CITY OF
SWIFT CURRENT
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SECTION 08010
STORM SEWER MAINS

MARCH 2019

1 GENERAL

1.1 DESCRIPTION

1.1.1 This section includes the supply and installation of a storm sewer system within areas required by the City.

1.1.2 The Contractor shall provide all labour, products and equipment required for the work, including but not limited to:

- bedding under and over piping
- storm sewers and appurtenances
- culverts
- cleaning sewers
- testing sewers
- connection to existing systems

1.2 RELATED SECTIONS

- 08000 Trenching and Backfilling for Utilities
- 08001 Watermains
- 08002 Sanitary Sewer Mains
- 08003 Lot Service Connections
- 08040 Culverts
- 08050 Lift Stations

1.3 INSPECTION AND TESTING

1.3.1 Products, workmanship, and testing shall conform to standards specified in this section.

1.3.2 All products and workmanship are subject to inspection by the City.

1.3.3 Perform all tests required by the specifications and by authorities having jurisdiction.

1.3.4 Notify the City and authorities in ample time before testing to permit inspection and to allow tests to be witnessed.

1.3.5 Do not cover any work before inspection and testing unless authorized by the City in writing.

1.3.6 Remove or repair defective products or work which fails to meet specified requirements as directed by the City, at the Contractor's expense.

1.4 SEWER PIPE TESTS AND REJECTION

1.4.1 Include all costs for testing, supply and delivery of specimens to testing laboratory and replacing defective material.

1.4.2 The City reserves the right to select, either on site or at the manufacturer's stockpile, 0.5% of total length of each category of pipe for testing, minimum number of lengths as follows:

- for each category of over 100 lineal meters – four (4) lengths
- for each category of over 50 lineal meters and less than 100 lineal meters – two (2) lengths
- for each category of less than 50 lineal meters – one (1) length.

1.4.3 Where the City has selected full sized pipe specimens for load tests, deliver these specimens to an approved testing laboratory. Results of the tests shall be mailed directly to the City in triplicate. Pipe will be accepted, based on certified factory tests, provided they are done under supervision of an independent testing agency. All pipe tests shall be performed in accordance with ASTM Specifications.

1.4.4 Should any specimens fail to meet test requirements, test two additional selected specimens for each failure. Pipe will be acceptable only if all re-test specimens meet requirements. Should test results be unsatisfactory, all or part of pipe supplied may be rejected and payment withheld until satisfactory tests of pipe in place are conducted.

1.4.5 Inspect pipe on delivery and reject any that fails to meet specified requirements. Replace rejected pipe with satisfactory pipe without delay. Mark all rejected pipe plainly as "Rejected" and immediately remove from site.

1.4.6 The City may require submission of a manufacturer's report verifying satisfactory random testing of the pipe designated for this project.

1.5 INFILTRATION AND EXFILTRATION TESTING

1.5.1 Total infiltration of groundwater into whole of system or exfiltration, shall not exceed 5.0 liters per mm of internal pipe diameter per kilometer per day including manholes, for PVC pipe, and 20 liters per mm of internal pipe diameter per km per day including manholes for concrete and clay tile pipe. Where such leakage is exceeded, repair sewer mains, at no additional cost to City, so total infiltration is within specified limits.

1.5.2 During construction and immediately on completion of a manhole, measure infiltration at new manhole. If amount exceeds specified limit, make necessary repairs immediately to reduce infiltration to allowable limit. Failure to comply with this requirement will be sufficient cause for the City to stop sewer laying work until repairs have been made.

1.6 TESTING

1.6.1 If required by the City, perform pill test after cleaning sewer mains. Through each section of main, pull wood or metal ball with diameter 50 mm less than inside pipe diameter. If pill does not readily pull through, uncover pipe and make good defects at no cost to City.

1.6.2 Pill test is not required on lines 216 mm diameter and larger if they are visually inspected in a satisfactory manner.

