

This specification outlines the requirements for constructing sub-drains with granular filter material to lines and grades indicated or directed.

PART 1 REFERENCES

This specification refers to the following standards, specifications, or publications:

Government of Newfoundland and Labrador, Department of Transportation and Infrastructure (TI), Highway Design and Construction Division, Highway Specifications Book:

Section 420.02.01 Supply and Installation of Pipe for Storm Sewers and Perforated Pipe for Sub-Drainage: Aluminized & Polymer Laminated Steel Pipe Materials

ASTM International (ASTM)

A760/A760M Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

A762/A762M Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains

C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C444 Standard Specification for Perforated Concrete Pipe

CSA Group

B137 Thermoplastic Pressure Piping Compendium

B1800 Thermoplastic Nonpressure Piping Compendium

G401 Corrugated Steel Pipe Products

Canadian General Standards Board (CGSB)

CAN/CGSB-8.2 Sieves, Testing, Woven Wire, Metric

PART 2 GENERAL

2.1 SUBMITTALS

.1 Submit in accordance with Section 01340 – Shop Drawings, Samples and Submissions.

.2 Inform Owner at least four (4) weeks prior to beginning Work of proposed source of bedding materials and provide access for sampling.

- .3 Submit data sheets, test data, and certification at least two (2) weeks prior to beginning Work.
- .4 Certification to be marked on pipe.
- .5 Submit to Owner one (1) copy of manufacturer's installation instructions.

2.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01015 – Materials & Equipment Delivered to Site and manufacturer's instructions.

2.3 SCHEDULING OF WORK

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

PART 3 PRODUCTS

3.1 MATERIALS

- .1 Perforated corrugated steel pipe ~~to meet following requirements:~~
 - .1 ~~In accordance with T1 Highway Specifications Book, Section 420.02.01. To CSA G401~~
 - .2 ~~Aluminized type 2 in accordance with ASTM A929/A929M or polymer laminated in accordance with ASTM A762, A762M Asphalt coated, type AC or galvanized corrugated steel pipe.~~
 - .3 Metal thickness unless otherwise indicated:

Diameter (mm)	Thickness of Metal (mm)
150 to 200	1.2
250 to 300	1.6
- .2 Plastic pipe and fittings: in accordance with CSA B137, nominal inside diameter 100 mm.
- ~~.3 High-Density Polyethylene pipe: CSA B137.~~
- .4.3 Perforated plastic pipe and fittings in accordance with CSA B1800.
- .4 Bedding gravel: ~~or crushed stone~~ or pit gravel; hard, durable particles and in accordance with Section 02223 – Excavating, Trenching & Backfilling ~~graded evenly in size from 16 mm to 18 mm.~~

.5 Granular filter material in accordance with Section 02226 – Aggregates for Earthworks and to meet following requirements:

.1 Screened stone or gravel

.5.2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.2.

ASTM Sieve (mm)	% Passing
10.00 12.5	100
5.00 4.75	70 95–100
2.50 00	60 80– 95–100
4.25	50–90
0.425 630	15 25– 65–40
0.315	40–35
0.16 080	0 4–10

.6 Geotextile in accordance with Section 02897 – Geotextile (Filter Fabric). Type as indicated in Contract Documents.

PART 4 EXECUTION

4.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sub-drainage piping installation in accordance with manufacturer's written instructions.

1 Visually inspect substrate in presence of the Owner.

2 Inform the Owner of unacceptable conditions immediately upon discovery.

3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Owner.

4.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to

requirements of authorities having jurisdiction, Contract Documents, and site-specific erosion and sedimentation control plan, whichever is more stringent.

