

CW 2140 - SEWER AND MANHOLE CLEANING

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CW 2140 - SEWER AND MANHOLE CLEANING

1. DESCRIPTION

1.1 General

- .1 This specification covers the flushing and cleaning of existing sewers, manholes and catch basins including removal of debris.

1.2 Definitions

- .1 Definitions for debris will generally be consistent with the nomenclature contained in the UK Water Industry Engineering and Operations Committee (WRc) "Manual of Sewer Condition Classification".

1.3 Referenced Standard Construction Specifications

- .1 CW 1120 - Existing Services, Utilities and Structures
- .2 CW 2145 - Sewer and Manhole Inspection

1.4 Referenced Standard Details

- .1 SD-019 – Backflow Protection Arrangement for Water Supply from Hydrant

3. CONSTRUCTION METHODS

3.1 High Velocity Cleaning Equipment

- .1 High velocity cleaning equipment is to be capable of producing a flow rate of 4.1 litres per second at 13,800 kPa (2,000 psi) of pressure complete with the following.
 - .1 Selection of nozzles capable of effectively cleaning and removing debris from the sewer and transporting debris in all sizes of the sewers to be cleaned.
 - .2 Water tank.
 - .3 Auxiliary engines.
 - .4 Pumps.
 - .5 Hydraulically driven hose reel with a wash down gun for cleaning manholes.
 - .6 Approved backflow prevention device for filling water tank from a hydrant.

3.2 Debris Removal Equipment

- .1 Vacuum unit(s) used for removing sewer debris sewer to be complete with the following.
 - .1 Positive displacement pumps or fans producing a minimum 700 litres per second of air movement.
 - .2 Storage tank.
 - .3 Minimum 150 millimetre diameter suction hoses attached to a hydraulic boom.
- .2 Configure the storage tank to allow the liquid portion of the debris to be returned to the sewer.

3.3 Solid Debris Cutting and Intruding Sewer Service Removal Equipment

- .1 Solid debris cutting equipment to consist of remote controlled hydraulically driven saw or blade cutters, remotely operated robots or other types of equipment capable of removing solid debris such as encrustation.

- .2 Intruding sewer service pipe removal equipment to consist of remote controlled hydraulically driven cutters and reamers and remotely operated robotic routers or grinders capable of cutting back intruding sewer service pipes.
- .3 Select the cuttings equipment to be used considering debris type, intruding sewer service pipe material and sewer pipe condition.

3.4 **Communication Equipment**

- .1 Equip cleaning crews with cellular telephones and a suitable communication system linking all crewmembers.

3.5 **Sewer and Manhole Cleaning**

- .1 Notify the Contract Administrator of the location where sewer, manhole, or catch basin cleaning will be done. Deliver notices to residents and businesses as indicated in Clause 3.16 of this specification.
- .2 Remove the upstream and downstream manhole covers during sewer cleaning.
- .3 Clean sewers and manholes of debris including sludge, dirt, sand, gravel, rocks, bricks, and other solid and semi-solid materials removed from the sewer with the equipment identified in Clause 3.1 of this specification. Unless otherwise directed by the Contract Administrator, all sewers are to be completely cleaned with the exception of the following:
 - .1 Combined sewers 900mm and larger.
 - .2 Waste water sewers 450mm and larger.
 - .3 Land drainage sewers 600mm and larger.
 - .4 Trunk sewers
- .4 Remove grease and or roots as per Clause 3.15 of this specification.
- .5 Take necessary precautions to ensure that no flooding of public or private property occurs during sewer and manhole cleaning. Operate the equipment so that the pressurized nozzle continues to move at all times. The pressurized nozzle shall be turned off or reduced anytime it is stationary or delayed in order to prevent damage to the sewer. Reduce pressure of cleaning equipment as directed by the Contract Administrator.
- .6 Start the cleaning operation with the upstream sewers in the system and proceed downstream with the direction of flow. Do not clean downstream sewers until all contributing upstream sewers have been cleaned or don't require cleaning according to the scope of work.
- .7 Clean manhole walls and benching before cleaning the sewers downstream of manholes.
- .8 Advise the Contract Administrator immediately when pipe material or backfill material is observed during the cleaning of a sewer. The Contract Administrator will direct one of the following operations be performed.
 - .1 Complete or attempt to complete cleaning of the sewer.
 - .2 Suspend cleaning operations and inspect the sewer.
 - .3 Simultaneously clean and inspect the sewer.
- .9 Limit the distance required for the nozzle to travel in the sewer to one manhole-to-manhole sewer segment unless approved by the Contract Administrator.
- .10 Clean sewers using a maximum pressure of 10,350 kPa (1,500 psi). Sewer cleaning using

