AMENDMENTS TO OPSS 409 (APR 99) – CONSTRUCTION SPECIFICATION FOR CLOSED CIRCUIT TELEVISION INSPECTION OF PIPELINES

OPSS 409.05.01 is superseded by:

All cassette video tapes shall be a minimum of high quality, T120 length, unused and Super VHS format.

The third paragraph of **OPSS 409.07.01** is superseded by:

A fixed camera shall be used for pipelines less than 200 mm in diameter. For pipelines equal to or greater than 200 mm a pan and tilt camera shall be used.

OPSS 409.07.05 is superseded by:

Reports shall be submitted to the contract Administrator in the following formats, within 10 working days of the completion of the field work, with the noted number of copies.

a) One bound copy of the printed report in book format with serlox binding that must include:
   - A copy of each Community map to reference work locations.
   - A sleeve bound behind the last page to adequately hold each map.
   - Photographs of pipe defects as requested.
   - A hard cover with the following information:
     - Book and video numbers.
     - The community area (only one per book).
     - Inspection dates.
     - Sewer section numbers (e.g. 6439 to 6514)
     - Total meters inspected in that book.

b) Two 3.5 inch computer disks each containing the identical survey report information.
c) One copy of the video recording.
d) Two CD-ROM renderings/copies shall be provided by the contractor.

Each CD-ROM shall be capable of having up to 2 hours of Full Frame Colour Video encoded onto it (i.e. one CD-ROM per video) in one continuous MPEG file.

The CCTV data must also be CD-ROM compliant in that the video digits in the data accurately reflect the position on the CD-ROM.

The CCTV video recording (CD version) must be indexed to the textual data. The field survey must record the time index on the video which shows the images corresponding to the text record. The indexing must include the start time of the entire survey and the exact time number for each pipe feature/defect recorded in the data.

This indexing will permit the user to view a particular sewer pipe or a particular feature/defect in a pipe, after inserting the appropriate CD, and then Advance to the stored time index in the MPEG file, then display the image(s).

All required header information fields shall be completed and verified for correctness. The software used to produce the survey report shall not allow the operator to continue inputting information until the preceding field has been completed. The report shall be machine printed and presented according to the MSCC.

All dimensions in the survey report shall be metric.

CONSTRUCTION SPECIFICATION FOR CLOSED CIRCUIT TELEVISION INSPECTION OF PIPELINES

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409.01 SCOPE

This specification covers the requirements for inspecting new and existing sanitary and storm pipe sewers, and pipe culverts by closed circuit television.

409.02 REFERENCES

This specification refers to the following standards, specifications or publications:

Water Research Centre (WRc) Publication:

MSCC Manual of Sewer Condition Classification, Third Edition, 1993

409.03 DEFINITIONS

For this specification the following definitions apply:

CCTV: means closed circuit television.

Drainage Structure: means a catch basin, maintenance hole or ditch inlet.

NAAPI: means North American Association of Pipeline Inspectors.

409.04 SUBMISSION AND DESIGN REQUIREMENTS

A copy of the CCTV operator's current NAAPI Certification Certificate is to be provided to the Contract Administrator two weeks prior to the start of CCTV inspection operations. A copy of said certificate is required for each operator working on the contract.

409.05 MATERIALS

409.05.01 Video Cassette

All video cassette tapes shall be a minimum of high quality, T120 length, unused and VHS format.

409.06 EQUIPMENT

409.06.01 Survey Vehicle

The survey vehicle shall contain a separate area for viewing, recording and controlling the CCTV operation.

The viewing and control area shall be insulated against noise and extremes in temperature. External and internal sources of light shall be controlled in a manner as to ensure the light does not impede the view of the monitor screen. Proper seating accommodation shall be provided to enable persons, in addition to the operator, to clearly view the monitor screen.

All equipment utilized within the pipeline shall be stored outside the viewing, recording and control area.

The vehicle shall include a telephone, or suitable alternative as agreed with the Contract Administrator for the duration of the work.

409.06.02 Survey Equipment

The surveying equipment shall be capable of surveying a length of pipeline up to:

a) 350 m where entry to the pipeline may be obtained at each end of the pipeline;

b) 30 m where rodding is used; or

c) 150 m where a self propelled unit is used when entry is at one end of the pipeline only.

Work shall not commence in a work shift until the Contract Administrator is satisfied that all items of the survey equipment have been provided and are in full working order.

Each survey unit shall contain a means of transporting the CCTV camera in a stable condition through the pipeline.

Where the CCTV camera is towed by winch and cable through the pipeline, all winches shall be stable during the entire CCTV inspection. All cables shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera.

Each unit shall carry sufficient numbers of guides and rollers such that, when surveying, all cables are supported away from pipe and maintenance hole edges. All CCTV cables and lines used to measure the camera's location within the pipeline shall be maintained in a taut manner and set at right angles, where possible, to run through or over the measuring equipment.

409.06.03 Video Equipment Quality

The electronic systems, television camera and monitor shall be of such quality as to enable the following to be achieved.

409.06.03.01 Camera

The pan and tilt camera shall have the capability of panning the pipe at 360° with tilt capability of 275° to ensure complete inspections and view of all laterals and deficiencies.

Resolution

The live picture shall be visible with no interference and capable of registering a minimum number of lines of resolution at the periphery as indicated below:

a) Fixed view camera 350 lines of resolution.

b) Pan & Tilt camera 400 lines of resolution.

Colour Constancy

To ensure the camera provides optimum results when used with its own illumination source, the lighting shall be fixed to intensity prior to commencing the survey. To ensure colour constancy, no variation in illumination shall take place during the survey.

