SANITARY & STORM SEWER MAIN
CLOSED CIRCUIT TELEVISION (CCTV)
INSPECTION AND CLEANING
SPECIFICATION
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Special Provisions

1. General

1.1. Scope of Work

The Contractor shall be responsible for all equipment and labour necessary to perform the inspection of sewers described under the attached prices and schedule, and any other work which may be occasionally authorized.

Before work will begin, the Contractor must provide the names and a certificate copy of the qualifications of operators who will be working in the City of Waterloo. Equipment operators shall be fully trained in all aspects of sewer inspection, capable of accurate observations and reporting of all conditions found using WRc defect codes. The City shall provide sewer layout maps showing the sewer sections to be cleaned and video inspected. The Contractor is to make any revisions to these maps to reflect actual field conditions and return them to the City on a bi-weekly basis along with report submissions.

The Contractor shall provide and furnish all required labour, materials, fuel, machinery and tools necessary, so that the Contract can and will be carried out continuously and expeditiously to completion, in all respects to the satisfaction of the Contract Administrator.

Changes, errors or mistakes made by the Contractor, his agents or employees, either through carelessness or otherwise, must be corrected by the Contractor, at her/his own expense.

In all cases of misunderstanding and disputes, verbal arrangements will not be considered. If any changes are made to the contract, written documentation containing the signature of both parties must be produced.

This specification shall be read in conjunction with any applicable contract documents and the OPSS 409 Construction Specification for Closed Circuit Television Inspection of Pipelines.

1.1.1. References

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

Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (SSMS)
SSMSD3.5.4 Cleaning and Flushing
SSMSD3.5.6 CCTV Inspections

Ontario Provincial Standard Specifications OPSS 409 Closed Circuit Television Inspection of Pipes

1.1.2. Scheduling of Work

The Contract Administrator will schedule the sequence of work with priorities given to the inspection of proposed construction projects. The City reserves the right to make additions or deletions as necessary. No payment shall be made for movement from location to location or travel time to the city.

The Contractor shall give City staff advance notice of the locations and types of work to be done on a daily basis by 9:00 a.m., including starting and finishing times. The Contract Administrator shall be notified immediately if no work is to be done. In the case of lost time due to inclement weather, excessive fogging within the sewers, breakdown, late arrival, etc., the Contractor will only be paid for actual metres completed.

When the City requires the services of the Contractor, a maximum of one-week interval between the request for services and arrival of the Contractor in the City of Waterloo will be allowed, unless an emergency dictates otherwise.

The City requires that the Contractor commence work on the contract for a trial period of three days in which time the quality of the reports and videos will be reviewed and any necessary changes or short comings will be amended. This is to ensure that the quality of the product is satisfactory and that both parties understand what is expected. The City will provide the locations that will be used for this trial period. Based on this trial, the City reserves the right to continue with or revoke the remainder of the contract.

1.1.3. Traffic Control

The Contractor shall erect all necessary signs, flashers, and warning devices, all properly positioned for the safe control of traffic and execution of the work. All devices shall be in accordance to the current Highway Traffic Act, the Ontario Ministry of Labour Regulations and the Ontario Traffic Manual Book 7 –Temporary Conditions (Field or Office Edition).

Interference to the normal flow of traffic shall be kept to a minimum. Where possible, equipment shall be located so that a single lane of traffic is maintained at all times. No road is to be closed by the Contractor. Contractors are permitted to work on City streets between the hours of 7:00a.m. to 7:00p.m. and on Regional roads between 9:00a.m. to 3:00p.m.

All works on Regional Roads require a work permit 48 hours before commencing work during the 9:00am to 3:00pm timeframe. Hours of work outside of the daytime hours indicated will require 11 days notice. Contact the Contract Administrator prior to start of work.

Some work may be required between midnight and 6:00a.m. on streets with high traffic flow and where traffic reductions are not permitted.
1.2. Mainline Sewer Cleaning

1.2.1. Intent

The intent of sewer cleaning is to remove foreign materials from the sewer and restore the sewer to a minimum 95% of original capacity. It is recognized that there are conditions such as broken pipe and major blockages where cleaning cannot be accomplished or that additional damage could result if cleaning were attempted or continued. Should such conditions be encountered, the Contractor will not be required to clean these specific sections. If in the course of normal cleaning operations, damage does occur from unforeseen circumstances, the Contractor will not be held responsible, providing that reasonable care was used.

1.2.2. Sewer Cleaning

Designated sewer sections will be cleaned using a combination unit with a high velocity jet, approved by the City. The cleaning equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action in all sizes of pipe. The combination unit shall include a water tank, debris tank, suction mechanism and hydraulically driven hose reel.

Cleaning equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes by the use of a vacuum system. The Contractor shall be required to make as many passes as necessary with a minimum of three (3) to restore the sewer to a minimum of 95% of the original capacity to ensure easy passage of the camera through the entire line. If cleaning of an entire section cannot be successfully performed from one manhole, it can be assumed an obstruction is present and cleaning efforts will cease and further investigations done.

1.2.3. Use of Hydrants and Water

Fire hydrants shall not be used without obtaining a hydrant use permit. When water from the fire hydrant is necessary to avoid delay in normal working procedures, the water shall be conserved and not to be used unnecessarily. In case of a fire no hydrant shall be obstructed, in the area served by the hydrant.

Operation of both public and private hydrants shall comply with the City of Waterloo standard operating procedure. See Appendix “E”. When hydrants are opened, they should be slowly flushed free of rust, and should always be allowed to drain after being used. The Contractor may use water from the list of approved City hydrants (see Appendix “E”) only after obtaining permission from the Contract Administrator. Any damage to hydrants resulting from misuse shall be the responsibility of the Contractor.

Water Hammer- To reduce the risk of damage to the water mains, (from the destructive forces of water hammer), City staff will install a gate valve on the hydrant port once the permit is issued. The Contractor must install a double check or reduced pressure type back flow preventor after the gate valve and before the supply hose. The back flow preventor must be available at all the times in the truck during the contract period for viewing, upon request by City forces. The back flow preventor must have a tag attached indicating it has been certified within the past year in accordance with the latest edition of CAN/CSA B64.10. Water hoses connected to hydrants should not be laid across the road and exposed to vehicular traffic, without the protection of a ramp.
1.2.3 Use of Hydrants and Water Cont’d

A Hydrant Use Permit MUST be obtained for Authorized use. Contact PWS Water Services Customer Service Representative for Hydrant Use Permit by telephone at 519-747-8613 or in person at the Waterloo Service Centre located at 265 Lexington Court. Bylaw 90-62 enforced. The hydrants assigned by the Contract Administrator Appendix “E” are to be used only. The Contractor is responsible for obtaining the necessary hydrant use permit and having it available for viewing while the hydrant is being used.