pressures greater than 10,350 kPa (1,500 psi) shall be approved by the Contract Administrator. Approved locations shall be monitored by closed-circuit television (CCTV) or as directed by the Contract Administrator.

3.6 Reverse Set - Up Cleaning

- .1 Perform a reverse set-up cleaning when a blockage in the sewer prevents completion of cleaning from the downstream manhole by moving equipment to the upstream manhole and attempting to complete the cleaning of the entire sewer.
- .2 Attempt to remove a specific blockage in the sewer for at least 1 hour before advising the Contract Administrator the blockage cannot be removed. Provide the Contract Administrator with the following information for blockages that cannot be removed.
 - .1 Location of the blockage indicated by a paint mark on the ground surface above the sewer and the distance from the nearest manhole.
 - .2 An inspection photograph, video recording or digital file of the blockage.
 - .3 The effect the blockage has on completion of the Work and the requirement for action to deal with the blockage such as an emergency sewer repair or scheduled maintenance.

3.7 Emergency Sewer Repairs

- .1 The Contract Administrator will arrange for an emergency repair of the sewer at blockage locations as soon as possible if the sewer condition prevents cleaning of the upstream sewer sections or poses an immediate operational or safety concern such as a complete collapse.
- .2 Carry out cleaning of other sewers not affected by the emergency repair and complete cleaning of the sewer where the blockage was removed when notified by the Contract Administrator the emergency repair has been completed.
- .3 Clean and remove backfill and debris that may have entered the sewer during emergency repairs.

3.8 Removal of Equipment that becomes stuck in a Sewer

- .1 Advise the Contract Administrator immediately if equipment becomes stuck in a sewer. Attempt to remove equipment that is stuck using whatever means are necessary for at least 4 hours. Advise the Contract Administrator if the equipment cannot be freed after 4 hours and mark the position on the surface over the sewer where the equipment is stuck.
- .2 The Contract Administrator will arrange to have an excavation made to the top of the sewer where the equipment is stuck within 48 hours of notification the equipment cannot be freed.
- .3 Be present during the excavation and once the top of the sewer is exposed and the excavation is secured, do one of the following.
 - .1 Remove the top of the sewer pipe and retrieve the equipment stuck in the sewer, or
 - .2 Defer removal of the top of the sewer and retrieval of the stuck equipment to the excavation contractor. Damages caused to the stuck equipment will not be the responsibility of the excavation contractor. No claim for equipment damages will be made against the excavation contractor.

- .4 The Contract Administrator will arrange to have the sewer repaired after removal of the equipment that was stuck.
- .5 Clean and remove backfill and debris that may have entered the sewer during removal of the equipment and subsequent repair of the sewer.

