

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This Section specifies requirements for fill materials to be used in construction of the work. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures |
| | .2 | Section 01 35 43 - Environmental Procedures |
| | .3 | Section 31 24 13 - Excavation, Embankment and Compaction. |
| | .4 | Section 31 05 17 - Aggregate Materials. |
| <u>1.3 MEASUREMENT PROCEDURES</u> | .1 | Work under this section including submittals and testing is considered incidental to work of other sections. |
| <u>1.4 REFERENCES</u> | .1 | American Society for Testing and Materials (ASTM) |
| | .1 | ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing. |
| | .2 | ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. |
| | .3 | ASTM D6928-08e1 Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus. |
| | .4 | ASTM C127-07 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate. |
| | .5 | ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. |
| | .6 | ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft ³) (600kN-m/m ³). |
| | .7 | ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft ³) (2,700kN-m/m ³). |

- .8 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .9 ASTM D 4972-01 Standard Test Method for pH 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 Other
 - .1 Nelson, D.W. and Sommers, L.E. 1996 Total carbon, organic carbon and organic matter. Pages 961-1010, IN Methods in Soil Analyses Part 3. Chemical Methods. Soil Science Society of America Book Series Number 5, American Society of Soil Science Inc. Madison WI. USA

1.5 SUBMITTALS

- .1 Submit samples of fill materials at least 3 to 5 days before delivery to site.
- .2 All test data from Clause 3.2 of this specification section to be recorded and made available to Departmental Representative as results become available.
- .3 All test data are to be submitted in an as-built report. Test data are to be reported along with corresponding location and time relating to accompanying drawings all to be prepared by the Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.

PART 2 - PRODUCTS2.1 COMMON FILL

- .1 Common Fill shall consist of selected material from excavation approved by Departmental Representative for use intended. Sources will be obtained from on site sources. The Departmental Representative reserves the right to change the borrow source or reject materials as

excavation progresses.

- .2 Satisfactory materials must be approved by the Departmental Representative and are to be free of debris, roots, wood, scrap materials, vegetation, refuse, soft unsound particles, and unless otherwise specified, the maximum particle diameter shall be one-half the lift thickness at the intended location.
- .3 Excavated material should be of quality that will compact, will not settle or shrink, and will not become unstable when wet.

2.2 TYPE 4 IMPORTED TILL

- .1 Soil free from stumps, roots, sod, ice or snow, and any other deleterious material consisting of hard and durable particles, conforming to the following gradation limits:

<u>Sieve Size, μm</u>	<u>Percent Passing</u>
80,000	100
14,000	65-100
5000	50-90
80	20-35

- .2 Minimum plasticity index (PI) = 4
- .3 Soil pH Values (Paste pH) prior to seeding between 5.5 and 7.

2.3 GRANULAR MATERIAL

- .1 Type 1 and Type 2 Granular Fill shall consist of clean crushed rock, comprised of hard durable particles free from clay lumps, cementation, organic material and other deleterious materials. Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1. Gradation to meet the following:

<u>Sieve Designation</u>	<u>% Passing</u>	
	<u>Type 1</u>	<u>Type 2</u>
80 mm		100
56 mm		70-100
28 mm		50-80
20 mm	100	
14 mm	50-85	30-65
5 mm	20-50	20-50
1.25 mm		
0.16 mm	5-12	3-10

0.08 mm

3-8

0-7

2.4 CLEAR STONE TYPE C3.1 and C4

Clear Stone Types C3 and C4 shall consist of durable stone particles of crushed or uncrushed screened rock. The stone shall be free from flat, elongated or other objectionable pieces and shall be approved by the Departmental Representative prior to use. Clear stone shall meet the physical properties and gradation requirements given in this section.

.2 Physical properties:.1 Absorption (ASTM C 127): 1.75.2 Plasticity Index (ASTM D 4318): 0.3 Micro-Deval (ASTM D6928): 25% maximum..4 Gradation:

<u>Sieve</u> <u>Designation</u>	<u>% Passing</u>	
	<u>C3</u>	<u>C4</u>
250 mm		
200 mm	100	
150 mm	90-100	
112 mm	20-35	100
80 mm	0-20	90-100
56 mm		
40 mm		
28 mm		0-10
20 mm	0-10	
14 mm		
10 mm		
5 mm		

2.5 RIPRAP TYPE R5

- .1 Type R5 Riprap shall consist of clean crushed rock, comprised of hard durable particles free from clay lumps, cementation, organic material and other deleterious materials. Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1. Gradation to meet the following:

<u>Sieve</u> <u>Designation</u>	<u>% Passing</u>
480 mm	
420 mm	
380 mm	

330 mm	
260 mm	
220 mm	100
190 mm	70-90
150 mm	40-55
120 mm	
70 mm	0-15

PART 3 - EXECUTION

3.1 FILL TYPES AND COMPACTION

- .1 Place fill materials as indicated after underlying surface is inspected and reviewed by Departmental Representative.
- .2 Compaction effort shall be to the neat lines and measured by densities as percentages of standard proctor maximum dry density where applicable, shall be:
 - .1 Type 2 Gravels:
 - .1 Under Slab for Control Structure: 98%
 - .2 Type 1 Gravels:
 - .1 Under Slab for Control Structure: 100%
 - .3 Type 4 imported till for use in building up berms north and south of the control structure:
 - .1 Top 500 mm: 98% SPMDD
 - .2 Below the top 500 mm: 95% SPMDD
 - .4 Type 4 imported till for use as fill against structures:
 - .1 98% SPMDD

3.2 QUALITY CONTROL

- .1 The Contractor shall be responsible for all QC sampling and testing at third party laboratory(ies) to show complete conformance of the fill materials with this specification. These records shall be made available to the Departmental Representative.
- .2 The Contractor shall submit the name and location of the proposed laboratory(ies) to the Departmental Representative for review. QC laboratories may be inspected by the Departmental Representative during the project. The Contractor shall be

responsible for all costs associated with the testing for QC requirements. Testing shall be conducted by qualified laboratory staff.

