

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 31 23 10 Excavation, Trenching and Backfill |
| | .2 | Section 32 11 23 Granular Base |
| <u>1.2 Measurement Procedures</u> | .1 | No measurement will be made under this section. Include costs in items of work that require aggregate. |
| <u>1.3 Source Approval</u> | .1 | Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least four (4) weeks prior to commencing production. |
| | .2 | If, in opinion of Departmental Representative, material from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements. |
| | .3 | Should a change of material source be proposed during work, advice Departmental Representative four (4) weeks in advance of proposed change to allow sampling and testing. |
| | .4 | Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory. |

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| <u>1.4 Production
Sampling</u> | <ul style="list-style-type: none">.1 Aggregate will be subject to continual sampling by Department Representative during production..2 Provide Departmental Representative with ready access to source and processed material for purpose of sampling and testing..3 Install adequate sampling facilities at discharge end of production conveyor to allow Departmental Representative to safely obtain representative samples of materials being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross-section sampling..4 Bear the cost of sampling and testing of aggregates which fail to meet specified requirements. |
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PART 2 - PRODUCTS

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| <u>2.1 Materials</u> | <ul style="list-style-type: none">.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material or other deleterious substances..2 Flat and elongated particles are those whose greatest dimension exceeds four times least dimension..3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:<ul style="list-style-type: none">.1 Natural sand..2 Manufactured sand..3 Screening produced in crushing of quarried rock, boulders or gravel. |
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- .4 Coarse aggregates satisfying requirements of applicable section shall be one, or a blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
- .5 Particles having at least one fractured face are considered to be crushed particles.

PART 3 - EXECUTION

- 3.1 Aggregate Source .1 Sources to be supplied by Contractor.
- 3.2 Processing .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use approved methods and equipment.
 - .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
 - .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- 3.3 Handling .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- 3.4 Stockpiling .1 Stockpile aggregates off site. Do not unload delivered aggregate on completed concrete surfaces where damage to

concrete may result.

- .2 Stockpile aggregates in sufficient quantities to meet project schedule.

END OF SECTION

PART 1 - GENERAL

1.1 Description

- .1 Work under this section consists of all operations and materials related to excavation and backfilling for the road construction, laydown areas, causeway, and any excavations excluding what is considered Dredging and underside of breakwater excavation.

1.2 Related Sections

- .1 Section 31 05 16 - Aggregates.
.2 Section 31 32 21 - Geotextiles.
.3 Section 32 11 23 - Granular Base Materials.
.4 Section 35 20 23 - Dredging.
.5 Section 35 31 23 - Breakwater and Rock Protection.

1.3 Measurement Procedures

- .1 Excavation and Trenching:
- .1 **Clearing, Grubbing and Stripping:** measure in square metres.
- .2 **Common Excavation:** measure in cubic metres calculated from cross sections in areas of excavation.
- .1 Price includes excavation, loading, transportation offsite, disposal, placement and if required, compaction.
- .2 Width for trench excavation as indicated.
- .3 Width for excavation for road structures as indicated.
- .4 Depth from ground elevation immediately prior to excavation, to elevation as

indicated on Plans or Profile.

- .3 **Access Road Removals:** Removal of access road Sta. 1+285 to Sta.1+890 8, and Widener 1, to be paid as lump sum.
- .4 Rock excavation:
 - .1 Geotechnical information indicates no rock excavation required. However, notify Departmental Representative immediately should rock or obstacle be encountered.
- .5 No separate payment for:
 - .1 Excavating unnecessarily beyond lines established by Departmental Representative, with exception of unavoidable slide material. Do not measure slide material, when such slides are attributable to negligence.
 - .2 Ripping and/or drilling and blasting of material.
 - .3 Scarifying or benching existing slopes or existing road surfaces.
 - .4 Removing and disposing of roots, stumps and other materials excavated during waste operation.
 - .5 Burying existing culverts from old road.
 - .6 Removing unsuitable material from embankment attributable to negligence.

