Specifications For CCTV Inspection Of Sanitary & Storm Sewers (Revised Aug. 2018)

1.0 INTENT

It is the intent of this Specification to describe the services to be provided.

1) The Closed-Circuit Television (CCTV) Inspection of designated sewers and maintenance holes to observe and record structural and service defects and construction features complete with all associated documentation for various locations throughout the City of Dryden:

   i.) written reports
   ii.) Digital Audio/DVD Format
   iii.) related photographs
   iv.) CD or USB

2) All other related costs accrued in the fulfillment of this contract.

The Contractor shall provide by the completion date, all written reports as per Section 3.4.

1.2 QUANTITIES AND TIMING

The requirements for CCTV Inspection are as follows:

a) Approximately 4950 linear meters of sanitary and storm sewers are to be CCTV inspected and approximately 135 maintenance holes are to be inspected and completed by NOVEMBER 30, 2018 in order to prepare for the 2019 capital budget. Depending on the unit prices, up to an additional 1000 meters of sewer and related maintenance holes may be added to this contract

The City shall have the right, at any time prior to or during the execution of the work, to alter the scheduling of the work, and to alter, deduct from, add to or omit, any part of the work with the contract price being adjusted accordingly, based on the Schedule or Prices submitted by the Contractor.
1.3 REQUIREMENTS FOR TELEVISION INSPECTION

1.3.1a VIDEO INSPECTION EQUIPMENT AND DVD’s

a) The cameras, transmission cables and recording equipment utilized under this contract shall produce DVD or USB Flash Drive color recordings.

b) The colour CCD cameras used in the inspections shall be a pan and tilt view type capable of radial rotation of 360°, lateral rotation of 270°, and of producing a continuous picture resolution of not less than 400 lines at the periphery of the picture.

c) The cameras shall be equipped with a self-contained, adjustable, directed light source compatible with the lens angle and dispersed to create even distribution of the light around the sewer perimeter without the loss of contrast, flare out of picture or shadowing.

d) The camera may be self-propelled or skid mounted. The Contractor shall include in his written report, the size of the camera skid used. The mounting of the camera shall be adjustable such that the central axis of the camera lies at a point equidistant between the invert and obvert of the pipe during inspection of the sewer. In the case of egg shaped sewers, the camera lens must be positioned vertically above the invert a height two thirds of the vertical dimension of the sewer. In all instances, when transporting the camera through the sewer the camera lens must be positioned on, and looking along the central axis of the sewer.

e) The camera transport shall permit complete inspection of the sewer from the centre of the finished manhole. The equipment and cables utilized shall be capable of inspecting a minimum sewer length of 200 metres, without reversal.

f) The DVD’s/USB shall be new and usable on standard DVD players/computers. The television inspection of any section of sewer between two adjacent manholes shall not be split between two DVD’s but shall be completed on DVD. Photographs will be required to enhance the report concerning sewer deterioration.

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

1.3.1b VIDEO RECORDINGS

Digital Format:

The inspections shall be captured in colour MPEG1 format (standard VCD 1.1
Compliance) from the live video source. All digital videos shall be first generation recordings. One complete single digital file shall be submitted for each inspection. The final file may be produced in one of three ways:

1) Using a computer system and capture card, the original recording may be captured continuously, regardless of the progress of the inspection. Where inspection progress is not continuous, the original raw digital file shall be edited prior to submission to remove pauses, or
2) Using a computer system and capture card, the original recording may be captured intermittently, where inspection progress is not continuous. The original raw digital files shall be combined to form one continuous file for submission, or
3) Specialized video recording equipment, which is capable of pausing, and resuming live recording may be employed to produce one single file for submission.

All digital video editing shall be done with non-linear video editing software, and in no case shall edited digital files be recompressed. Digital video files shall conform to the following requirements:

**MPEG Requirements:**

- **Video:** Picture Size = NTSC 352 x 240 @ 29.97 frames per second
- **Pixel Clock:** Frequency = 13.5 MHz
- **Bitrate:** Video bitrate = 1151929 bits/sec
  - MPEG1 bitrate (multiplexed audio/video) = 1411200 bits/sec
- **Streams:** Number of Streams allowed = One
- **Audio:**
  - Frequency = 16 bit, 44.1K sampling rate
  - Bitrate = 224kbit/sec
  - Number of Streams allowed = One

Video capture equipment shall be capable of capture with no frame loss. **Compact discs must be labeled.**

**1.3.2 INSPECTION OF SEWERS**

a) Prior to commencing the inspection of a sewer section, the linear surface distance between the centres of the maintenance hole covers at each end of the section shall be measured and recorded in the Header information. The cable calibration shall be adjusted such that zero is at the centre of the manhole cover.
b) The maximum speed of the camera during the inspection shall be 10 metres/minute.

