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**2.8 PERFORATED PIPE SUBDRAINS****2.8.1 GENERAL**

The Work shall consist of trenching, supplying and installing perforated pipe wrapped in filter fabric and backfilling with select filter material at locations and to the depth and grade as established by the Consultant.

**2.8.2 MATERIALS****2.8.2.1 Perforated Pipe**

The Contractor shall supply perforated pipe in accordance with Specification 5.23, Supply of Corrugated Metal Pipe and Pipe Arches or Specification 5.24, Supply of Corrugated Polyethylene Pipe.

**2.8.2.2 Filter Fabric**

The Contractor shall supply filter sock or filter fabric material for wrapping the perforated pipe in accordance with the following:

<b>PROPERTIES</b>	<b>ASTM Test</b>	<b>REQUIREMENTS</b>
<b>PHYSICAL</b>		
Grab Tensile Strength	D4632	400 Newtons (N) Minimum
Grab Tensile Elongation	D4632	50 % Minimum
Mullen Burst	D3786	1275 kPa Minimum
Puncture	D4833	240 Newtons (N) Minimum
Trapezoid Tear	D4533	180 Newtons (N) Minimum
UV Resistance	D4355	70 % @ 150 hr.
<b>HYDRAULIC</b>		
Apparent Opening Size	D4751	0.212 mm Minimum
Permittivity	D4491	2.1 sec <sup>-1</sup>
Flow Rate	D4491	102 l/sec/m <sup>2</sup>

**2.8.2.3 Filter Material**

The Contractor shall supply filter material composed of hard, durable mineral particles free from organic matter, clay balls, soft particles and other deleterious materials and meeting the gradation requirements as specified in Specification 3.2, Aggregate Production and Stockpiling, for designation 8 class 25 material. The Contractor shall supply aggregate materials in accordance with Specification 5.2, Supply of Aggregate

and haul aggregate materials in accordance with Specification 4.5, Hauling.

### 2.8.3 CONSTRUCTION

#### 2.8.3.1 **Trench Excavation**

Trenches shall be excavated to depths and grades as established by the Consultant. The trench shall be kept as narrow as practicable and still permit jointing to be done. The minimum width of the trench shall be the inside diameter of the pipe plus 0.25 m. The bottom of the trench shall be stable to afford a firm and uniform bearing throughout the entire length of the culvert. Where the bottom of the trench is in an impervious layer which has become wet and puddled, gravel material shall be added to stabilize the bottom. However, the depth of gravel material shall be kept to a minimum to prevent possibilities of water flow under the subdrain pipe.

#### 2.8.3.2 **Pipe Installation**

Perforated pipe shall be installed to the depth and grade established by the Consultant. Perforations shall be oriented in directions as indicated by the Consultant, in accordance with the requirements for either collecting or carrying of water.

#### 2.8.3.3 **Filter Fabric Installation**

The perforated pipe shall be wrapped with filter fabric or fitted with a filter fabric sock prior to installation.

#### 2.8.3.4 **Trench Backfill**

The subdrain trench shall be backfilled with pervious filter material conforming to Section 2.8.2.3. Filter material shall be placed in 0.15 m layers, shall be thoroughly tamped and carried to a minimum of 0.15 m above the seepage zone, or to height as directed by the Consultant. The remainder of the trench shall be backfilled with impervious material and thoroughly compacted.

### 2.8.4 MEASUREMENT AND PAYMENT

#### 2.8.4.1 **Trench Excavation**

Measurement and payment for excavation for the subdrain trench will be made in accordance with Specification 2.3, Grading, for the various classes of material excavated.

#### 2.8.4.2 **Supply and Install Perforated Pipe Subdrain**

Measurement for the supply and installation of perforated pipe subdrains will be in metres, measured along the pipe invert. Payment will be made at the unit price bid per metre for "Perforated Pipe". This payment will be full compensation for preparation of the bottom of the trench, supplying and installing the pipe and filter fabric and backfilling of the trench.

#### 2.8.4.3 **Filter Material**

Payment for filter material for backfilling will be made at the unit bid per cubic metre for "Filter Material".

This payment will be full compensation for processing, hauling and placing the material as specified.

**2.8.4.4 Supply of Aggregate**

Payment for the supply of aggregate will be made in accordance with Specification 5.2, Supply of Aggregate.