1.2.4. Cleaning Precautions

During cleaning operations, satisfactory precautions shall be taken so that the water pressure created does not damage or cause flooding of public or private property. When possible, the flow of sewage in the sewer shall be utilized to aid in the cleaning process. In older sections of the City, it may be necessary to reduce pressures to less than 1000 PSI to prevent water damage to homes. A maximum pressure of 1800 PSI will be used to prevent damage to the sewer lines. The Contractor is responsible for any flooding caused by his flushing operation and must respond immediately to any complaints received.

1.2.5. Recovery of Equipment

Every reasonable precaution shall be made to ensure equipment does not become stuck in the sewer. Should this occur, the City will make no payment for lost time. The Contractor shall be responsible for all costs associated with recovering the equipment. If it is determined that the Contractor is not at fault, the above shall not apply and the City will perform any work required to excavate the equipment.

If at any time, the nozzle and hose of cleaning equipment becomes stuck in a pipe section due to structural defects, Contractors may be required to cut the hose so it can be left in place until excavation is done and the equipment is retrieved. There will be no extra payment for this work.

1.2.6. Material Removal

Debris such as dirt, sand, rocks, grease and other solid or semi-solid material, which is a result of cleaning, shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole to manhole shall not be permitted due to the risk of a line plugging. This material will be removed using the vacuum system on the combination unit. At the end of each day, back flush the last section of sewer cleaned to ensure no build up of debris has occurred. Operators are required to decant liquid waste at the last manhole prior to disposal of the solid sludge ONLY at the approved dump site.
1.2.7. Disposal of Material

The City will provide a dumpsite for all materials removed from City of Waterloo sewers during the cleaning operation. This is the only permitted disposal site within the City of Waterloo during the contract period. The Contractor must have a special permit from the Ministry of Environment to transport and haul waste material outside of the City of Waterloo. If the need does arise, the Contract Administrator shall be provided with a copy of the C of A or Environmental Compliance Approval (ECA). Operators are required to decant approximately 75% of liquid waste at the last manhole prior to disposal of the remaining solid sludge at the approved dump site. The dump site is provided as a convenience for all Operators. Inform the Contract Administrator when the dumpsite is filled to approximately 75% of capacity.

1.2.8. Reaming

The City requests CCTV Contractors to have the capability to remove obstructions. This may be achieved by flail reaming or by robotic cutting. Flail reaming will not be allowed for the removal of intruding vitrified clay laterals. These are to be removed by robotic cutting. This item will be paid on a per hour basis.

1.2.9. Re-inspection

If in the opinion of the Contract Administrator, it is determined that re-inspection is required as a result of inadequate cleaning, the Contractor shall re-clean and re-inspect the sewer at no additional cost to the City.

1.2.10. Acceptance

Acceptance of sewer line cleaning shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the Contract Administrator. If CCTV inspections show the cleaning to be unacceptable, the Contractor is required to re-clean and re-inspect the sewer until accepted by the Contract Administrator. Once approved, payment will be issued.
2. Inspection

2.1. General

2.1.1. Sewer Main Inspection

Prior to commencing the inspection of a sewer section, the linear distance between the inside walls of the maintenance holes at each end of the section shall be measured, using a steel tape.

Prior to commencing an inspection, the Contractor shall de-water the sewer section to ensure that the full diameter of the pipe is visible, where indicated in the Schedule of Unit Price. Flow in the pipes will be controlled to a maximum depth of 20% of the pipe diameter to permit viewing of the pipe walls. The method of control shall be outlined to the City of Waterloo and accepted prior to the commencement of work. The Contractor shall maintain the flow, where required, of all sewers, drains, house or inlet connections encountered during the progress of the work and if necessary provide by-pass pumping.

The maximum speed of the camera during the inspection shall be 9 meters/minute. Where a structural defect identified as a fractured, broken, missing or collapsed pipe is encountered, the camera shall be stopped and rotated to permit inspection of the defect at an angle of 90 degrees. The camera shall be stopped to ensure accurate recording of all defects or drain connections.

The camera lens shall be kept clean at all times. No inspection of a sewer shall proceed while the camera lens is dirty (i.e. it impairs the operators’ ability to accurately encode features).

The sewer section shall be kept clear of fog during the inspection. No inspection of a sewer shall proceed while fog is present in the pipe.

The chainage shall commence at the inside wall of the starting maintenance hole and shall be accurate to within 1.0 percent of the length of the sewer as compared to the steel tape measurement. If the chainage is not accurate to within this limit, the inspection will be rejected. The chainage indicator shall be adjusted to indicate the chainage of a point on the wall of a sewer as it passes the periphery of the picture. The inside wall of the maintenance hole at each end of the sewer section shall be clearly visible on the inspection videotape.
2.1.2. Manhole Inspection

The aim of the CCTV inspection is to collect all the necessary information on the manhole and pipe details, based on the information that can be obtained at the time of inspection. The Contractor shall be responsible for completing the inspection sheet (refer to Appendix “A”) for all manholes on sewer sections inspected during the Contract. The manhole inspection sheet will be provided by the City and includes, but not limited to the location, service type, material, scoring of the manhole condition etc. The inspection sheets are to be submitted bi-weekly along with the video reports.

Submit videos, index of the original video inspections on 5.2 mm slim-line clear “jewel cases” capable of displaying the information in the ‘Sewer inspection title for DVD’. The DVDs, and jewel cases are to be labeled as shown on Number 2 of Appendix C for maintenance & rehabilitation projects. For Subdivision reference see Appendix D.

The manhole inspection video(s) shall be in a DVD ROM sorted by sequential order “not hidden in folders”. This DVD ROM may contain multiple manhole inspection videos and each manhole inspection mpeg file shall be named by the manhole name provided by the City.

