

PART 1 - General

- 1.1 Related Sections .1 Section 01 35 43 - Environmental Procedures.
- 1.2 Measurement For Payment .1 No measurement for payment to be made under this section. Include costs in unit prices for item which excavating, trenching, and backfilling is required.
- 1.3 References .1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-95, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-98, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (2,400 ft-lbs/ft³) (600 kN-m/m³)
 - .5 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
- 1.4 Definitions .1 Excavation classes: two (2) classes of excavation will be recognized; common excavation and rock excavation.
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1.4 Definitions
(Cont'd)

- .1 (Cont'd)
- .1 Rock: any solid material in excess of 0.25 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Unsuitable materials:.
- .1 Weak and compressible materials under excavated areas.
- .2 Frost susceptible materials under excavated areas.
- .3 Frost susceptible materials:
- .1 Fine grained soils with plasticity index less than ten (10) when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.
- .2 Table
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 2.00 mm | 100 |
| 0.10 mm | 45 - 100 |
| 0.02 mm | 10 - 80 |
| 0.005 mm | 0 - 45 |
- .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .5 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

PART 2 - Products NOT APPLICABLE

PART 3 - Execution

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| 3.1 Site
<u>Preparation</u> | .1 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated. |
| 3.2 <u>Excavation</u> | .1 | Excavate to lines, grades, elevations and dimensions as indicated. |
| | .2 | Remove all other obstructions encountered during excavation in accordance with Section 02 41 16 - Sitework, Demolition and Removal. |
| | .3 | Excavation must not interfere with bearing capacity of adjacent foundations. |
| | .4 | Dispose of surplus and unsuitable excavated material in approved location off site. |
| | .5 | Do not obstruct flow of surface drainage. |
| | .6 | Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter. |
| | .7 | Notify Departmental Representative when bottom of excavation is reached. |
| | .8 | Obtain Departmental Representative's approval of completed excavation. |
| 3.3 Fill Types And
<u>Compaction</u> | .1 | Use beach gravel as backfill as indicated. |
| 3.4 <u>Backfilling</u> | .1 | Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations. |
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3.4 Backfilling .2 Areas to be backfilled to be free from debris,
(Cont'd)

.3 Do not use backfill material which is frozen
or contains ice, snow or debris.

3.5 Restoration .1 Upon completion of Work, remove waste
materials and debris, trim slopes, and correct
defects as directed by Departmental
Representative.

.2 Clean and reinstate areas affected by Work as
directed by Departmental Representative.

.3 Restore site to its normal state prior to
excavation.

PART 1 - General

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| <u>1.1 Section Includes</u> | <p>.1 Materials and installation of polymeric geotextiles used in breakwaters, retaining wall structures, filtration, drainage structures and roadbeds, purpose of which is to:</p> <ul style="list-style-type: none">.1 Separate and prevent mixing of granular materials of different grading..2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure. |
| <u>1.2 Related Work</u> | <p>.1 Section 01 33 00 - Shop Drawings and Other Submittal Procedures.</p> <p>.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.</p> <p>.3 Section 31 23 10 - Excavating, Trenching and Backfilling.</p> |
| <u>1.3 References</u> | <p>.1 American Society for Testing and Materials (ASTM)</p> <ul style="list-style-type: none">.1 ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity..2 ASTM D 4595-86-94, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method..3 ASTM D 4716-00, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head..4 ASTM D 4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile. <p>.2 Canadian General Standards Board (CGSB)</p> <ul style="list-style-type: none">.1 CAN/CGSB-4.2-M88, Textile Test Methods. |
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| 1.3 | References | .2 | (Cont'd) |
| | <u>(Cont'd)</u> | | |
| | | .2 | CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes. |
| | | .1 | No.2-M85, Mass per Unit Area. |
| | | .2 | No.3-M85, Thickness of Geotextiles. |
| | | .3 | No.7.3-92, Grab Tensile Test for Geotextiles. |
| | | .4 | No.6.1-93, Bursting Strength of Geotextiles Under No Compressive Load. |
| | | .3 | Canadian Standards Association (CSA) |
| | | .1 | CAN/CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel. |
| | | .2 | CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles. |
| 1.4 | <u>Samples</u> | .1 | Submit samples in accordance with Section 01 33 00 - Shop Drawing and other Submittal Procedures. |
| | | .2 | Submit to Departmental Representative the following samples at least two (2) weeks prior to commencing work. |
| | | .1 | Minimum length of 1 m of roll width of geotextile. |
| 1.5 | <u>Mill Certificates</u> | .1 | Submit to Departmental Representative a copy of mill test data and certificate at least two (2) weeks prior to start of work. |
| 1.6 | <u>Delivery And Storage</u> | .1 | During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents. |

1.7 Waste
Management And
Disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, and packaging material, in appropriate on-site bins, for recycling in accordance with Waste Management Plan.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

1.8 Measurement
For Payment

- .1 Payment for supply and installation of geotextile will be by the lump sum.

PART 2 - Products

2.1 Material

- .1 Geotextile: woven or non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 3.5 m minimum.
 - .2 Length: 50 m minimum.
 - .3 Composed of: minimum 85% by mass of polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure.
- .2 Physical properties:
 - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 2.5 mm.
 - .2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 250 to 270 g/m2
 - .3 Tensile strength and elongation (in any principal direction): to ASTM D 4595.
 - .1 Tensile strength: minimum 950 N, wet condition.
 - .2 Elongation at break: 70 to 100 percent.
 - .3 Seam strength: equal to or greater than tensile strength of fabric.

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- 2.1 Material
(Cont'd)
- .2 Physical properties: (Cont'd)
 - .4 Mullen burst strength: to CAN/CGSB-4.2, method 11.1, minimum 2500 kPa.
 - .3 Hydraulic properties:
 - .1 Apparent opening size (AOS): to ASTM D 4751, 50 to 150 micrometres.
 - .2 Permittivity: to ASTM D 4491, 0.25 cm per second.

PART 3 - Execution

- 3.1 Installation
- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins and washers.
 - .2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
 - .3 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
 - .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
 - .5 Pin successive strips of geotextile with securing pins at 600 mm interval at mid point of lap.
 - .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
 - .7 After installation, cover with overlying layer within four (4) hours of placement.
 - .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
 - .9 Place and compact soil layers in accordance with Section 31 23 10 - Excavating Trenching and Backfilling.
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- 3.2 Cleaning .1 Remove construction debris from Project site
and dispose of debris in an environmentally
responsible and legal manner.
- 3.3 Protection .1 Vehicular traffic not permitted directly on
geotextile.