

08125 CCTV Camera Sewer Main Inspection**Index**

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08125-1 General**1.1 Description of Work**

The work under this section includes, but is not limited to, the supply of all superintendence, labour, material, equipment and tools required to:

1. Clean all sewers as outlined in these specifications,
 AND EITHER
 - a. Inspect sewers using CCTV live video and code defects to NASSCO PACP standards by a NASSCO PACP qualified operator,
 - OR
 - b. Inspect sewers using a digital scanning device and provide scans of sewers and code defects to NASSCO PACP standards by a NASSCO PACP qualified operator.

08125-2 Sewer Inspection**2.1 General**

Two different levels of inspection will be accepted.

1. Inspection via a pan and tilt type camera capable of panning 360° and tilting 270°. These inspections require NASSCO PACP defect coding to be completed by the contractor during the inspection.
2. Inspection via a digital scanning device. These inspections require NASSCO PACP defect coding to be completed by the contractor during or after the inspection.

Inspection units, of either type, shall have a minimum of one operator on site at all times who has successfully attained NASSCO PACP certification. 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.

2.2 Pan and Tilt Camera Inspections

Sewer inspections shall be performed to observe and record structural and service defects, construction defects and construction features and to assess thoroughness of cleaning. All observations shall be coded in accordance with NASSCO PACP 6 or

above and the findings shall be included in an inspection report submitted on flash or portable hard drive. Operators who have successfully attained NASSCO PACP certification only shall perform the inspections and defect coding.

2.3 Digital Scanning Device Inspections

Sewer inspections shall be performed so that structural and service defects, construction defects and construction features can be observed and post inspection by the City. Surveys shall be coded by the contractor in accordance with NASSCO PACP 6 or above and be included in an inspection report submitted on flash or portable hard drive. Operators who have successfully attained NASSCO PACP certification only shall perform the inspections and defect coding.

08125-3 Equipment

3.1 General

The inspection unit shall consist of a self-contained vehicle with separate areas for viewing and equipment storage. Each inspection unit shall be equipped with fans and blowers to remove any fog which may be present in the sewer at the time of the inspection. Each unit shall have a suitable communication system for its crew members.

Inspection equipment shall consist of cameras, lighting, cables, power source, monitor, digital media recording and storage and other related equipment. The camera shall be pan and tilt type capable of panning 360° and tilting 270°, or a digital scanning device. The adjustment of focus and iris shall allow optimum picture quality and the focal range shall be adjustable from 100 mm to infinity.

3.2 Lighting

The light source shall be adjustable to allow an even distribution of light around the sewer perimeter without loss of contrast, flare out of picture, or shadowing. Video overlay equipment shall be capable of superimposing alpha-numeric information onto the video and shall be capable of providing a minimum of 15 lines of information, 30 characters per line.

3.3 Video Format

All videos shall be recorded in MPEG2 format and be delivered on flash or portable hard drive media. Videos in DVD format from a proprietary DVD recorder are not acceptable. Flash drives and/or portable hard drives submitted by the Contractor to the Engineer will not be returned to the Contractor.

3.4 Camera Transport

The camera shall be transported through the sewer by means of a rubber tires or crawler tractor. The transport unit must be capable of passing over minor surface imperfections including, but not limited to, broken joints and solid debris up to 40mm in height. Mounting of the camera on a float or skid for tow through the sewer shall only be permitted where the condition of the sewer precludes the use of a tractor and where authorized by the Project Engineer. If the camera is towed the supporting equipment shall not impede the view of the camera and shall be stable to ensure steady and smooth progress.

The camera transport shall permit complete inspection of the sewer from the center of the start manhole to the center of the finish manhole. The transport and cable shall be capable of inspecting a minimum of 200 metres of sewer from a single access point. A remote reading counter shall be used to measure distance traveled from the center of the start manhole and measurements shall be recorded in metres to the nearest 100mm.

The camera height shall be adjustable so as to position the center of the lens in the center of the sewer.

08125-4 Execution**4.1 General**

All fog shall be evacuated from the sewer. The camera lens shall be kept clean at all times and the sewer shall be kept clear of fog during the entire inspection.

All inspections shall be performed in the direction of flow unless a reverse set up is required. Inspections shall generally begin with the upstream sewer in the system and proceed downstream in a consecutive manner.

The face of the start manhole shall be clearly visible at the start of the inspection and the inspection shall be performed from the centre of the start manhole to the centre of the finish manhole.

During the inspection automatic distance measurement shall be indicated on the screen and begin to move immediately as the camera moves.

4.2 Cleaning

Cleaning shall be performed by the Contractor to permit inspection from the upstream manhole to the downstream manhole. Calcium deposits shall be cut back so that a camera can pass through but do not need to be completely removed. Complete removal of all debris is not necessary but if the survey is terminated due to debris a reverse inspection must be attempted.