3.9 Debris Removal

- .1 Continuously remove debris from the downstream manhole during sewer cleaning. Do not allow debris to be passed into the downstream sewer unless approved by the Contract Administrator.
- .2 Decant or dewater debris removed from sewers and catch basins and legally dispose of solid and semi-solid debris. Return decanted or dewatered liquid to the sewer of origin as soon as possible, but not within 3 sewer sections upstream of a lift station. If decanting is required it shall be done immediately downstream of the lift station.
- .3 Store debris in totally sealed containers at all times and remove from the Site at the end of each day. Vehicles used to transport sewage within City of Winnipeg limits must be licensed by the Industrial Control Branch of the Water and Waste Department.
- .4 Provide written procedure for method of dewatering and debris disposal to Contract Administrator for approval before beginning Work.
- .5 Off-site debris dewatering facilities must meet Provincial environmental regulations and requirements. Obtain approval from City of Winnipeg, Industrial Waste Control Branch of the Water and Waste Department if the facility is located within the City of Winnipeg. Provide copies of required licences, permits and relevant documentation required for dewatering facility to the Contract Administrator before starting the Work.
- .6 Keep a log containing the following information for each debris disposal unit.
 - .1 Contract Name and Bid Opportunity No.
 - .2 Vehicle ID – License Number
 - .3 Date of Disposal
 - .4 Time of Disposal
 - .5 Origin of Debris – Sewer ID Number(s)
 - .6 Net Weight. of Load
- .7 Provide log books and scale printouts to the Contract Administrator.

3.10 Catch Basin Cleaning

- .1 Clean catch basins completely of debris including sludge, dirt, sand, gravel, rocks, bricks, and other solid and semi-solid materials. Dispose of debris as indicated in Clause 3.9 of this specification.
- .2 Continually track catch basin cleaning progress and observed condition such as missing hood, damaged frame or cover or broken barrel on a drawing provided by the Contract Administrator.
- .3 Record discrepancies with existing catch basin information such as additional or missing catch basins or different locations than shown on the drawing provided.
- .4 Provide the completed catch basin record drawing to the Contract Administrator at the completion of the Work.

3.11 Solid Debris Cutting

- .1 Cut and remove solid debris from the sewers for the limits identified by the Contract Administrator using the post cleaning sewer inspection.
- .2 Remove solid debris to within 15 millimetres of the inside surface of the sewer.
- .3 Monitor the entire cutting operation and while the cutting equipment is travelling within the pipe to reach the work area by CCTV.
- .4 Inspect the entire sewer section in accordance with CW 2145 after completion of solid debris cutting.

3.12 Removal of Intruding Sewer Services

- .1 Cut and remove intruding sewer services from the sewer at the locations identified by the Contract Administrator from the post cleaning sewer inspection.
- .2 Leave intruding sewer services finished smooth and within 15 millimetres of the inside surface of the sewer.
- .3 Monitor the entire intruding sewer service removal by CCTV.
- .4 Inspect the entire sewer section in accordance with CW 2145 after completion of intruding sewer service removal.

3.13 Flow Control

- .1 Undertake flow control measures such as off peak work, plugging, use of sewer cleaning equipment to lower downstream flow levels or plugging and bypass pumping if sewer flows are hampering effective sewer cleaning.
- .2 Provide the Contract Administrator with at least 48 hours notice and proposed method of flow control before undertaking flow control measures.
- .3 Use sewer plugs to stop or reduce sewer flow that tether to and are removable from the ground surface.
- .4 Monitor flow levels upstream of a plugged sewer at all times to ensure flooding of public or private property does not occur.
- .5 Demonstrate that off peak work, plugging, sewer cleaning equipment, or a combination of methods cannot effectively reduce the flow levels to the specified maximum before requesting the use of bypass pumping.
- .6 Provide the Contract Administrator with information on capacity of pumping equipment for review before setting up by-pass pumping.
- .7 Remove plugs placed in sewers and re-establish normal flow when directed to do by the Contract Administrator.
- .8 Provide additional by-pass pumping equipment when directed to do so by the Contract Administrator.
- .9 Provide approved traffic ramps for by-pass pumping discharge hoses where crossing roadways and traffic lanes and locate where directed and approved by the Contract Administrator.