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

4.14.3 TRENCHING

- .1 Do excavating, trenching and backfilling in accordance with Section 02223 – Excavating, Trenching and Backfilling.
- .2 Prior to any placing of bedding:
 - .1 remove material from cave-ins and accumulations of water, muck, and objectionable matters.
 - .2 repair or remove and replace damaged sections.
- .3 Do not place bedding or filter material prior to approval of excavation by the Owner.
- .2.4 Chutes or other proper means shall be used to prevent segregation or materials or displacement of structures or pipes. Improper dumping of backfill material will not be permitted.

4.24.4 BEDDING

- .1 Place 100 mm layer of bedding material as indicated and compact to minimum 95 % of corrected maximum dry density, where the maximum dry density is determined in accordance with ASTM D698 and corrected as specified in Section 02501 – Corrected Maximum Dry Density, before a further layer is placed.
- .2 Placing of Under Bedding in Trenches
 - .1 In the case of rock bottomed trenches, select bedding shall be placed in the bottom of the trench to provide under bedding for the pipe.
 - .2 In the case of Other Material bottomed trenches, no select bedding is required for corrugated steel pipe. However, if plastic pipes are to be used then select bedding shall be placed in the bottom of the Other Material bottomed trench to provide under bedding for the plastic pipe.
 - .3 Under bedding shall be shaped to conform to the underside of the pipe and be graded to conform to the required grade for the pipe.

4.34.5 INSTALLATION OF PIPE SUB-DRAINS

- .1 All pipes shall be handled with care so as not to damage the pipes or their protective coatings. Each pipe shall be inspected for defects before being lowered into the trench. Any pipe that is defective or unsound, in the opinion of the Owner's Representative, shall not be incorporated in the work.
- .2 Provide dewatering as required.
- .3 Lay drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with bed throughout full length.
- .4 Riveted corrugated steel pipe shall be laid with the inside circumferential laps pointing in the direction of the flow. The longitudinal laps shall be located in the upper half of the pipe.
- .5 Helical aluminized or polymer laminated corrugated steel pipe shall be installed so that the helix angle is constant for the total length of the installation and each pipe section shall be installed next to the previous section such that the lock-seam forms a continuous helix.
- .6 Commence laying at outlet and proceed in upstream direction.
- .7 Lay perforated pipes with perforations downwards at angles indicated on the drawings.
- .8 Lay bell and spigot pipe with bell ends facing upstream.
 - .1 Do not mortar joints.
- .9 Cover joints of bell and spigot pipe with two-ply tar paper strips not less than 150 mm wide.
 - .1 Use strips of sufficient length to permit ends to be laid flat on bedding and turned outward on either side of pipe for a minimum distance of 75 mm.
- .10 Pipes shall be cut whenever necessary to permit the installation of adaptors, bends, wyes, tees, or catch basins. At catch basins, the pipe shall be cut so that pipe ends will not project more than 300 mm in from the walls of the catch basin. Pipe cuts shall be made neatly at right angles to the axis of the pipe.
- .11 Where aluminized or polymer laminated corrugated steel pipe is cut, drilled, or welded:
 - .1 the pipe shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld spatter, etc., and wiped clean.