Caution must be exercised to ensure that the water pressure or cleaning tools do not damage or weaken the existing sewer pipe nor cause flooding of property connected to the sewer. The Contractor shall be responsible for the cost of repair of any such damage or flooding.

4.3 Water Dechlorination

The Contractor shall not use chlorinated water for cleaning or flushing of storm sewer mains. The threshold for chlorinated water is 0.02mg/L. Any water, potable or otherwise, shall be dechlorinated before use in the storm sewer system. Dechlorinating should be used with AWWA approved chemicals. It is the Contractor's responsibility to dechlorinate the water used in the storm sewer system. No payment shall be made for dechlorinating water for use in the storm sewer system as it is considered subsidiary to the work.

4.4 Debris Removal

All material resulting from cleaning shall be removed at the downstream manhole of the section being cleaned. No solids shall be allowed to pass into the downstream section. All solid material collected shall be hauled by the Contractor to the Heavy Grit Facility located at the City of Saskatoon Landfill. The Contractor will be responsible for payment of tipping fees at the City of Saskatoon Landfill.

If the flusher hose is used to move the camera through the sewer, the flusher shall not be cleaning while moving the camera through the sewer.

4.5 Defect Reporting

The Contractor shall be responsible for any excavation, including subsequent backfill, compaction, and surface restoration to City Specifications, required to remove a camera or other equipment that becomes jammed in the sewer due to damages caused or fault by the Contractor.

If inspection of an entire sewer cannot be completed due to a collapse, excessive deformation, obstructions or large displaced joints, the equipment shall be moved to the upstream manhole and a reverse inspection shall be attempted. If complete inspection still cannot be performed, the Project Engineer shall be immediately advised. Jointly, the Contractor and the Project Engineer shall decide whether to abandon the inspection, re-perform the inspection following solid debris cutting or removing intruding connections or modifying the camera setup or completion of external point repairs. There will be no payment made for work including, but not limited to, solid debris cutting, cleaning, removing debris, removing intruding connections, modifying the camera setup, completion of external point repairs, or re-inspection of the line following any of the aforementioned work.

If inspection of an entire sewer cannot be completed due to excessive calcium and debris, the equipment shall be moved to the upstream manhole and inspection again attempted. If complete inspection still cannot be performed due to excessive effort to cut calcium or remove debris the Project Engineer shall be immediately advised. Jointly, the Contractor and the Project Engineer shall decide whether to abandon the inspection with abandon evidence provided by the Contractor.

If during the inspection, the Contractor observes a flow disparity, clear water infiltration, hole, collapse, void, or deformation > 10%, they shall capture an image and immediately notify the Project Engineer. The operator must code that observation in the video. If a void is visible or suspected outside of the pipe, the Contractor shall immediately place barricades around the location and notify the Project Engineer.

4.6 Video Format

The inspections shall be recorded in colour in MPEG2 format.

At the start of each survey a video overlay system shall be used to clearly display, on the monitor and video recording, the following information:

1. Contract ID
2. Street Name
3. Start MH GIS#
4. Finish MH GIS#
5. Sewer Size (Diameter)
6. Sewer ID Number (GIS#)
7. Contractor Name
8. Date & Time of Inspection
9. Direction of Inspection
10. Start MH to Finish MH distance

During the inspection the following information shall be clearly displayed on the periphery of the screen, on the monitor and video recording. The information shall be arranged to minimize interference with the inspection image.

1. Automatic update of the cameras distance from the start manhole
2. Sewer GIS#

Inspection reports and corresponding videos shall be delivered weekly on flash or portable hard drive media. Flash drives or portable hard drive media will not be returned to the Contractor.

The reports must be in Excel format and the videos in MPEG2 format. Both shall be identified with the file naming convention of **GIS#_ (abbreviated location) _yyyymmdd**.

The inspections shall also be provided in a PACP 6.0 or above database format for direct import into the City of Saskatoon's Sewer Inspection software. (PipeLogix).

4.7 Pan and Tilt Camera

The camera speed shall not exceed 9 metres/minute.

During the inspection the picture shall be in focus from the point of observation to a minimum of two pipe diameters ahead. The camera shall be stopped for 2 seconds at major defects and connections, junctions and major branches. Major defects shall

include, but not be limited to, deformed sewers, holes, large displaced joints, obstructions, and large open joints. At major defects, connections, junctions and major branches the camera shall be positioned in order to provide a perpendicular view. The intent of this procedure is to permit a more detailed inspection of specific defects or construction feature.

4.8 Digital Scanning Device

During the inspection the picture shall be in focus from the point of observation to a minimum of two pipe diameters ahead. Final scans shall not have any missing frames or have minor missing frames accepted by the Project Engineer.