Conduct all manhole inspections in accordance with the following:

i. Inspect from the top of the manhole frame to the bottom of the manhole at the centerline elevation of the existing sewer.

ii. Position a graduated survey rod in the manhole that will be visible during the entire inspection to indicate distance.

iii. Block ambient light to reduce lens flare and poor contrast during the inspection.

iv. Ensure the frame of the manhole is visible at the start of the inspection. Keep the picture in focus during the inspection from the point of observation to a minimum of two riser diameters ahead. Stop camera for 2 seconds at major defects and connections.

v. Rotate and pan the camera to provide a perpendicular view of all major defects and connections. Major defects to include but not be limited to cracked and deformed risers or barrels, displaced bricks, holes, large displaced joints, missing or damaged gaskets between manhole sections, missing bricks or concrete, missing mortar.

vi. Rotate and pan the camera a full 360 degrees at the following locations.

1. 300 mm below the frame and cover. Ensure the base of the frame is clearly visible.

2. 300 mm below the base-to-riser flat top or conical reducer joint.

3. 300 mm below the top of the base joint.

4. The centerline of incoming existing sewers.

vii. Contractor may be required to perform sewer and manhole inspections where the Engineer has determined the specified tolerance requirements have not been satisfied.
2.1.3. Sequence of Work

The CCTV inspection of the sewer shall be carried out as follows:

a) The sewer shall be dewatered, as required, by Section 2.1.8 to ensure that the full diameter of the sewer is visible during the inspection, where included in the Schedule of unit prices;

b) Manhole Inspection shall be carried out as required by Section 2.1.2.

c) The sewer shall be inspected using CCTV equipment in accordance with OPS 409.06 specifications;

d) At the start of each survey use a video overlay system to clearly display, the “on screen display for the start of each sewer section” on the monitor and video recording, as described in Appendix “C” for 30 seconds.

e) The media storage (DVD) containing data files, videos and the summary reports shall be submitted to the Contract Administrator as stated in section 2.1.9.c and 2.1.9.f. The DVDs and jewel case are to be labeled as shown on Number 2 of Appendix C for maintenance & rehabilitation projects. For Subdivision reference see Appendix D.

f) The Contractor must have the ability to respond to emergency requests for inspections and/or flushing/cleaning works within (4) hours of verbal notification during the period of the Contract.

2.1.4. Reversal and Abandonment of Survey

When the CCTV camera, during the course of sewer inspection (survey), is obstructed in it’s progression from maintenance hole to maintenance hole, then a reversal must be performed, where the survey is paused and resumed from the opposite maintenance hole. If such a survey abandonment occurs, the Contract Administrator MUST immediately be notified by the Contractor. Abandonment of the survey of the sewer length may be considered in any following circumstances:

- Inability to maintain picture quality due to condition of the sewer;
- Risk to the contractor’s equipment;
- Inability to locate the maintenance hole;
- Inability to gain access to the maintenance holes once located;

2.1.5. Recovery of Equipment

Every reasonable precaution shall be made to ensure equipment does not become stuck in the sewer. Should this occur, the City will make no payment for lost time. The Contractor shall be responsible for all costs associated with recovering the equipment. If it is determined that the Contractor is not at fault, the above shall not apply and the City will perform any work required to excavate the equipment.
2.1.6. **Standby Time**

The Contractor will indicate the amount per hour to be charged for standby time if unable to proceed with cleaning and CCTV inspections due to circumstances beyond his control. The Contractor is to notify the Contract Administrator immediately if on standby time.

2.1.7. **Contact Phone Number**

The Contractor shall provide to the Contract Administrator a mobile telephone number for direct contact to the flushing and CCTV trucks.

2.1.8. **Flow Control & By-Pass Pumping**

When interruptions of sewer section flows are necessary to effectively conduct inspections, the Contractor shall, subject to the approval of the City, control flows using plugging and blocking methods.

The City reserves the right, when necessary, to request bypassing and de-watering of a sewer to be inspected. The Contractor will be responsible for any damage to public or private property resulting from the bypass operation or lack thereof.

A sewer line plug shall be inserted into the line at a manhole upstream from the section to be inspected. The plug shall be designed so that all or any portion of the sewage flows can be released during the inspection. Flows shall be reduced in order to inspect the pipe invert. Sewage levels upstream of the plugged section shall be monitored at all times. After the work is completed, flows shall be restored to normal.

2.1.9. **Reports**

a. Code the sewer condition in accordance with the requirements of the U.K Water Industry, Engineering and Operations Committee, (WRc) “Manual of Sewer Condition Classification” Third Edition, 1993. **The City has added the following codes to be used in remarks:**

   - Lateral codes to include - Black Pipe (BLT), Vitrified Clay (VLT), Concrete (CLT), Asbestos Cement (ALT), Poly-Vinyl Chloride (PLT) and Buried Manhole (BMH)

b. Provide one copy of the hard copy report and an electronic copy of the inspection report in MS word format.

c. The report is to begin with a front cover & an index as described in Appendix “C”.

d. The Annual CCTV Contractor shall submit the inspection reports binders to the Contract Administrator on a bi-weekly basis for review.

e. For City and Regional road rehabilitation projects the inspection reports shall be submitted to the Contract Administrator in the following formats, within 10 working days of the completion of the fieldwork.

f. The report is to be prepared during the sewer inspection and each survey will have its own report and a video file. The report will be in book form with mounted colour photographs. Revised copies of the maps, as noted in The Scope of Work, are to be attached to the reports.
Video

3.1.1. General

The DVD shall contain tables of electronic data that can be imported into the City’s “CTspec”, Sewer Pipe condition Analysis program in “sewer.dat” format data file described within Appendix “B”, and the supporting videos and an electronic copy of the inspection reports in MS word format.

3.2.1. Inspection and Equipment

1 The camera unit shall be self-propelled and have an adjustable lighting system capable of providing a clear monitor picture and a minimum illumination level of 100-foot candles.

2 The video inspection of each sewer section shall be done in the direction of flow unless circumstances do not permit this. Each sewer section shall be inspected consecutively as shown on the maps provided.

3 Inspection units shall be equipped with all equipment required for taking instant photographs of the view that appears on the monitor during the course of the inspection.

4 Each inspection unit shall be equipped with fans and/or blowers necessary to remove any fog that may be present in the sewers during inspection.

5 Sewer sections shall be kept clear of fog during the inspection. No inspection of a sewer shall proceed while fog is present in the pipe.