- .2 the cleaned surface shall receive at least one application of metal conditioner to de-oxidize, degrease, and phosphatize the metal surface to be treated if the surface is oily.
- .3 pre-mixed, ready-to-apply, liquid zinc compound shall be applied to the prepared clean dry metal surface.
- .4 the cold-galvanizing compound must be of a type that imparts cathodic action against corrosion.
- .5 all cut edges and any damage to aluminized or polymer laminated coatings shall be repaired in accordance with the latest version of CSA G401.
- .12 Make joints tight in accordance with manufacturer's instructions.
- .13 Do not allow water to flow through pipes during construction except as approved.
- .14 Make watertight connections to existing drains, new or existing maintenance holes and catch basins where indicated or as directed.
- .15 Aluminized or polymer laminated corrugated steel pipe sections shall be joined together by means of aluminized or polymer laminated steel couplers. The couplers shall be installed to lap approximately equal portions of the pipe being connected and such that the corrugations or projections of the coupler properly engage the pipe corrugations. As the coupler is being tightened, it shall be tapped with a mallet to take up the slack.
- .16 The interior of pipes shall be carefully cleaned of all dirt, cement or superfluous material of every description as the work progresses.
- .17 At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other means deemed acceptable by the Owner. If water is in the trench when work recommences, then the plug shall remain in place until the trench is pumped completely dry.
- .18 The alignment of sewer pipes between catch basins shall be tested as each portion is laid. The Owner may order a strong light to be supplied by the Contractor, which will be shone through the pipe from catch basin to catch basin. If less than half of the full diameter of the end of the pipe at the light source is visible from the far end, then the Owner's Representative may order the pipes realigned at the Contractor's expense
- .19 The upstream ends of perforated pipe shall be sealed by means of a concrete plug. When the pipe is in position the wet concrete shall be placed in the open end of the pipe. The concrete shall fill the end of the pipe to a length equal to the diameter of the pipe.
- .20 Surround pipe with bedding gravel and compact as directed by the Owner.

.21 Placing of Bedding in Each Side and Over Pipe

- .1 When placing select bedding over pipes, bedding operations shall be kept back at least 3 m from the advanced end of the pipe line, except for the completion of any section or at the termination of a day's work. Uncovered pipe, left overnight, shall be backfilled as soon as possible to the end of the pipe without covering it. The trench shall be filled with select bedding material to a height of at least 300 mm above the top of the pipe, or when more than one pipe is laid in the trench, to a height of at least 300 mm above the top of the highest pipe. Select bedding material placed around a pipe shall be maintained at equal levels on each side of the pipe at all times, so that the intended alignment of the pipe be achieved.

- .22 Surround and cover drain with filter material in uniform 150 mm layers to an elevation of at least 150 mm above top of drain and compact to at least 95 % of corrected maximum dry density, where the maximum dry density is determined in accordance with ASTM D698 and corrected as specified in Section 02501 – Corrected Maximum Dry Density.

- .23 Wrap or sleeve perforated pipe with geotextiles filter as indicated.

- .2.24 Place Geotextile filter fabric in accordance with Section 02897 – Geotextile (Filter Fabric).

- .25 Backfill remainder of trench in accordance with Section 02223 - Excavating, Trenching and Backfilling.

- .26 Do not place bedding surround and backfill in frozen conditions.

- .27 Protect sub-drains against flotation during installation.

- .28 Install "Y" connections to surface as indicated, for flushing.

4.6 CONNECTIONS TO MUNICIPAL

- .1 Connect pipe sub-drains to municipal storm sewer system where indicated.

4.7 INSTALLATION OF FRENCH DRAINS

- .1 Install French drains as indicated.

- .2 Backfill remainder of trench to Section 02223 - Excavating, Trenching and Backfilling.

- .1 Install clay seal at top of French drain the Owner and as indicated.

PART 5 PAYMENT

5.1 MEASUREMENT FOR PAYMENT

- .1 Bedding gravel and filter material will be measured in cubic metres of material incorporated into work to specified paylines indicated in the Contract Documents. No deduction to be made for volume occupied by drain.
- .2 Supply and installation of subdrains will be measured horizontally from centre to centre of maintenance holes or catch basins over surface after work has been completed, in metres, for each type and size installed. In cases where drain is not connected to maintenance holes or catch basins, measurement will be actual length in place.

5.2 BASIS OF PAYMENT

- .1 All costs associated with the work outlined in this specification shall be deemed to be included in the appropriate unit and lump sum prices quoted as outlined in the Measurement for Payment subsection of this section and as included in the MERX Schedule of Quantities and Prices.
- .2 Excavation and backfill will be measured in accordance with Section 02223 – Excavating, Trenching and Backfilling.
- .2.3 Geotextile fFilter fFabric will be paid in accordance with Section 02897 – Geotextile (Filter Fabric).