TOWN OF HILLSBOROUGH

Pre-Acceptance and End of Warranty Sewer Video Inspection Specifications

Part 1 — General

1.1 *Description*

A. Scope: Provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to perform video inspection of new piping, manholes and laterals (to cleanout), including all requirements to clean pipe, mains and/or lateral connections.

1.2 *References*

A. NASSCO's Assessment and Certification Program for pipelines, manholes and lateral (PACP/MACP/LACP), latest version, for standard TV inspection form and condition codes.

1.3 *Quality assurance*

A. Videographer shall be certified through NASSCO's PACP/MACP/LACP program.

B. Video inspection firm shall have a minimum of 5 years of experience in buried piping video inspection.

C. Videographer shall conform to coding and reporting guidelines specified in PACP, including report annotations, pipe conditions, pipe defects, and severity ratings for all inspection types, regardless of the type of camera utilized.

D. Contractor shall maintain a master copy of all reports and recordings for two years after Final Completion.

E. Quality of inspection recording shall be acceptable to TOWN when viewed on a standard computer monitor.

1.4 *Submittals*

A. Digital Video Disc (DVD) or USB Drive labeled with the following information:
   1. Contractor's name.
   2. Project or Contract number.
   3. Location and date of Inspection.

4. Inspection type: pre, post, warranty, repair, etc.

B. Upon request, CCTV may be submitted to the TOWN via a file sharing system.

C. Printed inspection reports:
   1. Inspection reports shall include the following information:
      a. CONTRACTOR's name.
      b. Location of inspection. (road name, etc.)
      c. Project name and phase, as applicable.
      d. Inspection Type: Pre, post, warranty, repair, etc.
      e. Upstream and downstream invert measurements.
      f. Manhole depths.
      g. Upstream and downstream manhole identification.
      h. Pipe diameter.
      i. Pipe material(s).
      j. Length between manholes.
      k. Lateral locations and associated address or lot number.
      l. Date televised.
      m. Video file name associated with the report.
   2. Provide printed location records to clearly identify the location of each defect, or lateral connection, in relation to adjacent manholes, using a standard stationing system zeroed on the upstream manhole. Record all information requested using proper NASSCO PACP/MACP/LACP defect codes. Color still shot images of all major defects encountered shall be included with each pipe segment.
   3. Provide a map of inspection locations.
   4. Provide one inspection report per segment. If the conditions do not permit inspection of the entire segment from one direction, provide an additional inspection report from the opposite end to the point the initial inspection was abandoned.

D. Inspection Video and Audio Recordings:
   1. Provide digital inspection recordings for all recordings.
   2. Once the survey of the pipeline is under way, the following data shall be displayed. The size and position of the data display shall be such as not to interfere with the main subject of the picture yet shall be easily readable when the recording is replayed.
      a. Camera's position, in feet, in the line segment from adjusted zero.
      b. Pipe dimensions and type (8" VCP, etc.).
      c. Upstream manhole and downstream manhole reference numbers per the construction drawings.
      d. Direction of inspection (upstream or downstream).
      e. Starting time of the inspection

3. Recording shall be of a quality sufficient for TOWN to evaluate the condition of the pipe, locate service connections, and verify cleaning.
4. Video Inspection recordings shall not be edited.
5. If TOWN determines that the quality is not sufficient, re-televise the pipe segment and provide a new recording and report at no additional compensation.
    a. Camera distortions, inadequate lighting, dirty lens, or steamy/blurred/hazy picture will be cause for rejection.
    b. Pipe stationing not shown on the video or in a font style or color that is unreadable will be cause for rejection.
6. Provide one electronic video file of each inspection.

E. Provide submittals according to this article for all post-construction and repair inspections performed.

F. Submittals for video inspection will require a minimum of 48 hours for review by the TOWN.

1.5 *Measurement and payment*

A. The TOWN is not responsible to pay for video inspection or other requirements set forth in this Section, regardless of inspection type, post-construction or repair.

1.6 *Regulatory requirements*

A. OSHA confined space requirements and other applicable health and safety requirements.

Part 2 — Products

2.1 *Television equipment*

A. TV Inspection System:
    1. Audio visual digital encoding equipment and software with color pan-and-tilt, waterproof camera specifically designed and constructed for pipeline inspection and recording.
    2. Footage counter: Automatic, updatable metering device accurate to two tenths of a foot and which displays on the TV monitor the exact distance of the camera from the starting point of the TV inspection recording.
    3. Lighting system: Fixed intensity with an even distribution of the light around the pipe perimeter without the loss of color or contrast, flare out of picture, or shadowing. Sufficiently powered so that all features and condition of the pipe can be clearly seen.
    4. Camera features:
        a. Vertical resolution: Minimum 470-line colored image quality and definition; to the satisfaction of the TOWN.
        b. Focus adjustment: Minimum focal range of 3 inches in front of the camera’s lens.

c. Radial viewing with ± 275 degrees pan and 360 degree rotation.
d. Camera height: Adjustable so camera lens is always centered at one-half the inside diameter of pipe or higher.
e. Provide a reflector in front of the camera if necessary, to provide acceptable video image quality in large diameter pipes.

