line may be tested at one time based on the use of a blower with a maximum capacity rating of 1,500 cfm. Up to five reaches not exceeding a total of 1,200 linear feet of sewer line may be tested at one time based on the use of a blower with a maximum capacity rating of 3,750 cfm.
 - 2. Industrial-Apartment Complex Areas
 - a. Up to two reaches not exceeding a total of 400 linear feet of sewer line may be tested at one time based on the use of a blower with a maximum capacity rating of 1,500 cfm. Up to three reaches not exceeding a total of 900 linear feet of sewer line may be tested at one time based on the use of a blower with a maximum capacity rating of 3,750 cfm.
- E. Candles
 - 1. In Residential Areas a minimum of one three (3) minute smoke candle shall be simultaneously used for each reach of sewer in the sewer section tested.
 - 2. In Industrial-Apartment Complex Areas a minimum of two three (3) minute smoke candles shall be simultaneously used for the first reach of sewer, increased by one three (3) minute smoke candle for each additional reach of sewer in the sewer section tested.

- F. The metal basket used to hold and retrieve smoke candles shall be placed as close as possible to the sewer pipe invert during testing.
- G. Testing shall not be done during rainy weather and testing shall be closely monitored on windy days. If smoke coming out of the ground is blown away so quickly as to escape accurate detection, testing will cease until such time that conditions permit.
- H. Be solely responsible for the operations and for preventing sewer backups into area homes and causing sewage overflow.
- I. Adequately notify residents/occupants, fire department and other affected by smoke testing as to time and place of the smoke testing.
- J. Be solely responsible for the safety of their crews.
- K. The Engineer, Owner, or his/her project representative reserves the right to observe field crews and evaluate effectiveness of identifying returns.

3.2 RECORDING OF FIELD OBSERVATIONS

- A. Document observations regarding each leak identified on a smoke sketch log. The smoke sketch shall include manhole numbers, direction of sewer flow, direction of smoke, manhole condition, sewer length, date, mini-system number, test number per date, crew, weather condition, wind condition, smoke intensity, infiltration probability function, address and other comments.
- B. Photograph using digital camera. Each photograph shall show the smoke escaping, at the source, in the foreground with the reference structure in the background. The photographs shall be attached to the field data gathering and observation form and provided electronically.
- C. The address or house number shall be recorded under the sketch. A description of the leak, possible cause and recommended suggested rehabilitation method shall be recorded on the field data gathering and observation form.
- D. The sketch shall provide a north arrow orientation. A sketch of the building and/or structure shall be drawn. A minimum of two tie measurements from permanent reference points to the smoke leak shall be shown, or identify the location of the smoke leak with GPS coordinates.
- E. Document as part of the physical survey any aspect defect contributing to infiltration/inflow for the Owner to undertake further evaluation. The physical survey shall identify such suspected I/I sources as:

1. Leaking manhole bottoms
2. Leaking manhole riser
3. Manhole ponding area
4. Manhole frame not attached to manhole structure
5. Exposed brickwork not grouted
6. Leaking pipes at manhole

END OF SECTION