6 Inspections shall be performed by means of self-propelled units. The rate at which the camera moves through the pipe shall not exceed 9 meters /minute.
3.2.2. The Video Format

**DVD ROM Data Storage Format**

1. The CCTV data will be DVD ROM compliant in that the video digits in the data accurately reflect the position on the DVD ROM. The CCTV video recording (DVD version) must be indexed to the textual data. The field survey must record the time index on the video, which shows the image(s) 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.

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

3. The CCTV inspection data files and videos can be transferred to DVD either directly from the truck or from a VHS recording device.

4. The picture resolution of the inspection videotapes shall not be less than 250 lines at the periphery of the picture.

5. Record the Analog Format Video in the field if necessary in conformance with the following requirements

   5.1 Inspections will be in colour on VHS format videotapes at standard play speed (SP mode). Use high grade, new unused videotapes.

   5.2 Ensure that the entire inspection is contained on one videotape. Where possible, record reverse set-up inspections immediately after original inspection.

6. It is the intent of the City of Waterloo to stay abreast with technology and to move forward, contractors are requested to meet mpeg2 or better video quality. Digital Format Video will be in conformance with the following requirements. Capture in colour from the live video source in parallel with the VHS tape recording to the following requirements shown in Table 1.

<table>
<thead>
<tr>
<th>Picture Size/ NTSC</th>
<th>Video Bit Rate/Mb/s</th>
<th>Frame Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVD 704X480</td>
<td>3, 4 or 5(good, better, best)</td>
<td>29.97 or higher</td>
</tr>
</tbody>
</table>

6.1 Use video capture equipment capable of capture with no frame loss to obtain digital video from first generation recordings. Digital video recordings can be saved to a hard drive and transferred to recordable media (DVD R) for submission.
3.2.2 The Video Format Cont’d

6.2 Each inspection will be contained within one complete single digital file that will be produced in one of the following ways.

1. Use a computer system and video capture card to capture the original recording continuously, regardless of the progress of the inspection.

2. Edit the original raw digital file to remove pauses where inspection progress is not continuous before submission.

3. Edit the original raw digital file to form one continuous file for submission.

4. Use non-linear video editing software to edit digital videos. Do not recompress edited digital files.

5. Ensure each digital video file (MPEG4) contains a file name with a maximum of 5 characters in accordance with the following: This inventory assignment number is described further in Appendix “G”.

6. Submit digital files with an index on each of the DVDs in 5.2 mm slim-line clear “jewel case” as described within Appendix “C” & “D”.

7. Ensure that the entire inspection is contained on same DVD or set of DVD’s. Again use the same reference number until section is complete.

8. The resulting pipe inspection DVD(s) shall contain:
   i. Text data file in sewer.dat format
   ii. Digital videos in industry standard MPEG 4 format
   iii. Electronic copy of the inspection reports in Microsoft Word format

9. The resulting manhole inspection DVD(s) shall contain
   i. Digital videos in industry standard MPEG 4 format

10. Record reverse set-up inspections immediately after original inspection.
3.2.3. Payment

Report and invoice submissions are to be made end of the project each year. Progress payments can be arranged at the end of each month. Progress payments will be processed after all of the following have been submitted, reviewed and approved by the Contract Administrator:

a) Hard copy inspection reports with Manhole inspection sheets.

b) Pipe inspection videos with electronic data on DVD ROM or alternate digital media storage

c) Manhole inspection videos on DVD ROM(s)

d) Where reaming is required, payment will be issued for complete inspections only, with an additional hourly payment for the reaming. Payment will not be issued for partial inspections where reaming is required.

e) Payment for cleaning and flushing of sewers shall be made at the unit rate in the Schedule of Unit Prices and shall include all labour and equipment necessary for the work requirement. Payment of cleaning and flushing shall be based on steel tape measurement of the sewer section being cleaned.

f) Payment for all equipment, labour and materials required for the inspection of sewers and the preparation and supply of video inspection records and for the preparation and supply of reports shall be at the unit rate provided in the Schedule of Unit Prices for the diameter of sewer being inspected. Measurement for the CCTV inspection of pipelines is in meters measured on the ground surface from the inside wall of one manhole to the inside wall of the adjacent manhole or the center of one manhole to the center of the adjacent manhole.

In the event that an inspection must be terminated due to a blockage or collapsed pipe, payment will be based on the actual length of the sewer inspected, as determined from the chainage indication of the videotape.

g) The unit prices quoted on the Schedule of Unit Prices shall include all costs associated with the reducing of the flow in the sewer using plugging or blocking methods and removal of fog, when required.
4. Consultant / Developer Start of Maintenance/Final Inspections of New Subdivisions

Each year there are a number of “New Subdivisions” requiring beginning of maintenance & final CCTV inspections of the 2 year “maintenance period”. The City of Waterloo prefers that these inspections be carried out by the City’s current annual CCTV Inspection contractor. If a Contractor, other than the City’s current annual CCTV Inspection contractor is used, they must first submit documentation to the Contract Administrator prior to commencement of the project, which proves that they are capable of meeting the requirements of this specification. Regardless of what contractor is used, the City of Waterloo Sanitary & Storm Sewer Main Closed Circuit Television (CCTV) Inspection and Cleaning Specification must be adhered to.

Copies of the reports, including, hard copies and media storage (DVDs) are to be sent directly to Developers or their representatives to review & correct deficiencies before submitting to the City of Waterloo. Sanitary sewer CCTV information (hard copy & electronic copy) are to be submitted separate of the Storm sewer CCTV information (hard copy & electronic copy). Labeling for these reports is to be in accordance with Appendix “D”.
## APPENDIX INDEX

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### SEWER MANHOLE INSPECTION REPORT

**Date:** _____________  
**Weather:** ___________________ 
**Atmospheric Readings:**  
- LFL  
- O2  
- H2S  
**Inspector:** _______________________

**City of Waterloo Manhole Number** _______________

**Municipal Address (closest to manhole):** ___________________________

### LOCATION

<table>
<thead>
<tr>
<th>Road</th>
<th>Side walk</th>
<th>Boulevard</th>
<th>Easement</th>
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### TYPE OF FLOW

<table>
<thead>
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<th>Sanitary</th>
<th>Storm</th>
<th>Combined</th>
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### MANHOLE TYPE

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<th>Straight Through</th>
<th>Intersection</th>
<th>Top End</th>
<th>Catchbasin Manhole</th>
</tr>
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</table>