- .7 Shattering rock to 300 mm below subgrade elevation.
 - .8 Scaling and removing loose rock from rock face.
 - .9 Watering, drying and compacting.
 - .10 Finishing.
- .6 Contractor will take initial cross sections after clearing, grubbing and stripping is completed and immediately prior to any excavation of material.
- .2 Infilling and backfilling:
- .1 **Granular Fill Imported Sandstone:** Cubic Metre in place, for sandstone imported, placed, shaped and compacted, measured from cross sections in the areas of excavation. The measurements will include any compression of sub-terrain layers that occurs.
 - .2 **Granular Fill Type 'A':** (from Stockpile) measured in cubic metres in place, calculated from cross sections taken in areas of infilling.
 - .1 Granular Fill 'A' used to create Laydown Area or access to dredge and breakwater site is incidental to Construction Site Work of Section 02 41 13 Site Work, Preparation and Removal.
 - .3 Causeway construction will be measured under Section 35 31 24,

Breakwater and Rock Protection

1.4 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D6913 / D6913M Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
 - .4 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
 - .5 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m³).
 - .6 ASTM D4318-17, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing Woven Wire, Metric.

1.5 Definitions

- .1 Rock Excavation:
 - .1 Material from solid masses of igneous, sedimentary or metamorphic

rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort with a Caterpillar D9 crawler bulldozer or equivalent to be considered integral with parent mass.

- .2 Boulder or rock fragments measuring in volume cubic metre or more.
- .2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.
- .3 Unclassified excavation: excavation of deposits of whatever character encountered in Work. This includes concrete pieces, timbers, rubble, debris, and other obstructions encountered during excavation.
- .4 Free Haul: distance that excavated material is hauled without compensation. Free haul distance to be 0.5 km or less.
- .5 Stripping: excavation of organic material covering original ground.
- .6 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved.
- .7 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
- .8 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .9 Borrow Material: material obtained from

construction areas and required for construction of embankments or for other portions of work.

.10 Imported granular material: obtained from outside the construction areas and required for construction of embankments or for other portions of work.

.11 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.12 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM C 136.

.2 Sieve sizes to CAN/CGSB-8.2 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.

1.6 Existing
Conditions

- .1 Examine soil reports attached to Specification.
- .2 Existing surface features:
 - .1 In the presence of the Departmental Representative, check the condition of the plants, utility poles, cables, on-site elements, asphalt pavements, concrete slabs, boundary markers and benchmarks that may be affected by the work
 - .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
- .3 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work and pay costs of relocating services.
 - .3 Remove cap cut-offs obsolete buried services within 2 m of foundations.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify Departmental

- Representative and Authorities having jurisdiction. Establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations.
 - .7 Maintain and protect from damage, water, electric, telephone and other utilities and structures encountered.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .4 Existing buildings and surface features:
- .1 Conduct, with Departmental Representative, condition survey of existing service poles, wires, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental

Representative.

1.7 Submittals

- .1 Make submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 Testing and Quality Control:
 - .1 Submit condition survey of existing conditions as described in item 1.6 Existing Conditions of this Section
 - .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 Submittal Procedures.
 - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
 - .3 Submit 70 kg samples of type of fill specified, if requested by the Departmental Representative, including representative samples of excavated material.
 - .4 Ship samples prepaid to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.8 Quality Assurance

- .1 Do not use soil material until written report of soil test results are

reviewed by Departmental
Representative.

.2 Health and Safety Requirements:

- .1 Do construction occupational
health and safety in accordance
with Section 01 35 29 Health and
Safety Requirements.

1.9 Waste Management
and Disposal

- .1 Separate waste materials for reuse and
recycling in accordance with Section
01 74 21 Construction/Demolition,
Waste Management and Disposal.
- .2 Divert excess materials from landfill
to local quarry for reuse as directed
by Departmental Representative.