08125-5 Quality Control

Prior to commencement of the first inspection, a test survey shall be provided to the City to ensure the compatibility of import into PipeLogix software.

Camera position tolerance shall be +/- 10% of the diameter of the sewer. If the camera position does not satisfy the requirements, the inspection shall be re-performed at the Contractor's expense.

Distance measurement within the sewer shall be accurate to within 0.5% of the above ground measurement between the start and finish manhole centres. If the distance measurement does not satisfy the accuracy requirements, the inspection shall be re-performed at the Contractor's expense.

5.1 Coding Accuracy

Coding accuracy will be evaluated for all surveys. Coding accuracy shall be a function of the number of defects or construction features not recorded (omissions) and the correctness of the coding and classification recorded. Coding accuracy shall satisfy the following requirements:

1. header accuracy 95%
2. detail accuracy 85%

The Contractor shall implement a formal coding accuracy verification system at the onset of the work. Coding accuracy shall be verified by the Contractor on a random

basis, on a minimum of 10% of the inspection reports. The coding accuracy checks shall be submitted along with the corresponding video.

A minimum of two accuracy verifications shall be performed for each operator for each week working. Coding not satisfying the accuracy requirements shall be returned to the Contractor for re-coding, and the accuracy of the inspection immediately preceding and following the non-compliant inspection shall be verified by the Contractor. This process shall be repeated until the proceeding and subsequent inspections meet the accuracy requirements. Any operator failing to meet the accuracy requirements on two occasions shall not be permitted to code on the remainder of the project until they have successfully reattained the PACP Level of Qualification for PACP qualified operators.

Inspection reports and videos will be reviewed by the Project Engineer to ensure compliance with the specifications within ten (10) working days of submission. The frequency of review will be adjusted based on the results of the review. Non-compliant submissions will be returned for correction by the Contractor, at the Contractor's expense.

08125-6 Flow Control

For storm pipes, the work is expected to be performed in dry conditions.

For sanitary pipes if the flow depth is more than 25% of the pipe diameter, inspections will not be accepted unless approved by the Project Engineer.

When flow depth, after cleaning and removal of all foreign materials, is greater than 25% of pipe diameter, the Contractor shall capture an image and immediately notify the Project Engineer.

The Contractor may need to plug segments of sewer or work at off-peak hours (12:00 am – 6:00 am) in order to perform cleaning and/or inspection. No extra payment will be made for plugging the sewer as it is considered subsidiary to the work.

If flow controls are undertaken and it is determined that flow levels remain greater than 25% of pipe diameter, the Contractor shall notify the Project Engineer. Jointly, the Contractor and the Project Engineer shall decide whether to continue with the inspection, remove the location from the contract, or replace it with equivalent work.

Surface bypassing is not in the scope of the contract.

08125-7 Contamination

The City of Saskatoon has a separate Sanitary and Storm sewer system. However, there may be locations where the sanitary and storm system are connected, herein referred to as cross connections.

If during the inspection the Contractor observes a cross connection, they shall capture an image, record the location, and notify the Project Engineer of its existence.

In the event that basements, ditches, roadways, sidewalks, etc should become contaminated due to damages caused or fault by the Contractor, immediate action shall be taken by the Contractor to close the source of contamination. The Contractor will be required to immediately report to the Project Engineer and the Water Security Agency any spills or discharges to the environment. Proper cleanup of the affected area shall follow and no work shall commence until a re-evaluation of the complete process has been carried out by the City. There will be no extra payment made for decontamination, clean up or down time. Permanently controlling the contamination caused by a cross connections are not in the scope of this contract.

The Contractor shall ensure that no upstream flooding occurs during the cleaning or inspection. The Contractor shall allow in the bid price for monitoring of water levels in manholes and for any emergency pumping.

08125-8 Water Supply

The Contractor is responsible for providing all water required at the construction site. Water may be obtained from City fire hydrants via water meters supplied by the City. Only qualified/experienced contractors will be allowed to operate city hydrants.

In some cases, temperatures may be below the threshold where water meters can be supplied. If the City cannot supply a water meter the contractor will be permitted to use fill hydrants, at the Engineers approval. A fill hydrant map will be provided.

To operate a City fill hydrant, training will be required and provided by the City. Any damage resulting from improper operation of hydrants shall be required by the City at the Contractor's expense.

08125-9 Measurement and Payment

The unit price for “Clean, Video Inspection, and Defect Code Sewer Main” will be paid for on a per linear metre basis. The length to be paid will be the total number of lineal metres which have been inspected and have had their report submissions accepted. No payment shall be made until such acceptance is made. Measurement shall be taken from the length recorded on the submitted inspection.

Payment shall include the supply of materials, equipment, labour, supervision and all other items required to perform the inspection work as specified.

End of Specification 08125