3.14 Water Supply for Sewer Cleaning

- .1 Obtain permit(s) for hydrant use for water supply for sewer cleaning in accordance with CW 1120.
- .2 Water supply for the Work may be taken from City of Winnipeg hydrants in accordance with the following.
 - .1 Water shall be taken from approved hydrants only. The location of approved hydrants will be provided by the Contract Administrator or as shown on the drawings.
 - .2 Submit a list of proposed hydrant location(s) to the City of Winnipeg Water Services Division (WSD) for approval. If a proposed hydrant location is not approved, the Contractor shall submit an alternate hydrant location for approval.
 - .3 Only hydrants approved by WSD shall be used for water supply.
 - .4 The Contractor shall supply and use a Backflow Protection Arrangement as shown on Standard Drawing SD-019 when taking water from City hydrants. Alternatively, the Contractor may rent the Backflow Protection Arrangement from the Water Services Division (WSD) if available. All costs associated with the supply of the Backflow Protection Arrangement or rental of same from WSD will be included in the cost of sewer and manhole cleaning. WSD will supply a meter and locks for the Backflow Protection Arrangement.
 - .5 The Contractor is permitted to turn approved hydrants on and off provided the Contractor has received training by the Water Services Division and the turn-ons and turn-offs are done in the presence of the Contract Administrator.
 - .6 Hydrants approved for use shall be considered to be "in the Contractor's control" from the time the City has turned the hydrant on until the Contractor has notified the City the hydrant is no longer being used and the meter box has been removed.
 - .7 Between November 1 and April 30 of any year the Contractor shall take all necessary precautions to prevent freezing of hydrants and related appurtenances for hydrants in their control and shall be responsible to pump out hydrants turned off by Emergency Services. Heating and hoarding of hydrants will be required by the Contractor. All costs associated with heating and hoarding shall be included in the price of "Sewer Cleaning" and no separate measurement or payment will be made.
 - .8 If a hydrant or appurtenance is damaged due to freezing or improper turn-on or turn-off procedures while in the Contractor's control, WSD will assess the damage and determine if WSD will repair the damage or if the Contractor will be responsible to repair the damage. Costs for repairs completed by WSD will be deducted from payments owing the Contractor. Repairs completed by the Contractor will be at the Contractor's expense.
 - .9 Erect and maintain signage (bump signs) warning oncoming traffic of hose crossings to the satisfaction of the Contract Administrator and the Manual of Temporary Traffic Control. Construct ramps as shown on attached Drawing D-8211.
 - .10 Direct hook-up of sewer flushing equipment to a hydrant is not permitted unless approved by the Contract Administrator and by WSD.
 - .11 WSD may instruct the Contractor to make other arrangements for hydrant turn-ons and turn-offs.
- .3 Further to Section 3.7 of CW 1120, charges incurred for the permit and water meters shall be

paid for by the Contractor when taken out. The Contractor shall forward the invoice to the Contract Administrator for reimbursement. The billing for water usage sent to the Contractor shall be forwarded to the Contract Administrator for payment. The Bid Opportunity number shall be noted on each permit.

3.15 Removal of Excessive Grease and/or Roots

- .1 Grease and roots will not be considered as solid debris.
- .2 Cut and remove grease and or roots that cannot be done through typical cleaning efforts as directed by the Contract Administrator.
- .3 Use hydraulically driven saw or blade cutters to remove grease and or roots. Flushing the sewer or the use of "spin nozzles" to remove grease will not be permitted.
 - .1 Remove grease and or roots to within 15 millimetres of the inside surface of the sewer.
 - .2 Monitor the entire removal operation and while the removal equipment is travelling within the pipe to reach the work area by CCTV.

3.16 Notices to Residents

- .1 The Contractor shall deliver notices provided by the Contract Administrator to residents and businesses on the affected sewers by 16:00 hours 2 days prior to the use of flushing equipment for either sewer cleaning or sewer inspection.
- .2 The notices will be in effect for a 3 day period which the Contractor will indicate with dates stamped on the envelope. The Contractor shall make every effort to complete the affected sewer lines within the notification window.
- .3 All costs associated with delivering notices shall be included in the price bid for "Sewer Cleaning" or "Sewer Cleaning Using Pressures Greater Than 10,350 kPa" and "Sewer Inspection" and no separate measurement or payment will be made.