### DEPTH OF MANHOLE (metres)

( from top of casting to centre of channel)

### SIZE OF MANHOLE(mm)


### CONDITION AND MATERIAL

#### MANHOLE MATERIAL

<table>
<thead>
<tr>
<th>Precast</th>
<th>Cast in Place</th>
<th>Brick</th>
<th>Lined</th>
</tr>
</thead>
</table>

#### MANHOLE CONDITION

<table>
<thead>
<tr>
<th>Surface Damage</th>
<th>Cracked</th>
<th>Fractured</th>
<th>Broken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Displaced</td>
<td>Mortar Missing</td>
<td>Bricks Missing</td>
<td>Debris</td>
</tr>
</tbody>
</table>

#### BENCHING

<table>
<thead>
<tr>
<th>None</th>
<th>Surface Damage</th>
<th>Cracked</th>
<th>Fractured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken</td>
<td>Joint Displaced</td>
<td>Mortar Missing</td>
<td>Bricks Missing</td>
</tr>
</tbody>
</table>

#### DROP STRUCTURE

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Inside</th>
<th>Outside</th>
</tr>
</thead>
</table>

#### STEPS

<table>
<thead>
<tr>
<th>None</th>
<th>Missing</th>
<th>Broken</th>
</tr>
</thead>
</table>

#### SAFETY LANDINGS

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### MANHOLE PAN REQUIRED

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### FRAME/COVER

<table>
<thead>
<tr>
<th>Loose</th>
<th>Poor Access</th>
<th>Buried</th>
<th>Damaged</th>
</tr>
</thead>
</table>

#### ADJUSTMENT TYPE AND HEIGHT

<table>
<thead>
<tr>
<th>None</th>
<th>Moduloc</th>
<th>Concrete</th>
<th>Metal</th>
<th>Other</th>
</tr>
</thead>
</table>

#### CASTING PROTRUDING ABOVE ROADWAY

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### CASTING DEPRESSED GREATER THAN 5cm IN ROADWAY

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### INFILTRATION

<table>
<thead>
<tr>
<th>Seeper</th>
<th>Dripper</th>
<th>Runner</th>
<th>Gusher</th>
<th>Litres per minute(estimate)</th>
</tr>
</thead>
</table>

#### REPAIRS REQUIRED

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Immediate</th>
<th>Heavy Debris</th>
<th>Benching</th>
<th>Major Structural</th>
</tr>
</thead>
</table>

#### DIGITAL PICTURE TAKEN

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### overall Score of Manhole

(1 to 10 scale - with 1 not acceptable and 10 very good condition)

**Comments:**

---

11
Manhole Number

Show North direction
Show all connecting mainline inlets, outlets and laterals indicating direction of flow for each.
Appendix B

CCTV Data Transfer “Sewer.dat”
Data Specification and Inspection Rules

Overview:
The Sewer.dat inspection data transfer format has been in existence since 1984. This “open architecture” format was devised by the UK Government body called WRc to ensure that inspection data could be transferred between many applications and that no one contractor or software supplier had a monopoly on inspection data input/interrogation software.

It’s format basis is derived from the site data input form found in the Manual of Sewer Condition Classification Ver. 2, 3, & 4, without the guideline boxes. Copies of the Manual are readily available.

There are at least 15 specialist software programs around worldwide that accept this format, and can be imported into ACCESS, Dbase V (with the sewer.dat fields properly defined within such applications) and geographical information systems.

The specification for the format is “free issue” and devoid of “control characters” that can be found in some bespoke applications/data transfer specs.

A number of companies offer a free service to contractors who wish to export to the sewer.dat format from their data handling software to test the correctness of the format and offer advice when necessary.

To ensure that the data transfer file format is correct the following points are to be adhered to:

• The file is to be standard ASCII text format (i.e. no control characters) therefore each line in the file should be terminated by an ASCII carriage return/linefeed combination i.e ASCII code 13 followed by ASCII code 10 (the default termination on most text generation programs).

• The maximum line length must not exceed 81 characters including the ASCII termination code, except for line 1 where the contractor can have their own reference after the 80th character.

• Decimal points must not be in any header field.

• Each header line must start with a three character identifier “OHn” n being between 1 and 6.

• Each detail line must start with a three character identifier “OD1”.

• Decimal points must be in detail footage.

• N=Numeric

• All characters in the Header Section Must be in upper case letters
Sample sewer.dat file:

```
0H1Pipespec 05A01 SPECIAL 0000108859 003X 383
0H22305661145EASTERN AVENUE TORONTO
0H3EASTERN0040340000000000EASTERN00303200000000000
0H4CU0300 CVC 0600670
0H505A0105A01DVD
0H6Z3C-                                                 Z
0D12830   000.0  ST             DOWNSTREAM                       [ 471]
0D12830   000.0  MH             EASTERN004
0D12830   000.0  WL             05
0D12830   000.0  GO             MH#EASTERN004 CAROLINE AVE
0D12870   000.6  EMJ    070515
0D12890   001.2S1ELJ    0705
0D12970   008.5  CX  10012    LIVE, CALCITE BUILDUP
0D13020   014.1  CM     0804
0D13050   015.8  IDJ    12      CALCITE BUILDUP
0D13150   016.3F1ELJ    0705
0D13170   016.3  EHJ    070525
0D13200   016.3  SA             CAMERA BLOCKED BY CALCITE        [ 532]
```

The anatomy of the sewer.dat file is as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Start Position</th>
<th>Number of Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1 “OH1”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveyed By</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Contract Number</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Job Number</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Catchment</td>
<td>34</td>
<td>10</td>
</tr>
<tr>
<td>Division</td>
<td>44</td>
<td>3</td>
</tr>
<tr>
<td>District</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td>Pipe Length Reference</td>
<td>48</td>
<td>11</td>
</tr>
<tr>
<td>Line 2 “OH2”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Time</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Road Name</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>Place Name</td>
<td>44</td>
<td>20</td>
</tr>
<tr>
<td>Line 3 “OH3”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Manhole</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Start Depth</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Start Cover</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>Start Invert</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>Finish Manhole</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>Finish Depth</td>
<td>38</td>
<td>4</td>
</tr>
<tr>
<td>Finish Cover</td>
<td>42</td>
<td>5</td>
</tr>
<tr>
<td>Finish Invert</td>
<td>47</td>
<td>5</td>
</tr>
<tr>
<td>Line 4 “OH4”</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>-------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Use</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Direction</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Size1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Size2</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Shape</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Material</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Lining</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Pipe Length</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Total Length</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>Year Laid</td>
<td>28</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 5 “OH5”</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Tape Number</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Video Recorder</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Comments</td>
<td>19</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 6 “OH6”</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Weather</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Location</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Location Details</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>Category Code</td>
<td>57</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Details “OD1”</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Number</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Photo Number</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Distance</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>CD</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Code</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Diameter</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>Clock At</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>Clock To</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Percentage</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>Intrusion</td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td>Remarks</td>
<td>35</td>
<td>30</td>
</tr>
</tbody>
</table>