PART 2 - PRODUCTS

2.1 Materials

- .1 Filter fabric: to Section 31 32 21
Geotextiles
- .2 Sandstone Backfill: Clean, durable
broken sandstone free from mud, dirt,
organic and other deleterious
materials. The sandstone will be well
graded and have a maximum size of 300
mm. Percent by mass passing No. 12.5 mm
sieve not to exceed 40%. Percent by mass
passing No. 0.075 mm sieve not to exceed
10%.
- .3 Granular Fill, Type 'A' Granular Fill:
Fill from stockpile near channel,
composed of sand and gravel.
- .1 Table (based on TP2):

ASTM SIEVE DESIGNATION	PASSING BY WEIGHT
100.0 mm	100
75.0 mm	85-100
50.0 mm	85 - 90
37.5 mm	73 - 95
19.0 mm	45 - 70
12.5 mm	40 - 60
9.5 mm	25 - 55
4.75 mm	25 - 45
2.36 mm	15 - 35
1.18 mm	8 - 28
0.300 mm	4 - 16
0.075 mm	0 - 9

PART 3 - EXECUTION

- 3.1 Site Preparation .1 Set out pertinent lines, grades and levels required for excavation and backfill work. Maintain accuracy of line and grade stakes during Work.
- .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- 3.2 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 sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 Preparation /
Protection

- .1 Protect existing features in accordance with Section 01 10 10 General Instructions, and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental representative's approval.
- .4 Protect natural and man-made features required to remain undisturbed.
- .5 Protect buried services that are required to remain undisturbed.

3.4 Stripping of Topsoil

- .1 Begin topsoil stripping of areas as indicated and as directed by Departmental Representative after area has been cleared of brush.
- .2 Strip topsoil to depths as indicated.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as indicated as directed by Departmental Representative

under consultation with owner.

- .1 Stockpile height not to exceed 2m and should be protected from erosion.
- .4 Dispose of unused topsoil to location as directed by Departmental Representative and owners.

3.5 Stockpiling

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 Cofferdams, Shoring, Bracing and Underpinning

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29 Health and Safety Requirements and Health and Safety Act for the Province of New Brunswick.
- .2 During backfill operation:
 - .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 600 mm above toe of sheeting.

.3 Upon completion of substructure construction:

.1 Remove shoring and bracing.

.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.7 Dewatering

.1 Keep excavations free of water while work is in progress.

.2 Provide for Departmental Representative for review details of proposed dewatering including dikes, well points, and sheet pile cut-offs.

.3 Dispose of water in accordance with Section 01 35 44 - Environmental Procedures to and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 Excavation

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as directed by

Departmental Representative.

- .3 Remove concrete foundations, rubble and other obstructions encountered during excavation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material at an approved land disposal site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Notify Departmental Representative when bottom of excavation is reached.
- .9 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .10 Shape the excavations by hand, firming walls and removing loose materials and debris from them.

If material from the bottom of the excavation has been disturbed, compact them until a density at least equal to that of the undisturbed soil.

- .11 Install filter fabric in accordance with Section 31 32 21 Geotextiles.

3.9 Fill Types and
Compaction

- .1 Compact granular fills to 95% or more of density according to ASTM D698

(Proctor Standard), or as directed by the Departmental Representative.

- .2 Placement and compaction of crushed rock to be in accordance with Section 32 11 23 Granular Base.

3.10 Backfilling

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved of construction below finish grade.
- .2 Areas to be backfilled to be free from debris, snow, ice, water, and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer. Compact to 95% in accordance with ASTM D698.
 - .1 Compaction is required on permanent and travelled infill areas. Mounds of material for barriers or materials placed under water will not be compacted.
- .5 Refer to related sections for backfilling and compaction requirements for sub-base and base materials.
- .6 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.

- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 600 mm.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

3.11 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 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

3.12 Quality Assurance .1
Inspection and
Testing

Testing of materials and compaction will be carried out by Testing Agency designated by Departmental Representative. Frequency of tests will be determined by Departmental Representative.

.2 Departmental Representative will pay for services of testing laboratory.

.3 Inspection and testing by the Soil Testing Agency and/or Departmental Representative will not augment or replace Contractor quality control nor relieve the Contractor of contractual responsibilities.

