

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Site storm sewerage drainage piping, fittings and accessories, and bedding.

1.2 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-place Concrete.
- .2 Section 31 23 25 - Rock and Gravel Fill.
- .3 Section 33 31 13 - Public Sanitary Utility Sewerage Piping.
- .4 Section 33 05 13 - Manholes and Catch Basin Structures.

1.3 REFERENCES

- .1 Codes and standards referenced in this section refer to the latest edition thereof.
- .2 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.
- .3 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).
- .4 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).
- .5 ASTM D2321-09 - Practice for Underground Installation of Thermoplastic Pipe for Sewers and

Other Gravity-Flow Applications.

- .6 ASTM D2729-03 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .7 ASTM D3034-08 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .8 ASTM D6938-10 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- .9 ASTM F667-12 Standard Specification for 3 to rough 24 in. corrugated polyethylene pipe and fittings

1.4 COORDINATION

- .1 Coordinate with other work having a direct bearing on work of this section.
- .2 Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system.

1.5 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submittal Procedures.
- .2 Product Data: Provide data indicating pipe and pipe accessories.

1.6 SUBMITTALS FOR INFORMATION

- .1 Section 01 33 00: Submittal Procedures.

- .2 Shop drawings to indicate proposed method for installing carrier pipe for undercrossings.
- .3 Inform Departmental Representative at least 4 weeks prior to beginning Work of proposed source of bedding materials and provide access for sampling.
- .4 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
- .5 Certification to be marked on pipe.
- .6 Submit to Departmental Representative 1 copy of manufacturer's installation instructions.

1.7 CLOSEOUT SUBMITTALS

- .1 Section 01 78 00: Close Out Submittals.
- .2 Accurately record actual locations of pipe runs, connections, catch basins and manholes, invert elevations, pipe size and materials..
- .3 Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 REGULATORY REQUIREMENTS

- .1 Conform to Newfoundland & Labrador Municipal Water, Sewer and Roads Master Specifications.

1.9 MEASUREMENT
FOR PAYMENT

- .1 Storm piping shall be measured in meters of each size of pipe installed, and shall include all fittings in the unit price.

PART 2 - PRODUCTS

2.1 SEWER PIPE
MATERIALS

- .1 Plastic Pipe
 - .1 Profile wall polyvinyl chloride pipe with locked-in gasket and integral bell system. Pipe and fitting to be certified to CAN/CSA B-182-4-M92 and ASTM F794. Nominal lengths 4 m and 6 m.
- .2 High Density Polyethylene Pipe
 - .1 Corrugated double wall pipe to CSA B182.6-M92 for storm sewers. Pipes to have a smooth inner wall. Pipe may be bell and spigot style or plain end fastened with a coupling recommended by the manufacturer. Pipe stiffness to be minimum 320 kPa.

2.2 ACCESSORIES

- .1 Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, clean-outs, reducers, traps and other configurations required.
- .2 Grout: Specified in Section 03 30 00.

2.3 BEDDING MATERIALS

- .1 Bedding material, Fill Type 1,

to: Section 31 23 25 - Rock and Gravel Fill and following requirements;

- .1 Type 1 bedding: clean, hard durable crushed gravel or stone, free from shale clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136-84a and ASTM C117-87 and giving a smooth curve without sharp breaks when plotted on a semi-log chart:

<u>ASTM sieve designation</u>	<u>% passing</u>
25.000 mm	100
19.000 mm	75 - 100
12.500 mm	-
9.500 mm	50 - 100
4.750 mm	30 - 70
2.000 mm	20 - 45
0.425 mm	10 - 25
0.180 mm	-
0.075 mm	3 - 8

- .2 Concrete required for cradles, encasement, supports, thrust blocks and cut-off walls all to Section 03 30 00, strength 25 MPa.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify existing conditions before starting work.
- .2 Verify that trench cut and excavation base is ready to receive work and excavations,

dimensions, and elevations are as indicated on construction Drawings.

3.2 PREPARATION

- .1 Clean and dry pipes and fittings before installation.
- .2 Obtain approval of pipes and fittings from Departmental Representative prior to installation.

3.3 BEDDING

- .1 Excavate pipe trench as specified in Section 31 23 25 - Rock and Gravel Fill for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- .2 Place bedding material at trench bottom, level materials in continuous layer not exceeding 200 mm compacted depth.
- .3 Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - CATCH BASINS AND MANHOLES

- .1 Work to be in accordance with Section 33 05 13 - Manholes and Catch Basin Structures.

3.5 FIELD QUALITY CONTROL

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
- .3 Remove foreign material from sewers and related appurtenances

by flushing with water.

- .4 Do infiltration and exfiltration testing as specified herein and as directed by Departmental Representative. Perform tests in presence of Departmental Representative. Notify Departmental Representative 24 h in advance of proposed tests.
- .5 Carry out tests on each section of sewer between successive manholes including service connections.
- .6 Install watertight bulkheads in suitable manner to isolate test section from rest of pipeline.
- .7 Exfiltration test:
 - .1 Fill test section with water to displace air in line. Maintain under nominal head for 24 hours to ensure absorption in pipe wall is complete before test measurements are begun.
 - .2 Immediately prior to test period add water to pipeline until there is head of 1 m over interior crown of pipe measured at highest point of test section or water in manhole is 1 m above static ground water level, whichever is greater.
 - .3 Duration of exfiltration test: 2 hours.
 - .4 Water loss at end of test period: not to exceed maximum allowable exfiltration over any section of pipe between manholes.

- .8 Infiltration test:
 - .1 Conduct infiltration test in lieu of exfiltration test where static ground water level is 750 mm or more above top of pipe measured at highest point in line to be used.
 - .2 Do not interpolate a head greater than 750 mm to obtain an increase in allowable infiltration rate.
 - .3 Install watertight plug at upstream end of pipeline test section.
 - .4 Discontinue pumping operations for at least 3 days before test measurements are to begin and during this time, keep thoroughly wet at least one third of pipe invert perimeter.
 - .5 Prevent damage to pipe and bedding material due to flotation and erosion.
 - .6 Place 90 degrees V-notch weir, or other measuring device approved by Departmental Representative in invert of sewer at each manhole.
 - .7 Measure rate of flow over minimum of 1 hour, with recorded flows for each 5 min interval.
- .9 Infiltration and exfiltration not to exceed 5.5 L per hour per 100 m of pipe, including service connections.
- .10 Repair visible leaks regardless of test results.

- .11 Television and photographic inspections: carry out inspection of installed sewers by television camera, photographic camera or by other related means.
- .12 Provide certification of test acceptance. Provide Departmental Representative with copy of video tape, digital format and certification of corrected deficiencies. If retesting is required Contractor to pay cost.

3.6 PROTECTION OF FINISHED WORK

- .1 Protect installed work.
- .2 Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

3.7 SCHEDULES

- .1 Sizes noted on drawings.