

TECHNICAL SPECIFICATIONS FOR THE INSPECTION OF GRAVITY PIPELINES BY SMOKE TESTING

1.00 PART 1 -- GENERAL

1.01 SCOPE

- A. It is the intent of this specification to provide for the smoke testing materials and procedures to be used in the investigation of the facilities as shown on the Project Maps. All materials and procedures shall be consistent with these specifications, current industry standards, and as approved by the Engineer.
- B. The Contractor shall minimize the physical entry of personnel into the sanitary sewer facilities. If required, manhole entry shall be in accordance with Federal, State, and local regulations for confined space entry and other regulations that may apply. The Contractor shall provide all safety equipment required for manhole entry operations, including harnesses, ventilation equipment, etc.

1.02 SUBMITTALS REQUIRED WITH THIS SECTION

- A. Work Permits from applicable local, state, and federal agencies
- B. Notification Documents
- C. Method of Smoke Production
- D. Field Log Worksheets written or in DVD format, if specified.
- E. Final Compiled Reports written or in DVD format, if specified.
- F. Identification for all Employees on-site.

1.03 PERSONNEL QUALIFICATIONS

- A. A single Crew performing the testing shall be no less than 3 persons. One supervisor and two helpers per crew. One person operates the blower and smoke device. The other two inspect the run for evidence of smoke.
- B. The Contractor's employees performing the smoke testing under these specifications shall be properly trained and thoroughly experienced in the use of the equipment and procedures.
- C. The Contractor shall require all personnel to demonstrate good judgment, in performing the testing.

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- D. The Contractor shall take appropriate action to ensure that his employees are polite to the public in all aspects of the work and that immediate assistance is provided to property owners if needed.

2.00 PART 2 – PRODUCTS

2.01 BLOWERS

- A. The Contractor shall provide a portable blower designed and built specifically for the use of smoke testing. The blower shall be self-contained and powered by a minimum three (3) horsepower (HP) gasoline engine and be capable of producing a minimum of 2000 cubic feet of air per minute when working as a blow-in ventilator and 4000 cfm when working as a suction ventilator.
- B. The base of the blower shall have appropriate adapters and seals to make a good connection to the manhole without excessive loss of air and smoke.

2.02 SMOKE PRODUCTION

- A. Smoke bombs shall produce a chemical reaction generating white to gray smoke, leaving no residue, and shall be non-toxic and non-explosive. Each bomb shall be capable of producing an adequate volume of smoke when used alone or in combination with a number of bombs for the duration of the test.
- B. Smoke Fluid shall produce smoke when exposed to the heat of the exhaust system of the motor for the blower. The smoke generated shall be white to gray smoke, leaving no residue, and shall be non-toxic and non-explosive.

2.03 OTHER EQUIPMENT

- A. In addition to the blower, the Contractor shall provide all other equipment, tools, and incidentals required to perform smoke testing as required by these specifications including but not limited to sewer line stoppers, sand bags, cameras, confined space entry equipment, etc.

3.00 PART 3 – EXECUTION

3.01 WORK PROGRESS

- A. The Contractor shall apply for and obtain work permits for all work to be performed in State and/or county Highways. All required insurances, traffic control measures, and other terms of the permit shall be provided to the satisfaction of the Agency Permit Engineer and/or Project Engineer.

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- B. The Contractor shall have all submittals required reviewed, including the form of the field worksheet, etc, by the Engineer. Work shall not proceed until acceptance of all submittals by the Engineer.
- C. A Work Schedule shall be submitted for review and approval by the Engineer. No field testing or notification may proceed until the schedule has been approved by the Engineer. After approval of the WORK SCHEDULE by the Engineer, the Contractor shall not make any revisions or modifications to it without the approval of the Engineer.
- D. Pre-notifications – With the first notification, the Contractor shall notify all affected residents in the Municipality that smoke testing will occur no more than two weeks prior and not less than one week prior to the date of the testing. This notification will be by using a printed flyer hung on each door of affected home and business owners and/or a press release in the Official newspaper of the Municipality. The flyer and/or press release notice shall include:
 - 1. Contact numbers for the Contractor and the Municipality, if residents want additional information. *(All persons who will be in contact with the public should be well versed in the smoke testing procedures, work schedule, and content of all public notices).*
 - 2. Warnings to the residents that individuals with respiratory, heart problems, or others who should never be exposed to smoke, should be removed from the premises prior to the tests. Others, such as house confined invalids, sleeping shift workers, and locked in animals should be identified and evacuated before the test. The notice should also request that homes with these individuals be requested to be registered as “Homes of Special Concern.”
- E. Regulatory Notifications – The Contractor shall notify the local Police and Fire Departments, the Municipality, and other emergency or official personnel just prior to distributing the flyers and publishing the Press Release to the General Public.
- F. Daily Notifications – In the Area of Daily Testing, the Contractor shall notify:
 - 1. All providers of emergency services by phone providing the area to be tested during the next day of work. Notification shall be 24 hours in advance of the testing.
 - 2. The Contractor shall notify, by hand delivery of a notification letter, door knob hangtags, or other acceptable methods to each address, all residences and businesses in the area to be tested 24 hours in advance of testing.