3.17 Damage to City and Private Property

- .1 All damage to City and private property caused by cleaning or inspection operations is the responsibility of the Contractor. The Contractor shall repair all damaged property to the satisfaction of the Contract Administrator. All costs associated with these repairs shall be at the Contractors own expense.
- .2 Notify the Contract Administrator immediately when damage to property occurs.
- .3 The Contractor shall provide written reports to the Contract Administrator for each property attended for investigation of damage. Reports shall include photographs of all damage, dates and times, verbal or written agreements with property owner and all actions taken or proposed to rectify the damage. Reports shall be submitted to the Contract Administrator within 24 hours of attending the property.
- .4 Sewers may be located in easements through private property or City owned parklands and right-of-ways where no paved access may exist. It will be the Contractors responsibility to identify these sewers and arrange for access and to restore any surface damage to private and City owned property to the satisfaction of the Contract Administrator.
- .5 Sewer backup or "blow-back" on private property resulting from cleaning or inspection activities

is not acceptable and shall be avoided at all costs. It is expected that where this possibility exists the Contractor shall take appropriate measures such as making modifications to cleaning equipment and/or taking additional time to clean such sewers.

.1 Clean-up of affected residences shall be done by cleaning professionals. Under no circumstances are cleaning equipment operators to enter residences unless they are neat and presentable and the Contract Administrator has received a Criminal Record Search for that individual.

.2 Where actual sewage or "grey water" has flooded private property the Contractor shall immediately clean and disinfect all affected areas as well as flush all weeping tile. The Contractor shall immediately hire an independent IICRC certified water damage or flood restoration contractor to assess any damage to contaminated building materials such as drywall, insulation, carpets, weeping tile or sub-floors, and immediately make any required repairs.

.3 If a residence is uninhabitable as a result of a sewer back-up the Contractor shall pay for reasonable hotel accommodations and meals for all affected residents.

.6 The Contractor shall provide the Contract Administrator with a 24-hour contact number to arrange for immediate clean-up and repair of private property.

3.18 Acceptance of Work

- .1 Submit required video inspections of sewer and manhole cleaning, solid debris cutting and intruding sewer service removal to the Contract Administrator for review and determination if work performed is acceptable. The Contract Administrator will review the inspection videos within 10 days of submission.
- .2 The Contract Administrator will visually inspect catch basins to determine if cleaning is acceptable.
- .3 Perform remedial work for sewer, manhole and catch basin cleaning, cutting of solid debris and removal of intruding sewer services and a re-inspection for the locations where the work was determined by the Contract Administrator as not being acceptable.

4. MEASUREMENT AND PAYMENT

4.1 Sewer Cleaning

.1 Sewer cleaning using a maximum pressure of 10,350 kPa (1,500 psi) will be measured on a length basis for each size and type of sewer and paid for at the Contract Unit Price for "Sewer Cleaning". Length to be paid for will be the total length of sewer cleaned in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Sewer cleaning using pressures greater than 10,350 kPa (1,500 psi) will be measured on a length basis for each size and type of sewer and paid for at the Contract Unit Price for "Sewer Cleaning Using Pressures Greater Than 10,350 kPa". Length to be paid for will be the total length of sewer cleaned in accordance with this specification, accepted and measured by the Contract Administrator.

.3 Cleaning and removing backfill and debris that may have entered the sewer during removal of equipment and the subsequent repair or during emergency repairs of the sewer will be measured on a length basis for each size and type of sewer and paid for at the Contract Unit Price for "Sewer Cleaning". Length to be paid for will be the total length of sewer cleaned in accordance with this specification, accepted and measured by the Contract Administrator.

- .4 Measurement will be made horizontally at grade above the centre line of the sewer from centre to centre of manhole covers or from the centre of the start manhole cover to the point of abandoned cleaning as confirmed by steel tape measurement made in conjunction with the sewer inspection.
- .5 The diameter of non-circular sewers will be taken as the largest dimension.
- .6 75% of the payment will be made upon submittal of the corresponding video inspection. The remaining 25% of the payment will be made upon final acceptance of the sewer cleaning as determined by the review of the corresponding video inspection.