5. Operating conditions: 100 percent humidity.
6. Inspection length: Minimum 1,500 feet of pipe.
    a. Service connections: 90 feet into connection
7. Self-propelled and capable of traversing minor off-set joints or pulled through with a tag line in more difficult circumstances.

B. TV Studio:

1. Contained in an enclosed truck, trailer or van and insulated against noise and extremes in temperature with air conditioning and heating.
2. Provided with means of controlling external and internal light sources to ensure monitor screen display is in accordance with the requirements of these Specifications.

C. Digital Recordings:

1. Image Capture: Images shall be stored and be exportable as JPEG formats.
2. Video Capture:
    a. Capture full time live video and audio files for each pipe segment and service connections inspected.
    b. File storage:
        i. Use industry standard Windows Media or MPEG-4 format.
        ii. Viewable on a personal computer.
        iii. Ensure compatibility of recordings and software with ENGINEER or provide compatible software for viewing.
    c. Resolution: Minimum 640 pixels (x) by 480 pixels (y) with an encoded frame rate of 29.97 frames per second.
    d. Software should be able to record a minimum of 120 minutes of recording on each file.
    e. Clear and stable image free of electrical interference.
    f. Clear and discernable audio recording free of background and electrical noise.
    g. Cross-reference the digital recording and inspection data to allow instant access to any point of interest within the digital recording.
3. Electronic recording file must allow snap scrolling to allow easy and quick access of the entire recording.

Part 3 — Execution

3.1 *Cleaning*

A. Prior to TV inspection, clean pipe and manholes. Re-clean any segment or manhole found to be insufficiently cleaned during the TV inspection process.

B. Clean pipelines to remove foreign materials, such as, rocks, grease, roots, gravel, settled sludge, or other materials that may prevent proper video inspection.

C. Cleaning equipment may consist of hydraulically propelled, high-velocity jet, mechanically powered, or manual hand removal and should be provided, operated, and maintained by the CONTRACTOR. Other types of cleaning equipment may also be utilized for special applications with the TOWN's approval. Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to the TOWN.

D. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists, and the cleaning effort shall be abandoned.

E. Damage to the sewer lines caused by the CONTRACTOR's operations shall be repaired prior to TOWN acceptance or release of warranty bond.

F. Damage due to flooding of any public or private property being served by any line section which is over-filled by CONTRACTOR's cleaning operations shall also be repaired or otherwise paid for by the DEVELOPER/CONTRACTOR.

G. All sludge, dirt, sand, grease, roots, and other solid or semi-solid material resulting from the cleaning operation shall be removed from the Site and disposed of at a location permitted and approved by the TOWN. All materials and debris will be removed from the Site no less than the end of every workday. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand, or damage downstream, shall not be permitted. Under no circumstances shall this debris be dumped or spilled into the streets, ditches, storm drains, streams or sewer mains.

H. The TOWN does not have a septage receiving station at its wastewater plant. Emptying the vacuum truck will need to be done at a nearby facility with the ability to accept the waste.

3.2 *Television inspection*

A. Provide inspection of both the upstream and downstream manholes beginning at the top of each manhole and panning down to inspect the manhole's interior walls. Center camera in manhole invert to the extent allowed by the invert geometry. Pan and record the entire circumference of the pipe penetration/manhole wall.

B. Inspect pipelines with pan and tilt conventional television imagery to record the condition, relevant features and defects of the pipeline under inspection. Notify the TOWN 48 hours in advance of any TV inspection so that the TOWN may observe inspection operations, if desired.

1. With camera rolling, perform the distance counter preset. If a preset point on the CCTV cable is used to set the counter, CONTRACTOR shall back up the camera after setting the preset and record the entry to the pipe.
2. Use manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the pipe conditions to move the camera through the segment.
3. Pipeline inspection shall be from center of the starting manhole to the center of the ending manhole. Measure distances along the pipe from the inside of manhole wall of the starting manhole to inside of manhole wall of the downstream manhole.
4. Position the camera head to reduce the risk of picture distortion. In circular pipes, the camera lens shall be positioned centrally, in prime position, within the pipe. Direct camera lens along the longitudinal axis of the pipe when in prime position.
5. Inspect pipes during low flow conditions.
6. Move the camera smoothly through the pipeline (in the downstream direction whenever possible) at a uniform rate not to exceed 30 feet per minute. Stop at every joint. When infiltration or other defects are evident, use pan and tilt when camera is not moving to document pipe condition. Stop elsewhere when necessary to ensure proper documentation of the pipe's condition and to record lateral locations.
7. Prior to recording the location of defects, construction features and service connections, remove slack in the cable of the television inspection camera to ensure metering device is designating proper footage. Check accuracy of the measurement meters daily by use of a walking meter, roll-a-tape, or other suitable device.
8. Capture color still shots of video recordings for all major defects encountered.
9. If relevant, stop at every lateral connection. Center the camera on the lateral so that the lighting and the pan and tilt view can be used to inspect as far into the lateral connection as possible. Pan the circumference of the tap, recording all defects found in the lateral service connection. Where lateral flow is observed, observe flows from service connections for approximately two minutes to ascertain if the flow is sanitary or extraneous flow. The video recording may be paused during lateral observation. Record results of the flow observed on video recording and inspection logs.