409.06.03.02 Video Cassette Recorder

The video cassette recorder (VCR) shall be capable of reproducing a resolution, at the periphery, of a minimum of 250 lines recorded at standard VHS speed. The VCR shall have four heads.

409.06.03.03 Focus, Iris, Illumination

The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The illumination shall be such as to allow an even distribution of the light around the pipeline perimeter without the loss of contrast or flare out of picture shadowing.

409.07 CONSTRUCTION

409.07.01 CCTV Inspection

The work shall include a CCTV inspection of the pipeline, and the preparation of all video, digital and written reports. Videos shall be recorded at standard VHS speed.

The CCTV operator shall be certified by the NAAPI.

A fixed camera shall be used for pipelines less than 300 mm in diameter. For pipelines equal to or greater than 300 mm a pan and tilt camera shall be used.

At the start of each pipeline being surveyed, the length of pipeline from zero chainage up to the cable calibration point shall be recorded and reported in order to obtain a full record of the:

a) pipe sewer length from the inside face of the maintenance hole to the inside face of the next maintenance hole or outlet end of the pipe sewer; or

b) pipe culvert length from one end of the pipe culvert to the other.

The metre reading entered on to the data display at the cable calibration point shall allow for the distance from the start of the survey to the cable calibration point such that the metre reading at the start of the survey is zero.

In the case of surveying through a maintenance hole where a new header sheet is required, the metre reading shall be set at zero with the camera focused on the outgoing pipe entrance.

At the start of each maintenance hole length, a data generator shall electronically generate and clearly display on the viewing monitor and video recording a record of data in alpha-numeric form containing the following minimum information:

a) Automatic update of the camera's metre reading position in the pipeline from adjusted zero.

b) Pipeline dimensions.

c) Maintenance hole/pipe length reference numbers.

d) Date of survey.

e) Road name/location.

f) Direction of survey.

g) Time of start of survey.

h) Pipeline use.

Once the survey of the maintenance hole length is underway, an automatic update of the camera's metre reading position in the pipeline from zero, in metres and tenths of a metre, shall be continually displayed.

The camera shall be stopped when defects are being noted on the coding sheet.

The survey shall be restarted at the opposite end of the pipeline if a blockage or obstruction is encountered.

409.07.02 Camera Position

The camera lens shall be positioned centrally in the pipeline with a positioning tolerance of ± 10% of the vertical pipeline dimension. In all instances the camera lens shall be positioned looking along the longitudinal axis of the pipeline.

409.07.03 Camera Travel Speed

The travelling speed of the camera in the pipeline shall be limited to:

a) 0.1 m/s for pipeline of diameter less than 200 mm;

b) 0.15 m/s for diameters exceeding 200 mm but not exceeding 310 mm; and

c) 0.20 m/s for diameters exceeding 310 mm.

409.07.04 Camera Position Metre Reading Device

A suitable metre reading device shall be used which enables the cable length to be accurately measured to indicate the location of the camera. The metre reading device shall be accurate to ± 1% of the length of the sewer being surveyed. The tolerance shall be demonstrated using one or both of the following methods in conjunction with a linear measurement audit form, which shall be completed each day during the survey:

a) Cable calibration device.

b) Tape measurement of the surface distance between maintenance holes.

If the accuracy of the measuring device fails it is to be replaced. The Contract Administrator may require that those lengths of pipeline first inspected with the original measuring device be resurveyed using the new measuring device.

409.07.05 Survey Reporting

Reports shall be submitted to the Contract Administrator in the following formats, within 10 working days of the completion of the field work, with the noted number of copies.

a) 3 copies of the printed report.

b) 2 - 3.5 inch computer disks each containing the identical survey report information.

c) 2 copies of the video recording.

All required header information fields shall be completed and verified for correctness. The software used to produce the survey report shall not allow the operator to continue inputting information until the preceding field has been completed. The report shall be machine printed and presented according to the MSCC.

All dimensions in the survey report shall be metric.

409.07.06 Site Coding Sheets

Each pipeline length shall be recorded according to the MSCC. Any variation from the manual shall be noted in the survey report.

409.07.07 Drawings

One clean set of the Owner's drawings showing maintenance hole numbers, which coincide with the coding sheets and video tapes, shall be returned to the Contract Administrator on completion of the survey. The drawings shall be clearly annotated to show any discrepancies between the drawings and the survey report. Such discrepancies shall be brought to the attention of the Contract Administrator during the survey.

409.07.08 Pipeline Cleaning and Dewatering

When specified, pipelines shall be cleaned and flushed immediately prior to inspection.

409.09 MEASUREMENT FOR PAYMENT

409.09.01 Actual Measurement

Measurement for the CCTV inspection of pipelines is in metres measured on the ground surface from the:

a) centre of one drainage structure to the centre of the adjacent drainage structure, or the outlet end of the sewer pipe; or

b) one end of a pipe culvert to the other end of the pipe culvert.

In the event that a CCTV inspection is terminated due to a blockage or collapsed pipe, or the pipe is inaccessible, measurement will be in metres for the actual length of pipeline inspected as determined from the chainage indication on the video tape.

409.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement will be based on the units shown in the clause under Actual Measurement.

409.10 BASIS OF PAYMENT

409.10.01 CCTV Inspection

Payment at the Contract price of the appropriate tender item for the installation of sanitary and storm pipe sewers, or pipe culverts shall include full compensation for all labour, equipment and material to do the work of CCTV inspection.