1.6.3 T.V. Testing - the Contractor, at his cost will carry out a T.V. inspection of all sanitary and storm sewer mains. All defects identified by the T.V. inspection shall be corrected by the contractor at the contractor's expense. The contractor shall be responsible for the cost of flushing and stringing the mains prior to TV inspection. If additional TV inspection is required to verify correction of defective work, it will be at the contractor's cost. The Contractor shall provide a copy of the DVD/CD-ROM recordings and a written report to the City for record purposes.

2 PRODUCTS

2.1 SEWER PIPE

2.1.1 To be type called for in the schedule of quantities or shown on drawings and meet the requirements noted in subsequent clauses of this section.

2.1.2 Non-reinforced pipe and fittings to CAN/CSA-A259.1 class 3, designated for flexible rubber gasket joints to CAN/CSA-A257.3.

2.1.3 Reinforced concrete pipe meeting ASTM Specification C76-70 CSA-A257.2-M92.

2.1.4 PVC pipe and fittings - DR 35 meeting ASTM Specification D3034 and CSA-B182.2 and CSA-B182.1 may be utilized for mains up to and including 375 mm diameter with prior approval of the City.

2.1.5 Ribbed PVC pipe and fittings to meet CSA B182.4, ASTM F794 with pipe stiffness of 320 kPa as measured in accordance with ASTM D2412. Maximum long term deflection is less than 7.5%

2.1.6 Cement - sulfate resisting Portland for all concrete pipe, meeting Type 50 CSA-A5.

2.2 PIPE JOINTS

2.2.1 For all sewers - as recommended by pipe manufacturer, to produce watertight joints with infiltration within specified limits.

2.2.2 Concrete pipe - rubber gasket to ASTM C443 and CSA A257.3.

2.2.3 PVC - rubber gasket to ASTM 03212 or ASTM F477.

2.3 PRE-CAST CONCRETE MANHOLE UNITS

2.3.1 To meet requirements of ASTM C478 and CSA A257.4 to dimensions shown on drawings.

2.3.2 Cement - sulfate resisting Portland, CSA A5, Type 50.

2.3.3 Manhole steps shall be 19 mm diameter, galvanized iron safety rungs spaced at a maximum distance of 400 mm center to center for full height.

2.3.4 Pre-cast bases to be minimum 20.7 MPa concrete.

2.4 CONCRETE BLOCKS AND BRICKS

2.4.1 Solid concrete, conforming to CSA A165.1 and 165.2 and ASTM C139, not less than 128 mm thick for block, standard dimensions for brick, true to shape, free from cracks and surface defects, compressive strength not less than 17.2 MPa, absorbing not more than 8% water by weight during twenty-four (24) hours immersion test performed after drying.

2.4.2 Cement - sulfate resisting Portland CSA A5, Type 50.

2.5 CATCH BASINS

2.5.1 Catch basin barrels to meet requirements of ASTM C478 and CSA A257.2, 900mm I.D. pipe barrel conforming to CSA-A257 2. Joints to be confined O-ring to CSA-A 257.3 using rubber gasket. Details shown on Standard Drawing.

2.5.2 Catch basin manholes shall be used in place of a catch basin when the lead exceeds 30 m in length or one catch basin discharges into another.

2.5.3 Catch basin - manholes shall be 1200 mm in diameter in accordance with the Standard Drawing.

2.5.4 Cement - sulfate resisting Portland CSA A5, Type 50.

2.6 CATCH BASIN LEAD PIPES

2.6.1 Catch basin lead pipes shall be:

- Non-reinforced concrete pipe to meet CSA A257.1
- PVC pipe DR 35 to meet ASTM D3034 or approved equivalent.

2.6.2 Pipe diameter shall be 250mm diameter for single catch basins and 300mm diameter for twinned catch basins with a minimum grade of 1.0%.

2.6.3 Catch basin leads shall have a minimum cover of 1.2 m to obvert.

2.7 MORTAR

2.7.1 For pipe joints and all other parts of the work, one part sulfate resisting Portland cement to two parts clean sand, by volume.