**Note:** The position from character 29 to 32 is a shared field in that there is no defect or feature that would have both percentage and instruction, hence if percentage the start position would be 29 for two characters (99%max), and if instruction, the start position would also be 29 but zero filed (20 inches would be 0020, for instance). If it is anticipated that there would be no instruction greater than 99 inches (which is likely) then the start position for instruction could be 31, as the resulting output file position would be the same but just without two proceeding zero’s.
General Reporting Notes- **Header Information**
(To be read in conjunction with other related documentation, i.e Clients Instructions or the Manual of Sewer Condition Classification):

The Inspection Company and the Inspectors name must be entered on the header. The data and accurate time of the inspection must also be recorded. Pipe sizes and shape must also be recorded. Recheck the accuracy of the Manhole numbers and road names as these are the “keys” to the whole inspection. The Depth of the start and finish Manhole must be entered, but as a minimum the start Manhole Depth is essential.

A total length between Manholes (Total Length field) must be entered, either from the footage to the finish Manhole (when the inspection successfully reaches finish Manhole) or estimated either from the plan or by striding the length. It is fully understood that, in the case of a SA, the total footage is an estimate. If the finish Manhole cannot be found then enter a sensible footage (normally 300 feet as an example) and not the footage of the abandonment. If estimated then just enter the text “Tot Len” in comments.

If a buried or uncharted Manhole is encountered then the inspection report MUST be finished with the MH/FH codes. In the case of an un-identified Manhole being found then the numbering of the Manhole MUST be as advised by the client prior to the start of the inspection contract. **Don’t just makeup the number. Make the position of the uncharted Manhole, with its number, on the site plan also making it obvious.**

If the inspection is abandoned and then inspected from the other direction then the current inspection must be finished using SA (plus a reason for the inspection being abandoned, SA) and a new header must be started. If the inspection is not going to be carried out from the other Manhole, in the case of a SA, then the header sheet MUST still be completed as if the inspection was to take place, with the reason for failing to carry out the inspection. **See the separate “No Access Instructions” appended to these guidelines.**

Determine prior to start of the contract, what text (data) the client wants displayed on the monitor (hence recorded). At the start of each inspection as much information as possibly needs to be recorded. The general minimum data to be displayed during the actual inspection would be:
- Date of Inspection
- Start and Finish MH
- Inspection Direction (Just U for Upstream or D for Downstream)
- Footage
General Reporting Notes- **Detail Information**
(To be read in conjunction with other related documentation, i.e Clients Instructions or the Manual of Sewer Condition Classification):

- **The Video Tape MUST be set to SP and NOT EP or LP FOR the best quality to be achieved, especially if the Video is going to be encoded onto CD-ROM.**
- The first three lines of each set of inspection details must have the codes ST, MH, and WL (WL is optional but is important to the Engineer as it directly relates to the sewer flow level at a certain time of day).
- **Alpha numeric number in the contract field MUST be used to electronically label the DVD/CD. This number must be obtained from the Contract Administrator prior to start any inspection.**
- **Alpha numeric number in the Video Tape Number field MUST be used to name the video MPEG file(s). (Ref: Appendix G)**
- **The Manhole Number must be entered in the remarks column against the MH code (this is essential as a number of data interrogation packages stores the header and detail records separately which are “connected” by an index. To ensure data integrity, a QC check can be run against the Detail information to confirm that the correct details are against the relevant header).**

<table>
<thead>
<tr>
<th>v Digit</th>
<th>Dist</th>
<th>Code</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0230</td>
<td>0.0</td>
<td>ST</td>
<td>MPL-30</td>
</tr>
<tr>
<td>0.0</td>
<td>MH</td>
<td>WL</td>
<td>10</td>
</tr>
</tbody>
</table>

- **Each line of Detail (or as an absolute minimum against the first and last detail lines) must have the video digit (V Digit) entered against each code, presented in the following way:**
  - The video digit must conform to the National elapse time base standards (time into the tape) for video tape recorders:
    - Always four digits (hmms, where s= units of 10 seconds)
    - Always right justified and zero filed.
    - The following elapsed time format MUST be adhered to, i.e.: 0230 is:
      = All seconds (3 minutes and 50 seconds)
    - Other Examples:
      - 0032= 32 seconds into the tape
      - 1503= 25 minutes and 3 seconds into the tape
      - 2451= 40 minutes and 51 seconds into the tape
    - This method locates the position of the defect/feature into the tape within 10 seconds, which is more than adequate.

The final Detail line for MUST end with the termination code, either SA (Survey Abandoned) or FH (Survey finished).

- i.e. 2451 76.0 F1 FL 12
- 2451 76.0 RMJ 30
- 2451 76.0 SA DUE TO ROOTS M
- OR
- 1495 97.3 D 10
- 1503 102.9 MH SJ355 13464
- 1503 102.9 FH
Each inspection Report must only contain one inspection hence, in the case of survey abandonment or buried or uncharted Manholes being encountered, a new header and a Detail must be completed. The above are essential for the validation of the data to take place and to tie the data in with the mapping systems.

When a defect or feature is encountered the camera must be stopped just prior to the defect/feature so that it can be clearly seen.

The defect/feature must be recorded for a sufficient amount of time to enable the engineer to assess the observation, without recourse to using the “pause” facility.

A video digit must be entered against the defect/feature in the format of time elapse into videotape. The format is: s: seconds (explained above).