4.2 Removal of Equipment That Becomes Stuck in a Sewer

- .1 The City will pay costs for excavating down to the top of the sewer pipe, repairing the sewer after cleaning equipment is removed, backfilling the excavation and restoring the surface.
- .2 Removal of the top of the sewer pipe and the cleaning equipment that was stuck in the sewer will be at own expense.
- .3 No payment or extra time will be given for equipment downtime and attempted equipment retrieval.

4.3 Reverse Set-Up Cleaning

- .1 Reverse set-up cleaning will be measured on a unit basis and paid for at the Contract Unit Price for "Reverse Set-Up Cleaning". Number of units to be paid for will be the total number of reverse set-up cleanings performed in accordance with this specification, accepted and measured by the Contract Administrator.

4.4 Manhole Cleaning

- .1 Manhole cleaning will be included with manhole inspection.

4.5 Debris Removal

- .1 Debris removal will be measured on a weight basis and paid for at the Contract Unit Price for "Debris Removal". The weight to be paid for will be the total number of tonnes of sewer and catch basin debris removed and legally disposed of in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 The weight to be paid for will be the total number of tonnes of debris measured on a certified weigh scale. Provide weigh tickets to the Contract Administrator for review and payment. Payment will only be made upon receipt of weigh tickets.
- .3 Only debris originating from the sewers cleaned will be included in the payment for "Debris Removal".

4.6 Catch Basin Cleaning

- .1 Catch basin cleaning will be measured on a unit basis and paid for at the Contract Unit Price for "Catch Basin Cleaning". Number of units to be paid for will be the total number of catch basins cleaned in accordance with this specification, accepted and measured by the Contract Administrator.

4.7 Solid Debris Cutting

- .1 The first 3 lineal meters either continuous or cumulative of solid debris cutting per sewer segment will be measured on a unit basis and paid for at the Contract Unit Price for "Solid Debris Cutting – First 3 Metres". Number of units to be paid for will be the total number of solid debris cutting locations that accumulate to a total length less than or equal to 3.0 metres in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Solid debris cutting in excess of the first 3 lineal metres per sewer segment will be measured on a length basis and paid for at the Contract Unit Price for "Additional Solid Debris Cutting". Length to be paid for will be the total length of solid debris cutting longer than the first 3.0 lineal metres in accordance with this specification, accepted and measured by the Contract Administrator.
- .3 Solid debris cutting at pipe joints and services will be measured on a unit basis and paid for at the Contract Unit Price for "Solid Debris Cutting – At Pipe Joints and Services". Number of units to be paid for will be the total number of locations of solid debris cutting at pipe joints or services in accordance with this specification, accepted and measured by the Contract Administrator.
- .4 Measurements will be taken from the pre and post sewer cleaning inspections.

4.8 Removal of Intruding Sewer Services

- .1 Removal of intruding sewer services will be measured on a unit basis and paid for at the Contract unit Price for "Removing Intruding Sewer Services". Number of units to be paid for will be the total number of intruding sewer services removed in accordance with this specification, accepted and measured by the Contract Administrator.
- .2 Measurements will be taken from the pre and post sewer cleaning inspections.

4.9 Flow Control

- .1 Flow control will be included with sewer cleaning.

4.10 Removal of Excessive Grease and/or Roots

- .1 Cutting and removal of grease and or roots from within a single manhole-to-manhole sewer segment will be considered as one (1) pay item regardless of the amount of grease and or roots removed from within that sewer segment.
- .2 Measurement will be on a unit basis and paid for at the Contract Unit Price for "Removal of Excessive Grease and or Roots per Sewer Segment". The number of units to be paid for will be the total amount of manhole-to-manhole sewer segments in which grease and or roots have been removed in accordance with this Specification, accepted and measured by the Contract Administrator.