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3. The day of the testing, the Contractor shall check with all homes of special concerns to be sure that all persons that may be sensitive to smoke will be out of the home prior to testing.
- G. It shall be the Contractor's responsibility to keep adequate records of all notifications to emergency services and to produce them upon request by the Engineer. Failure to comply with this requirement may be cause to suspend the Contractor's operations until compliance is achieved.
- H. Performing the Testing.
- I. Reporting the Data.

3.02 WORK SCHEDULE

- A. Upon award of the Contract and prior to commencing any work, the Contractor shall provide a complete WORK SCHEDULE to the engineer for review and approval. The Work Schedule shall be typed and shall indicate the planned progress for the proposed work.
- B. The Work Schedule shall indicate the following:
 1. Street or neighborhood names.
 2. Street limits.
 3. Upstream and Downstream Manhole Numbers (from Project Maps).
 4. Date of Testing.
 5. Starting Time.
 6. Ending time.
- C. Acceptable Periods of Work
 1. The Contractor shall not commence testing before 7:00 am and shall terminate testing no later than 7:00 pm each day.
 2. Work times in commercial areas shall be scheduled to be prior to the opening of the majority of the businesses in that area.
 3. Smoke testing shall not be performed on weekends or on holidays without the prior approval of the Engineer.

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- D. Contractor shall not perform smoke testing on days that, in the opinion of the Engineer, will hinder the results of the test. (For example, when high winds, heavy rains, or excessively high groundwater levels would interfere with the effectiveness of the testing).

3.03 PERFORMING THE TESTING

A. Procedure

1. Safety

- a. The Contractor and his personnel shall be aware of and shall follow all Federal, State and Local safety laws and regulations.
- b. No entry into any part of the collection system shall be permitted until the Contractor has demonstrated that on-site personnel have been trained in applicable safety procedures and have the equipment on-site to allow those procedures to be followed.
- c. Traffic Control. The area of work shall at all times be protected by means of an adequate number of cones, barricades, flags, or whatever means are necessary to properly and safely protect both vehicular and pedestrian traffic. Flag men shall be provided on all streets where required. Further requirements for Traffic Control may be imposed by the specific agency having jurisdiction.
- d. Any condition deemed to be an unsafe condition shall be immediately corrected by the Contractor. The failure of the Engineer or his representatives to bring a potentially dangerous situation to the Contractor's attention shall not relieve the Contractor from his responsibility for providing a safe work area.

- 2. Unless otherwise approved by the Engineer, the sections of sewer subject to testing shall consist of a central manhole, where the blower will be positioned, and upstream and downstream manholes and the sewer pipes between them. The pipe sections and lengths shall not exceed the capacity of the blower to provide adequate smoke for testing.
- 3. Flow Control – It is the intent of this specification that the smoke testing be accomplished without the need for bypass pumping. The Contractor shall provide temporary plugs, sandbags, or flow barriers as required to contain an adequate volume of smoke within the section of

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sewer being tested, or to limit the extent of sewer subjected to pressurized smoke. The Contractor shall monitor the resulting surcharged sewer at the manhole upstream of the section of sewer being tested, and prevent overflow conditions from occurring.

4. Prior to placing any smoke into a manhole, the Contractor shall first evacuate the system with a blower to ensure that any collection of explosive gas and any odor that may be introduced into the homes and businesses have been dispersed prior to pressurizing the sewer with smoke. Evacuation may be accomplished by removing the manhole covers of all manholes in the run, then placing a vacuum on the manhole where the blower is located, or, then blowing air into the manhole.
5. All smoke testing information shall be accurately and neatly recorded on field worksheets. The Final Report and information shall be transferred to a computer generated log sheet together with related digital photographs taken during the project execution.
6. For each sewer main tested, the Contractor shall prepare a field log identifying each point of smoke exfiltration from;
 - a. Roof gutters.
 - b. Sewer cleanouts.
 - c. Leakage in house laterals.
 - d. Patio or area drains.
 - e. Storm drain cross connections.
 - f. Any other source not stated above.
 - g. Indicate if roof vents showed evidence of smoke or not.
7. The points of exfiltration, as identified above, shall be referenced and dimensioned to permanent landmarks or house or lot numbers.
8. A photograph of all leaks using a digital camera or approved substitute shall be included in the field log. Photographs of smoke evidence shall have a location indicated in the photograph using a heavy marker or flag and/or recorded on a DVD disk if specified. All photographs shall be clearly cross-referenced to the type and/or computer generated log indicating the location of the leak.

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9. The report shall reference the alphanumeric manhole number shown on the Project Maps.
10. The Contractor shall prepare a bound report and/or DVD record, if specified, of the smoke testing as specified. The report shall
 - a. Contain a typed log that clearly identifies each sewer main tested.
 - b. Have all field data checked for accuracy and compiled into typewritten reports.
 - c. Contain the digital data (i.e. photographs) at the end of the project.
 - d. Contain copies of the materials used to make notifications and a log of the daily notifications to the emergency and safety personnel.
 - e. Submit two (2) complete copies of the report and/or DVD to the Engineer.

4.00 PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Mobilization, when listed on the Proposal, will be measured as a lump sum item.
- B. Smoke Testing, when listed on the Proposal, shall be measured as the horizontal distance from the center of the upstream manhole to the center of the downstream manhole for each segment tested. Measurements shall be made to the nearest foot.

4.02 PAYMENT

- A. Payment for Mobilization shall be 50% with first pay request, 40% with second pay request, and 10% with final pay request.
- B. Payment for Smoke Testing shall be made per LF.