If the defect span for more than 3 feet or is repetitive over a number of joints (i.e. ELJ, Encrustation Light at Joint) then a start flag (S1, S2 etc, sequentially up to S9 then SA, SB ...SZ! can be used) can be entered against the code at the start footage. When the defect finishes the appropriate finish flag, the flag is inserted against the defect at the finish footage and the same flag number is used to finish the defect off (S1 MUST finish with an F1 and so on). This will aid the Rig Manager in reporting repeating defects without having to enter the code at every joint footage or every 3 feet.

Note: The defect that has a start flag against it can change its position (i.e. a FL or CL) but not its magnitude (i.e. you cannot start with CL and finish with FL). You must “close”, or finish, the defect with the appropriate finish flag and then start the new defect with an UNUSED (in the current inspection) start flag.

If the inspection was abandoned (SA) then a reason for the abandonment MUST be entered in the remarks column against the SA code. The description of the reason for the survey abandoned should contain the appropriate defect code that has caused the abandonment (i.e. if due to an intruding connection) then the end of the report would read:

```
1102 342.8 CNI 04 11 02
1102 342.8 SA DUE TO CNI
```

If you are unsure about the defect magnitude (an FL or CL, for instance) then enter worst code of the two, with its support information, and then in remarks enter:

POSS CL

i.e. 0032 301.2 FL 11 POSS CL

All defects and features MUST have the relevant support data (i.e. JN/CN must have sizes and positions).
Appendix -C

REPORTS

1. Sewer Inspection Title for Report– Front Cover

1st Line City of Waterloo – 2007 Sanitary Sewer CCTV Inspections
2nd Line Contract No. - (Ref: Appendix G)
3rd Line Map No – (City Sanitary Atlas Map #) Provided by Contract Administrator
4th Line DVD No- (Ref: Appendix G)
5th Line Street Names

Note: Annual Contract - 2007 Reports to begin at 07A01
New Subdivisions – SEE Appendix D for new subdivision format

2. 2nd Page of Report – CCTV Inspection Report/DVD Video Index for Jewel Case

1st Line DVD Number
2nd Line Date
3rd Line Street Name
4th Line Start MH Finish MH
5th Line Use (Sanitary or Storm)

Media Storage (DVD’s)

1. Sewer Inspection Title for DVD- Label

1st Line City of Waterloo
2nd Line DVD No-(Ref: Appendix G)
3rd Line Street Name/s

VIDEO’s

1. On-Screen Display for the Start of Each Sewer Section

While the camera is stationary at the beginning of the section, the following should appear on the screen:

1st Line From Manhole Number > To Manhole Number
2nd Line Street Name
3rd Line Location Description (example – 2nd MH north of King Street)
4th Line Size of Pipe, Pipe Use (Sanitary or Storm)
5th Line Camera Direction (Up or Down Stream)

2. Continuous on Screen Display for the CCTV Inspection of Sewer Sections

While the camera is travelling at no more than 9 meters per minute these headings shall appear at the bottom left hand corner of the screen:

1st Line From Manhole Number > To Manhole Number
2nd Line Street Name
3rd Line Camera Direction (Up or Down Stream)
4th Line Footage
Appendix -D

SUBDIVISION REPORTS

1. Sewer Inspection Title for Report– Front Cover

1st Line City of Waterloo
2nd Line Subdivision Name, Stage, & Phase
3rd Line Consulting Firm’s Name
4th Line DVD Number (Ref: Appendix G)
5th Line Indicate Start or End of Maintenance Period


1st Line DVD Number
2nd Line Date
3rd Line Street Name(s)
4th Line Start MH Finish MH
5th Line Use (Sanitary or Storm)

SUBDIVISION DVD’s

1. Sewer Inspection Title for DVD Labeling

1st Line City of Waterloo
2nd Line DVD No-(Ref: Appendix G)
3rd Line Subdivision Name, Stage, & Phase
4th Line Consulting/Developer Firm
5th Line Indicate Start or End of Maintenance Period

VIDEO’s

1. On-Screen Display for the Start of Each Sewer Section

While the camera is stationary at the beginning of the section, the following should appear on the screen:

1st Line From Manhole Number > To Manhole Number
2nd Line Street Name
3rd Line Location Description (example – 2nd MH north of King Street)
4th Line Size of Pipe, Pipe Use (Sanitary or Storm)
5th Line Camera Direction (Up or Down Stream)

2. Continuous on Screen Display for the CCTV Inspection of Sewer Sections

While the camera is travelling at no more than 9 metres per minute these headings shall appear at the bottom left hand corner of the screen:

1st Line From Manhole Number > To Manhole Number
2nd Line Street Name
3rd Line Camera Direction (Up or Down Stream)
4th Line Footage
List of Hydrants to be used by the CCTV Contractor for Sewer Flushing

<table>
<thead>
<tr>
<th>STREET</th>
<th>LOCATION</th>
<th>HYDRANT NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen St. E.</td>
<td>St. John's Senior's Home</td>
<td>771</td>
</tr>
<tr>
<td>Seagram Dr.</td>
<td>Entrance to Granite Club</td>
<td>354</td>
</tr>
<tr>
<td>Winchester Dr.</td>
<td>397 Winchester Dr.</td>
<td>1246</td>
</tr>
<tr>
<td>Parkside Dr.</td>
<td>Access from Albert McCormick Arena main parking entrance</td>
<td>235</td>
</tr>
<tr>
<td>Service Centre Yard</td>
<td>At the Dearborn Entrance</td>
<td>N/A</td>
</tr>
</tbody>
</table>

APPENDIX E
A Hydrant Use Permit **MUST** be obtained for Authorized use. Contact PWS Water Services Customer Service Representative for Hydrant Use Permit by telephone at 519-747-8613 or in person at the Waterloo Service Centre located at 265 Lexington Court. Bylaw 90-62 enforced.

1. Pick-up hydrant gate valve **HANDLE** from Customer Service Representative before start of job.

2. Remove hydrant cap from the backflow prevention device.

3. Connect your fire hose or connection to the backflow prevention device & operate gate valve as needed.

4. When water use is completed, close gate valve & disconnect your hose connection from the backflow device. (**DO NOT LEAVE HANDLE ON GATE VALVE UNATTENDED**)

5. Replace hydrant cap on the end of the backflow device.

6. Return hydrant gate valve **HANDLE** at the end of the contract or job completion. (If lost, or not returned, you will be invoiced for a full gate valve replacement cost.)

7. Special provisions for hydrant use must be made during the colder or freezing times of the year. Contact the Customer Service Representative for proper use of hydrant during this type of cold weather.