END OF SECTION

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 31 23 10 Excavation, Trenching and Backfill.
	.2	Section 35 31 23 Breakwater and Rock Protection.
<u>1.2 Description</u>	.1	This section specifies requirements for the supply and installation of geotechnical fabrics to be used as indicated on drawings and in this section.
<u>1.3 Measurement Procedures</u>	.1	<u>Filter Fabric - Woven</u> : The supply and installation of filter fabric Type W, geotextile woven plastic yarn will be measured as a square metre supplied and placed.
	.2	<u>Sediment Control Fence: Type 1 Silt fence</u> : Supply, installation, maintenance and removal will be paid in linear metres.
	.3	Damaged material shall be replaced at no cost to the owner.
	.4	The Quantity to be measured for payment shall be the number of square metres of area covered with geotextile in accordance with this Item.
	.5	Overlapped joints, patches and seams shall be measured as a single layer of fabric.
<u>1.4 References</u>	.1	American Society for Testing and Materials International, (ASTM)
	.1	ASTM D 4101-10, Standard Specification for Polypropylene

- Injection and Extrusion Materials.
- .2 ASTM D 4491-99a(2009)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .3 ASTM D 4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- .4 ASTM D 4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-M89 (November 2004), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing. Geosynthetics.
 - .3 New Brunswick Department of Transportation and Infrastructure Standard Specifications for Highway Construction (January 2019 Edition).
- 1.5 Submittals .1 Submit samples in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submit to the Departmental Representative the following samples at least 2 weeks prior to commencing work: manufacturer's specifications on the filter fabric proposed to be used.
- 1.6 Delivery, Storage and Handling .1 During delivery and storage, protect geotextile 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 21 Construction/ Demolition, Waste Management & Disposal.

PART 2 - PRODUCTS

- 2.1 Materials .1 Geotextile - Woven (W2) to be synthetic fiber and be rot proof, unaffected by action of oil or salt water and not subject to attack by marine life, insects, or rodents. Filter fabric to be of woven construction supplied in rolls of minimum 3.0 metres width.
- .1 Geotextile to have the following properties:
- .1 Tear (N) 500
 - .2 Tensile Strength (N) 1,200
 - .3 Elongation at Break(%) 25
 - .4 Opening Size (um) 840 max
 - .5 Permittivity (sec⁻¹) 0.01
- .2 Contractor shall note that the material may become buoyant.
- .3 Seams: to be in accordance with manufacturer's recommendations.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
- .2 Sediment Control Fence: Type 1 Silt fence as per New Brunswick Department of Transport and Infrastructure Standard Specification 2019, Item 602.
- .1 The fence may be prefabricated or

constructed on site from the
specified individual components.

- .2 The fabric shall conform to the
requirements of 601.2, Type W1,
geotextile.
- .3 Support posts are to be supplied
as indicated on Standard Drawing
602-1.

PART 3 - EXECUTION

3.1 Geotextile Installation

- .1 Place geotextile material by unrolling
in orientation, manner and locations
indicated and retain in position with
securing pins and washers, weights or
other method as approved by
Departmental representative.
- .2 Place geotextile material smooth and
free of tension stress, folds, wrinkles
and creases
- .3 Geotextile shall not be placed on
stumps, brush, limbs, ice or other
material that may tear or puncture the
fabric.
- .4 Overlap each successive strip of
geotextile minimum of 600 mm over
previously laid strip.
- .5 Pin successive strips of geotextile
with securing pins or fasteners as
recommended by manufacturer.
- .6 Protect installed geotextile material
from displacement, damage or
deterioration before, during and after
placement of material.

- .7 After installation, cover with overlying layer within 4 hrs of placement.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

3.2 Sediment Control
Fence

- .1 Implement temporary measures to control erosion and sedimentation between the construction site and wetlands prior to construction.
- .2 Install a sediment control fence in accordance with the New Brunswick Department of Transport and Infrastructure Standard Specification 2019.
- .3 The fence shall be opened 3 m every 50 m interval to allow access between the dune and the wetlands.
- .4 Keep fences throughout construction, especially after any rain that could damage the sediment control fence.
- .5 Remove fences once soil is stabilized and erosion is eliminated.

3.3 Protection

- .1 Vehicular traffic is not permitted directly on geotextile. For road bed construction, at least 300 mm of fill material shall be kept between equipment and fabric.