c) The camera shall be stopped for no less than two (2) seconds where a structural defect identified as a fractured, broken, missing or collapsed pipe is encountered and at junctions and major branches. The camera shall be stopped and rotated to permit inspection at an angle of 90°.

d) At service connections the camera shall be stopped and situated in order to clearly view up and into the connection as far as the lighting will permit for a minimum of five seconds. If the specified vertical height of the camera lens does not permit a proper view then, at any additional cost to the City, the Contractor must record another video inspection with the camera lens so positioned as to allow for a proper view looking up and into each service connection. All voids shall be similarly inspected. No video inspections will be accepted if the camera lighting system, iris and focus adjustments do not provide satisfactory illumination and focus up and into each connection or void.

e) The camera lens shall be kept clean at all times. No inspection of a sewer shall proceed while the camera lens is dirty.

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

g) All recordings shall be made at the SLP or normal speed.

h) The inspection video shall have a continuous chainage indicated on the screen. The chainage shall commence at the face of the starting maintenance hole and shall be accurate to within 1.0 per cent of the length of the sewer as compared to the surface measurement.

i) Identify locations of service connections by stations, stating the clock location in relation to facing downstream.

Measurement shall be accurate to plus or minus (±) 150 mm.

j) The Contractor must take appropriate measures to insure the picture quality is not reduced due to misting or fogging. The use of heaters and blowers may be required.

k) All sewers shall be cleaned prior to inspection.

l) If inspection of the entire sewer cannot be completed due to a collapse, excessive deformation or solid debris, intruding connections, obstructions, large displaced joints, or
excessive sediment build-up the Contractor shall advise the Contract Administrator. Jointly they shall decide to:

- abandon the inspection;
- re-perform the inspection subsequent to:
  - performing solid debris cutting;
  - conduct sewer cleaning
  - removing the connections protrusion;
  - modifying the camera set-up (position and/or method of transport)
  - completion of emergency repairs

All locations where a complete inspection could not be obtained shall be noted in a log, reviewed with the Contract Administrator on a weekly basis. The log shall note the sewer ID number, measurement of the length inspected (up and downstream), length of segment not inspected and the reason for the incomplete inspection.

m) If during the inspection, the Contractor observes a flow disparity, clear water infiltration or missing bricks, collapse, void, or deformation > 10%, they shall capture an image (photograph or digital file) and immediately notify the Contract Administrator. Such captured images shall be turned over to the Contract Administrator at the end of each workday. If a void is visible or suspected outside the pipe, the Contractor shall immediately place barricades around the location and notify the Contract Administrator or the Environment Division.

1.3.3 INSPECTION OF MAINTENANCE HOLES

The inspection of maintenance holes shall be carried out in conjunction with the sewer inspections and recorded in the format similar to that shown in Appendix “C”.

Maintenance holes showing signs of moderate to severe deterioration/defects/infiltration shall be photographed to show the deterioration/defects/infiltration and shall be included with the report for that location. The photographs shall be taken with a digital camera and also submitted in digital format on a compact disk or USB flash drive.

1.4 REQUIREMENTS FOR TELEVISION INSPECTION AND DOCUMENTATION
a) A sewer information screen in the format indicated in Appendix “A” shall be displayed for a minimum of 30 seconds at the start of all video inspection tapes. Inspection of the sewer shall not proceed while the information screen is being displayed.

b) The sewer inspection reports provided shall be in the format adopted from the latest revision of the Manual of Sewer Classification NWC/DOE Standing Technical Committee Report No. 24 NWC, May 1980, Third Edition, August, 1993 and “Addendum” dated February 1996. The Report shall identify the chainage and defect code for all defects and construction features as established from the classification definitions. Alternative classification systems will not be accepted. If required, the City of Dryden will supply to the Contractor a copy of the data entry software, which is based on the WRc format. The contractor will be required to maintain a daily log of all activities going on and locations of work. Areas of concern should also be noted.

c) The Bidder is advised that all operators carrying out inspections under this Contract shall have successfully attained the North American Association of Pipeline Inspectors (NAAPI - formerly APIO) Level of Qualification for WRc Operators or an accepted alternate training program. The operator shall be fully trained in all aspects of sewer inspection and shall be capable of making accurate observations and recording of all conditions which may be encountered in the sewers.