Contact the Customer Service Representative if there is any damage or problems with the use of the authorized hydrant.
Appendix G

Media Storage (DVD) and Video (MPEG) File Numbering Procedure for CCTV Inspections

Note
This Appendix shall be read in conjunction with Appendix B

The following information is provided to assist in the submission of CCTV requirements to the City of Waterloo. The information is also available from the City of Waterloo CCTV Specifications & the Development Services Manual.

CCTV information is to be submitted in electronic format as a combined package on the DVD submission. Sanitary & Storm information MUST BE submitted separate from each other and will NOT be accepted if storm & sanitary are combined on one DVD.

Important

The following format must be followed when electronically naming the recordable media (DVD ROM) and MPEG video file(s). In order to correctly link video MPEG(s) to the text data file, the inventory number used in naming the DVD and MPEG file(s) MUST reflect on the sewer.dat text data file in appropriate fields (refer Appendix B)

The CCTV information is to be submitted on DVD(s), using the following INVENTORY assignment format:

<Last 2 numerals of the current year> <Assignment # > <CCTV sequence number assigned>

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>Column D</th>
<th>Column E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

(ex. 19R01 for sanitary and 19R51 for storm)

Definition:

Column A & B - Represent the year of Inspection (use the last two numerals of year)

Column C - Represents one of three options:
   a) The Annual Maintenance contract will be assigned the letter “A”.
   b) The Rehabilitation project will be assigned the letter “R”.
   c) The Subdivision Consulting Firm/Developer will be assigned a numerical code for all subdivision works within the City of Waterloo. Consultants approved for city rehabilitation projects are to contact the Public Works Services representative for detail.

Definition:

Again the “current year” detail is the year submitted to the City of Waterloo, the “Consultant”/Developer assignment is from Table 1, and the “CCTV sequence number” is established based on the next sequence number in the year’s total submission of subdivision stages and/or phases from the consultant.
Table 1

<table>
<thead>
<tr>
<th>Name</th>
<th>Full Name of Company</th>
<th>Company Assigned Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braun</td>
<td>Braun Consultants</td>
<td>1</td>
</tr>
<tr>
<td>IBI</td>
<td>IBI Group</td>
<td>2</td>
</tr>
<tr>
<td>MTE</td>
<td>MTE Consultants Inc.</td>
<td>3</td>
</tr>
<tr>
<td>PEIL</td>
<td>Planning &amp; Engineering Initiatives Ltd.</td>
<td>4</td>
</tr>
<tr>
<td>STANTEC</td>
<td>Stantec Consulting Ltd.</td>
<td>5</td>
</tr>
<tr>
<td>Earth Tech</td>
<td>Earth Tech (Canada) Inc.</td>
<td>6</td>
</tr>
<tr>
<td>Meritech</td>
<td>Meritech Engineering</td>
<td>7</td>
</tr>
</tbody>
</table>

Each Subdivision stage or part of stage or phase must use the same sequence number but indicate that it is the "start of maintenance" or "final of maintenance" on the DVD.

If any developers consultant is not included in Table 1 above, contact the IPPW Infrastructure Engineering, City of Waterloo at 519.886-1550 ext. 78251 to obtain next available code number.

Column D & E - Represents two pieces of information:

a) Sanitary inspections numbers represent 01 to 49 - The sequence numbering for sanitary is to begin with “01” in each year and progress to a maximum of “49” for each project assignment, stage and/or phase.

b) Storm Water inspection numbers represent 51 to 99. The sequence numbering for storm is to begin with “51” in each year and progress to a maximum of “99” for each project assignment, stage and/or phase.

c) Remember to start over again from the lower number at the beginning of each year.

d) If there is more than one MPEG file on the DVD.
   • First MPEG file name will retain the full name of the DVD# (ex. 19R01 for sanitary and 19R51 for storm)
   • To preserve the five digit format of the sewer.dat for media names, the subsequent MPEG files will drop the first number of the DVD# and an alphanumeric suffix will be added starting with “A”. (i.e. 9R01A, 9R01B, etc. for sanitary and 9R51A, 9R51B for storm etc…).

Each package is to include the following:

- Data Files - Sewer.dat
- Video files - Pipe & Manhole (MPEG-2 or MP4 is preferred as it takes less space)
- Reports - MS Word Format or PDF

**OPTIONAL DRAWINGS** - (phases and stages marked overall servicing/grading of development phase “6” drawings).

If you have any comments or concerns with this process, please contact the Infrastructure Engineering Analyst by telephone at 519 886-1550 ext. 78251 or by e-mail adecsei@waterloo.ca

Attached is an example showing a CCTV Inspection in electronic format.
Example of a DVD Disc & Jewel Case Submission for: Pipe Inspection

A sample submission for the same project for either storm or sanitary:

DVD Disc

1. - each pipe inspection MPEG file shall be named as per Appendix G

DVD Jewel Case Insert

1. – DVD Reference #
2. – Index Type – Pipe Inspection
3. – Street Name
4. – Start Manhole ID # to End Manhole ID #

City of Waterloo
DVD No
Pipe Inspections
(DVD Submission#) of (total # of DVD’s)

Subdivision Name, Stage, & Phase
Consulting/Developer Firm
Start or End of Maintenance Period

Subdivision submissions only

Street Name:
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#

Street Name:
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St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
St MH ID  to  End MH ID#
Example of a DVD Disc & Jewel Case Submission for: Manhole Inspection

A sample submission for the same project for either storm or sanitary:

**DVD Disc**

1. Each manhole inspection mpeg file shall be named by the manhole name provided by the City & record mpeg(s) directly onto the CD/DVD not hidden in folders

**DVD Jewel Case Insert**

1. – DVD Reference #
2. – Index Type – Manhole Inspection
3. – Street Name
4. – Manhole ID #

**DVD No. Manhole Inspections Index**

<table>
<thead>
<tr>
<th>Street Name:</th>
<th>Street Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhole ID#</td>
<td>Manhole ID#</td>
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<tr>
<td>Manhole ID#</td>
<td>Manhole ID#</td>
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</tr>
</tbody>
</table>

City of Waterloo
DVD No
Manhole Inspections
(DVD Submission#) of (total # of DVD’s)

Subdivision Name, Stage, & Phase Consulting/Developer Firm
Start or End of Maintenance Period