2.8 CAST IRON FRAME, COVERS AND GRATES

2.8.1 Catch basin covers and frames (or approved equals):

- Frame and grate by Trojan Industries Inc. TF-106, or approved equivalent for straight faced curb and gutter.
- Frame and grate by Trojan Industries Inc. TF-33, or approved equivalent for rolled curb and gutter
- Top inlet standard round lane paving frame and grate by Trojan Industries Inc. TF-38 for swales or lanes.

- Top inlet standard round top frame and grate by Trojan Industries Inc. Type TF-39 or T-K1 grate for landscaped areas.

2.8.2 For manholes and catch basins, close-grained grey cast iron, meeting ASTM A48, Class 20, true in form and dimension, free from faults, sponginess, cracks, blowholes and other defects. Cast steel to conform to ASTM A27, grade 70-36. Substitution of ductile iron meeting ASTM A445 for cast iron or cast steel shall be subject to approval of the City.

2.8.3 Machine or grind frames, covers and grates to even non-rocking bearing surfaces.

2.8.4 Hot dip in asphaltic varnish.

2.8.5 Manhole frames and covers to be Trojan Industries Inc. Type TF-105, TF-39 or an approved equal. All manhole covers are to be clearly stamped “Storm Sewer”.

2.9 MANHOLES

2.9.1 Construct manholes as shown on drawings, unless otherwise permitted in writing by the City. Submit full details of any proposed alternative construction with bid.

2.9.2 For cast-in-place concrete for manholes, conform to CSA A23.1.

2.9.3 Manhole types shall be in accordance with the applicable standard drawings.

2.9.4 For pipe 600 mm in diameter or smaller use a 1200 mm diameter manhole, except where a three or four way junction occurs, in which case a vault type manhole or tee riser must be used.

2.9.5 For pipe larger than 600 mm in diameter or larger use a Type 1 or Type 1S manhole which has a square poured in place bottom section and pre-cast 1200 diameter upper section.

2.9.6 Pre-cast tee-riser manholes may be accepted for 1200mm diameter or larger trunks where there is no change in pipe size, direction or grade. Tee riser manholes must be bedded in concrete to the springline of the pipe.

2.9.7 Place manholes accurately, plumb, in alignment and at exact plan location.

2.9.8 Construct manholes watertight and complete, including finishing flow bottoms, as work proceeds. Do not lay pipe in advance more than two manholes ahead of last completed manholes.

2.9.9 Shape bottoms accurately for necessary flows as shown on drawings or as directed by the City. On manholes with sewers 610 mm diameter and smaller, form invert through manhole with half-round pipe. At manholes containing lot services shape bottoms to provide slopes required to ensure no build-up of sewage occurs in manholes.

2.9.10 Place stubs for future lines accurately and plug watertight. Shape flow bottoms to suit future lines.

2.9.11 At all bends through manholes, provide 50 mm drop in invert from inlet to outlet.

2.9.12 Support pipes at manholes to prevent shearing or settlement. Where not detailed use concrete fill, concrete or timber beam, or suitably compacted gravel.

2.9.13 During construction, plug pipes at manholes to prevent entry of concrete and mortar. Remove plugs immediately after construction is completed.

2.9.14 Set covers accurately within 15 mm of correct grade. On sloping streets, set covers to match slopes.

2.9.15 Set all precast concrete sections, bricks, blocks and frames in mortar. Tool joints smooth and point all voids after setting. All sanitary manhole barrels are to be sealed with rubber neck to prevent infiltration. Gaskets for storm manholes only, may be omitted at the discretion of the City.

2.9.16 Manhole safety steps shall be a 19 mm diameter solid steel bar, hot dip galvanized after fabrication.

2.10 SAFETY PLATFORMS

2.10.1 Safety platforms shall be aluminium grates to MSU Mississauga or approved equal.

2.10.2 To be installed according to manufacturer's recommendations.

2.10.3 To be installed on manholes greater than 5.0 meters in depth when measured from the top of the frame to the lowest invert.

