

APPENDIX B

CLOSED CIRCUIT VIDEO INSPECTIONS

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EQUIPMENT:

The Supplier must provide equipment meeting the following requirements:

- Self-contained monitoring unit complete with pan/tilt/zoom digital camera capability with remotely controlled lighting system capable of varying the illumination of the interior of the sewer line for inspection and photographic purposes.
- Minimum camera resolution must be 640 x 480 and show the entire periphery of pipe.
- CCTV video is to be recorded directly in a DVD format.
- Video file format must be MPEG 2 encoded, Regional Code 1 and comply with the NTSC (National Television Standards Committee).
- Supplier must be able to video pipe sizes ranging from 150mm diameter up to 1,800mm diameter inclusively.

DEFINITION OF FAULT:

- Any sewer pipe joint which displays a gap or spread, offset, gasket, or signs of infiltration.
- Any service lateral which displays water infiltrating around service connections, any service lateral exhibiting pronounced protrusion into the sewer line or any active or abandoned service lateral.
- Any section of sewer which is crushed, broken or displays longitudinal or circumferential cracks (other than hairline cracking) which displays a gap/spread, offset or signs of infiltration.
- Any variance in grade, alignment or diameter of sewer line section.
- Any gravel, roots, or foreign material which may impede flow.
- Any deformation in the shape of the pipe.
- Any section of sewer displaying standing water.
- Any material change or spot repair.

INSPECTION:

- Perform inspection of pipe from manhole to manhole by passing CCTV camera through sewer preferably in the direction of flow, according to line conditions at the time inspection is made.
- The inspection shall be performed on one (1) sewer line at a time by transporting the CCTV camera through the line along the axis of the pipe.
- All faults will be inspected using the pan and tilt feature of the camera. Continuous faults shall be inspected using the pan and tilt feature at intervals so as to provide a representation of that fault.

RECORDS:

- Maintain inspection report during CCTV inspection.
- Report to include location of each fault and service laterals with their respective distance measured from centerline of reference manhole and clock position referenced to axis of pipe. Report

to also include pictures of significant defects (severely deteriorated pipe, severely protruding lateral, etc.)

- At the start of each sewer main inspection, the following information shall be recorded in the DVD:
 - Date, time and weather conditions
 - Location (street, civic address, etc.)
 - Pipe type (combined, sanitary or storm)
 - Pipe size
 - Pipe material
 - Pipe ID
 - From Manhole ID
 - To Manhole ID
 - Direction of travel (upstream, downstream)
 - Survey number
 - Any other information that may be pertinent to the work
- The Pipe ID shall be displayed on the screen at all times during the inspection for quick reference.
- On screen display to clearly identify exact location of camera in meters.

REPORTS:

- All faults will be classified as per **NASSCO's Pipeline Assessment Certification Program (PACP)** .
- The inspection report shall be in PDF.
- The inspection report shall be submitted to the Departmental Representative by email and shall have the following file naming convention:
 - Street_PipeID_YYYY_MM_DD_Incremental Number (1,2,3,etc...)
Example: Mountain_6934_2008_01_01_1
 - The incremental number is only used if a sewer line section is inspected more than once in the same day.

ACCURACY:

- Pipe diameter shall be estimated within plus or minus 1 (one) nominal pipe size for all sizes of sewers outlined in these Specifications.
- Maximum permissible error in location of faults and service laterals with their respective distance measured from centerline of reference manhole to be within a 1 (one) meter tolerance.

DVD's:

- Supply a complete record of all CCTV video inspections on DVD.
- Label all DVD's, listing streets and corresponding pipe ID's inspected.
- DVD shall include a main menu with a chapter for each individual inspection. Chapter to be labeled by Street and Pipe ID.