d) The Contractor shall submit to the Contract Administrator on a bi-weekly basis the original colour video inspection, one copy of the typed video report and DVD/USB containing the inspection reports and captured images. Copied DVD’s and/or paper copies of reports without disks will not be accepted. Refer to Appendix “A” for the Sewer Inspection Title Screen and Appendix “B” for the Sewer Inspection Title for the Inspection Report and Title on Video labeling. The inspection report is to include:

i.) a detailed log of each sewer length (maintenance hole to maintenance hole); all sizes, dimensions and chainages to be in metric units;

ii.) the start and end counter number (real time) on the video as noted for each sewer section in the report for referencing the DVD;

iii.) Beginning and ending manholes

iv.) a metric chainage location to be given for each lateral connection location, defect location, and any other anomaly found in the sewer. Chainages shall be related to the face of the maintenance hole. For linear deficiencies, beginning and ending chainage locations shall be given;
v.) representative colour photographs of anomalies including all broken, crushed and collapsed pipes are to be supplied and mounted for each sewer section with description and chainage location.

vi.) a summary page indicating areas in need of immediate attention due to collapsed pipe, obstructions (including moderate or severely intruding laterals), broken pipe, crushed pipe, existing repairs that need attention and future repairs. This shall be included in the report for that video as the first page;

vii.) photographs mounted in the same section as the inspected sewer section;

viii.) typed index pages indicating street, section of sewer i.e.: maintenance hole to maintenance hole and page numbers;

ix.) The direction in which the inspection was taken i.e.: with flow or against flow.

x.) The portion of the city sewer map highlighting the sewer-main inspected in the report.

e) The report shall be prepared during the sewer inspection and each video shall have one report. The final reports shall be submitted white three ring binders.

f) In addition to the reports and videos, reports shall also be provided in a standard digital format compatible with the City’s personal computers. Acceptable format is digital files on a compact disk or flash drive.

g) A description of the contents of the digital files must accompany the CD. This description must include an outline of the length and contents of all fields in the digital file.

h) The video’s and reports shall become the property of the City of Dryden. Release of sewer inspection information shall not be allowed without the permission of the City of Dryden Public Works Department.

i) Street nomenclature shall include the directional description at the end of the street name (i.e.: First St W)

j) The video number and the disk/USB number shall be the start date of that video presented in the month/day/year format.

1.5 SEWER CLEANING AND DEBRIS/BLOCKAGE REMOVAL
a) Sewer cleaning shall be performed, unless otherwise directed by the Contract Administrator, in order to allow a complete inspection of the sewer segment.

b) Sewer cleaning shall remove all debris from sewers and manholes to alleviate and prevent sewer backups, overflows, and property damage, to restore hydraulic capacity, to reduce odours, to permit a thorough condition inspection. Definitions for debris shall be consistent with the nomenclature contained in the WRc “Manual of Sewer Condition Classification”. Initial cleaning shall consist of a minimum of three passes. The first pass shall extend from the downstream manhole to a point in the sewer equal to 1/3 of the total distance between the manholes, which are being cleaned. The second pass shall include 2/3 of the sewer line and the third pass shall extend the full distance between manholes. All passes shall be made using the full capacity of the sewer cleaning equipment. Once the initial three passes have been completed, the contractor shall then make three complete passes from manhole to manhole utilizing the full power of the cleaning equipment.

c) Removal equipment shall be on site and in operation, in the downstream manhole, at all times during the sewer cleaning. All debris shall be removed from the downstream manhole of the sewer segment being cleaned and brought to the Gordon Rd. Landfill. The cost of debris disposal at the Landfill site shall be borne by the Owner. Every effort must be made prior to landfill disposal to remove as much liquid as possible and return it to the sanitary sewer. Passing material from manhole to manhole shall not be permitted.

d) Precautions shall be taken to ensure that no flooding of public or private property occurs during any phase of the cleaning operations. Satisfactory precautions shall be taken to protect the sewer lines from damage that might be inflicted by the use of cleaning equipment.

e) If cleaning of an entire sewer cannot be completed from the downstream manhole, the equipment shall be moved to the appropriate manhole and cleaning continued,

f) Excessive roots or solid debris shall be cut and removed from the sewer. The work shall be performed using remote controlled equipment and the entire operation shall be monitored and recorded by CCTV.

g) Intrusions, which prevent the inspection from continuing, shall be cut and the cuttings shall be removed from the sewer. The work shall be performed using remote controlled equipment and the entire operation shall be monitored and recorded by CCTV. The finished cutting shall be smooth and within 10mm of the inside surface of the sewer. If a drain pipe (catchbasin lead) or service connection is damaged or broken by the contractor, then the contractor shall repair the damage (by excavating if necessary) to the approval of
the Contract Administrator at no additional cost to the City. The Contractor shall submit for approval, the proposed method of repair and reinstatement for damaged drain pipe or service connection.