2.11 CONCRETE

2.11.1 Ready-mixed concrete, sulfate resisting, Portland cement CSA A5, Type 50, 20 MPa compressive strength at twenty-eight (28) days of age, to CSA A23.1

2.12 REINFORCING STEEL

2.12.1 CSA G30.12 or G30.13, 34.5 MPa minimum yield, Grade 50 all deformed except where noted otherwise. Use Grade 40 for ties.

3 EXECUTION

3.1 BEDDING SEWERS

3.1.1 Excavate trenches to widths not less than 300 mm greater than pipe diameter. Maximum width at top shall not exceed outside pipe diameter plus 600 mm.

3.1.2 Bed pipe as detailed in the trenching and pipe bedding standard drawing.

- Obtain the City's approval for all materials to be used in the pipe bedding zone.

3.2 LAYING AND JOINTING PIPE

3.2.1 Commence laying at lower end of line, lay pipes and specials true to line and grade, socket ends up grade, joints close and evenly butted all around pipe. Take special care to prevent sagging of spigot end in hub and provide true, even invert surface throughout entire length of sewer. Excavate at end of each pipe to provide rest for socket, sufficient to permit proper jointing. Clean pipe interior, remove all dirt, mud and other extraneous materials.

3.3 CLEANING SEWER MAINS

3.3.1 On completion of construction of mains and services, flush and string, (in readiness for TV inspection) all mains until all deposits of earth or other material are removed. If new system connects to an existing system, plug outgoing line at manhole at junction and remove dirt and debris at that manhole. Do not permit debris from new construction to enter existing system. Pay all costs for repairs where damages occur due to negligence. Pay all costs of water from the municipal authority.

3.3.2 During flushing operations, check all manholes. If depth of flow in any manhole is greater than should be anticipated, bucket main and remove obstructions in pipe line. Pay all costs for required repairs.

3.3.3 Whenever practicable, flush out in runs not over 250 meters. Remove all foreign material from each run before proceeding with next.

4 MEASUREMENT AND PAYMENT

4.1 STORM SEWER PIPE AND CATCH BASIN LEADS

4.1.1 Payment will be made at the contract unit price per lineal meter of pipe installed. Price shall include the supply, installation and joining of the storm sewer pipe, as well as all labour, equipment and materials required to complete the wok.

4.2 MANHOLE FRAME / COVER

4.2.1 Payment will be made at the contract unit price per each manhole frame and cover installed. Price shall include the supply and installation of the manhole frame and cover to finished grade as well as all labour, equipment and materials required to complete the work.

4.3 MANHOLES

4.3.1 Price shall be made at the contract unit price per vertical mater of manhole installed. Measurement will be made from the lowest invert to the top of the grade rings.

4.3.2 Price shall include the supply and installation of all materials, labour and equipment required to construct the manhole. These materials include but are not limited to the following:

a) 1200mm Dia Barrel
b) Grade Rings
c) Slap Top
d) Concrete Base
e) Barrel Risers
f) Ladder Rings

4.4 BEDDING SEWERS

4.4.1 Payment will be made at the contract unit price per lineal meter of sewer bedded. Price shall include all labour, equipment and materials required to complete the work.

4.5 CATCH BASINS

4.5.1 Payment will be made at the contract unit price per catch basin installed. Price shall include all labour, equipment and materials required to install the catch basin to finished grade. Price shall also include connection of the catch basin leads to both the catch basin and the manhole.

4.6 CONNECT TO EXISTING STORM MAIN

4.6.1 Payment will be made at the contract unit price per each connection to existing sewer completed. Price shall include the supply and install of all necessary materials, equipment and labour required to complete the work.

4.7 TESTING / CLEANING

4.7.1 There will be no direct payment for these items; price will be included in alternate bid items.

END OF SECTION