10. TV inspection recordings shall be continuous for each pipe segment. If during TV inspection of a pipe segment the camera is unable to pass an obstruction even though flow is unobstructed, televise the pipe segment from the opposite direction in order to obtain a complete recording of the line. Measure the distance between the manholes (centerline to centerline) with a tape or wheel to accurately determine the total length of the manhole segment.
11. Adjust light levels, clean fouled or fogged lens, and allow vapor to dissipate from camera lights in order to produce acceptable recordings.
12. TV inspection recordings that do not meet the specified requirements shall be re-televised. Examples of inadequate recordings include: too much shaking, to fast to clearly observe pipe, lacking or incorrect screen information, water/fog/debris on lens, problems with meter counter during video, technical glitches resulting in loss of screen view or unable to view video, not capturing all items as required, not coding apparent defects, or anything preventing the TOWN from fully examining and understanding the infrastructure for which it is to assume full responsibility.

C. Televise each lateral up to the cleanout at the right of way or easement. Record the length of each lateral and the lot or address for which it is associated. Identify any defects or deficiencies.

3.3 *Flow control*

A. For new installations, provide video inspection prior to placing pipe segments in service and after cleaning, not simultaneously.

B. Provide flow control in the pipe segment as needed to ensure a clear and adequate video inspection. TOWN may reject video inspection if flow affects the quality of the video.

C. Whenever flows in a pipeline are blocked, plugged, pumped, or bypassed, take sufficient precautions to protect the pipelines from damage that might be inflicted by excess pipe surcharging. Further, take precautions to ensure that pipe flow control operations do not cause flooding or damage to public or private property being served by the pipes involved. No overflows are permitted. The DEVELOPER/CONTRACTOR is responsible for all damages.

D. CONTRACTOR is responsible for all damages to CONTRACTOR owned and operated equipment, TOWN facilities, and privately-owned facilities caused by malfunction of plugs, pumps or other CONTRACTOR equipment. In the event of a failure or malfunction of CONTRACTOR equipment, CONTRACTOR is responsible for all work necessary to restore facilities including, but not limited to, excavation and restoration of pipelines and roadways required to retrieve malfunctioning or stuck cameras, plugs and hoses.

E. For portions of the pipe that are bowed or bellied, camera may submerge. Wherever the camera encounters a submerged condition, or where the flow depth negatively impacts the video quality, reduce the flow depth to an acceptable level by performing the video inspection during minimum flow hours, or by pulling a camera with swab, high-velocity jet nozzle or other acceptable dewatering device. Recordings made while floating the camera are not acceptable unless pre-approved by TOWN.

3.4 *Field quality control*

A. The CONTRACTOR shall operate a quality control system, to be approved by the TOWN or DEVELOPER's ENGINEER, which will effectively gauge the accuracy of all inspection reports produced by the operator.

B. The TOWN shall be entitled to audit the control system and be present when assessments are being computed. Should any report or assessment be deemed unsatisfactory by the TOWN, the DEVELOPER/CONTRACTOR, shall re-record, re-code and re-submit any video, data or reports that the TOWN deems necessary to assess condition for acceptance or to release warranty bonds.

3.5 *Documentation*

A. The CONTRACTOR shall keep records (in a log-type form) of the Work accomplished in the cleaning of the sewer lines. Copies of the log shall be furnished to the TOWN documenting Work completed. The following information shall be required as a minimum:
    1. Location (manhole no. to manhole no.) and type of surface cover.
    2. Date and Time.
    3. Length of sewer.
    4. Condition and depth of manholes.
    5. Size and type of pipe.
    6. Type and condition of manholes.
    7. Type of cleaning performed, and various types of equipment used.
    8. Meter readings (fire hydrant use).
    9. Remarks as to type of materials removed, amount of materials removed, and number of hours spent to clean each pipe section.

3.6 *Acceptance*

A. The TOWN shall not accept any infrastructure showing the following PACP/MACP/LACP defects:
    1. Fractures or cracks
    2. Protruding taps or otherwise improperly installed taps
    3. Infiltration
    4. Offset joints
    5. Sags/Bellies of over 5%

6. Root intrusion or grease build up
7. Manhole defects or improper pipe to manhole connections
8. Other structural, operation and maintenance, and miscellaneous observations that are detrimental to the proper operation and maintenance or longevity of the system.

B. Any defects repaired shall be retested and re-televised under the same specifications as for initial construction and televising.