h) If it is necessary to excavate for removal of lodged equipment the Contractor shall undertake such excavation, repair, backfill and restoration at their own expense. All such work shall be performed by an approved sub-contractor and shall be completed in accordance with the City of Dryden specifications.

i) When water from a fire hydrant is required the Contractor must contact the Public Works Department to confirm the location of the nearest fire hydrant available from which to draw water. In case of a fire no fire hydrant shall be obstructed in the area served by the hydrant. At all times backflow preventers must be employed when drawing water from any hydrant and proper ramps must be employed for all vehicular and pedestrian traffic.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

a) Sewer Inspection

i.) Sewer inspection shall be measured on a length basis. The length to be paid shall be the total number of lineal meters acceptably inspected. Measurement shall be made above ground from the center of the start manhole to the center of the finish manhole. If the inspection is abandoned, the length paid shall be measured from the start manhole to the point of abandonment. The diameter of non-circular sewers shall be taken as the largest dimension.

ii.) Payment for photographs shall be included in the prices bid for the sewer inspection.

iii.) Payment for inspection reports shall be included in the prices bid for the sewer inspection.

iv.) Payment for video recordings shall be included in the prices bid for the sewer inspection.

b) Maintenance Hole Inspection

i.) Maintenance hole inspections shall be measured on a unit basis. The number of units paid shall be the total number of manhole inspections acceptably performed. Payment shall be made at the Contract Unit Price per item for “Maintenance Hole Inspection”.

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ii.) Payment for photographs shall be included in the prices bid for the maintenance hole inspection.

iii.) Payment for manhole inspection reports shall be included in the prices bid for the maintenance hole inspection.

c) Reverse Set-up Inspection

i.) Reverse set-up inspections shall be measured on a unit basis. The number of units paid shall be the total number of reverse set-ups acceptably performed. Payment shall be made at the Contract Unit Price per item for “Reverse Set-up - Inspection”.

d) Sewer Cleaning

i.) Sewer cleaning shall be measured on a length basis. The length to be paid shall be the total number of lineal meters acceptably cleaned.

ii.) Measurement shall be made above ground from the center to center of manhole covers as confirmed by tape measurement made in conjunction with the sewer inspection. If cleaning is abandoned, the length paid shall be measured from the start manhole to the point of abandonment. The diameter of non-circular sewers shall be taken as the largest dimension.

e) Reverse Set-up Cleaning

i.) Reverse set-up for sewer cleaning shall be measured on a unit basis. The number of units paid shall be the total number of reverse set-ups acceptably performed. Payment shall be made at the Contract Unit Price per item for “Reverse Set-up - Cleaning”.

f) Solid Debris Cutting

i.) Solid debris cutting shall be measured on a length basis. The length to be paid shall be the total number of lineal meters successfully cut.

g) Removal of Intruding Connections

i.) Removal of intruding connections shall be measured on a unit basis. The number of units paid for shall be the total number of protruding connections acceptably removed.
Payment shall be made at the Contract Unit Price per item for “Removal of Protruding Connections”.

Invoices shall include a detailed listing (i.e. sewers inspected, sewers cleaned, etc.) of the work being invoiced.
## APPENDIX ‘A’

### SEWER INSPECTION TITLE SCREEN

<table>
<thead>
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<th>LINE NO.</th>
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<tbody>
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<td>CITY OF DRYDEN</td>
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<td>3.</td>
<td>CONTRACTOR: ABC CCTV CONTRACTORS</td>
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APPENDIX “B”

1. Sewer Inspection Title for DVD Report - front cover

1st Line    SEWER TV INSPECTION FOR THE CITY OF DRYDEN

2nd Line    CONTRACT OR QUOTATION No.
             Video NO.: MM/DD/YY
             DISK NO.:  MM/DD/YY
             USB NO. : MM/DD/YY

3rd Line     MAP NO.  282

4th Line     STREET LOCATIONS

5th Line     STREET LOCATIONS

6th Line     CONTRACTOR NAME AND PHONE NUMBER

2. Sewer Inspection Title for DVD

1st Line    SEWER TV INSPECTION FOR THE CITY OF DRYDEN

2nd Line    CONTRACT OR QUOTATION No.
             VIDEO NO.: MM/DD/YY
             DISK NO.:  MM/DD/YY
             USB NO. : MM/DD/YY

3rd Line     MAP NO.  282  STREETS:

4th Line     STREETS:

5th Line     CONTRACTOR NAME AND PHONE NUMBER
**APPENDIX “C”**

*City of Dryden Maintenance Hole Inspection Report*

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<thead>
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<th>Inside Maintenance Hole Photograph</th>
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<table>
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<tr>
<th>Outside Maintenance Hole Photograph</th>
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## City of Dryden Maintenance Hole Inspection Report

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