- .3 The minimum testing frequency for Type 1 and 2 shall be:
 - .1 One gradation tests per 1000 tonnes placed with a minimum of two (2) per borrow source.
 - .2 Two in-situ density test per material type placed each day. For areas where compaction methods vary a minimum of two per location and a minimum of two per lift.
 - .3 ASTM D 698 samples as required to be representative of the granulars, but not less than one per location.
- .4 The minimum testing frequency for imported till shall be:
 - .1 One in-situ density test per 2,500 m³ placed. For areas with less than 2,500 m³ or where compaction methods vary a minimum of two per location and a minimum of two per lift.
 - .2 Standard Proctor ASTM D 698 samples as required to be representative of the soil, but not less than one per 10,000 m³ placed.

PART 1 - GENERAL1.1 DESCRIPTION

- .1 This Section specifies requirements for erosion control measures to temporarily stabilize and protect exposed soils to allow the establishment of vegetation.
- .2 The requirements of Section 01 35 43 - Environmental Procedures require that total suspended solids be less than 25 mg/L when discharged from the contract area.
- .3 Provide Erosion Control plan to limit off-site discharge of suspended solids to 25 mg/L (max), in accordance with Clause 1.5 of this section.
- .4 Climate conditions may make it advantageous to delay hydraulic seeding to a time when the growing season is more conducive to vegetative growth. In this situation the soils may be prepared for hydraulic seeding and then covered with Dry Mulching, and Hydraulic Seeding carried out at a later date.

1.2 RELATED SECTIONS

- .1 Section 01 35 43 - Environmental Procedures
- .2 Section 31 23 10 - Excavation, Trenching and Backfilling.
- .3 Section 31 24 13 - Excavation, Embankment, and Compaction.
- .4 Section 32 11 23 - Fill Materials.
- .5 Section 32 92 21 - Hydraulic Seeding.
- .6 Section 32 91 24 - Dry Mulching.

1.3 MEASUREMENT

- .1 Work under this section will be paid as

PROCEDURES

lump sum under Section 01 22 16, Measurement and Payment, Item 1.3.3, Erosion Control and will constitute full payment and installation for preparation of the Erosion Control plan, provision and installation of materials (silt fencing, erosion control blankets, check dams, etc) as required to carry out the plan and maintenance of installed erosion control measures.

- .2 Costs to maintain erosion controls is considered incidental and will not be measured for payment.

1.4 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 43 - Environmental Procedures.

1.5 SUBMITTALS

- .1 Erosion Control Plan:
- .1 Prepare and submit a detailed erosion control plan at least one (1) week prior to scheduled commencement of excavation and fill activities.
 - .2 Plan shall identify sequence and schedule of construction activities and identify type and extent of erosion control measures to be used. The Plan shall address measures for inspection and maintenance of erosion controls after installation.
 - .3 No work shall commence until the Departmental Representative has reviewed the erosion control plan.
 - .4 If conditions are encountered as the work progresses that are outside the scope of the approved erosion control plan, make appropriate revisions to amend the plan and submit the amended erosion control plan to the Departmental Representative for review prior to continuing with the work.
 - .5 Incorporate into the work and perform

all activities required to execute the approved erosion control plan.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Not Used

PART 3 - EXECUTION

3.1 WORKMANSHIP .1 All erosion control shall be reviewed by the Departmental Representative prior to installation.

.2 Select and apply erosion control measures which are suitable and appropriate for the location, slope, and condition of the underlying surfaces.

3.2 MAINTENANCE .1 Maintain installed erosion controls until acceptable vegetation establishment meets the approval of the Departmental Representative.

3.3 CLEAN UP .1 Upon approval of Departmental Representative, remove erosion controls and all associated surplus materials, rubbish and tools. Seed areas of exposed soil resulting from removal of erosion controls to Section 32 92 21 as directed by Departmental Representative.

PART 1 - GENERAL1.1 RELATED
SECTIONS

- .1 Section 32 92 21 - Hydraulic Seeding.
- .2 Section 32 91 24 - Dry Mulching.

1.2 MEASUREMENT
PROCEDURES

- .1 No measurement for supply and application of soil amendments, including fertilizer, lime, and compost is required as this is a lump sum item.

1.3 REFERENCES

- .1 ASTM D 4972, Test Method of pH of Soil.
- .2 ASTM D 2972, Test Method for Moisture, Ash, and Organic Matter of Peat and other Organic Materials.
- .3 Soil and Compost Use Guidelines 1st Edition as produced and distributed by Landscape Nova Scotia Horticultural Trades Association.

1.4 DEFINITIONS

- .1 Category 'A' COMPOST: A mixture of soil and decomposing organic matter used as a fertilizer, mulch, or soil conditioner. Compost is processed organic matter containing 40% or more organic matter as determined by the Walkley-Black or LOI test. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (50)), and contain no toxic or growth inhibiting contaminants. Composed bio-solids must meet the requirements of the Guidelines for Compost Quality, Category (A) (B) produced by the Canadian Council of the Ministers of the Environment (CCME), January 1996.

1.5 QUALITY
CONTROL

- .1 Test Reports: Contractor to provide certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Contractor to provide product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: Contractor shall conduct pre-installation meeting with the

Departmental Representative to verify project requirements, installation instructions and warranty requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Divert unused soil amendments from landfill to an official hazardous material collections site.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 SOIL AMENDMENTS

- .1 Compost:
 - .1 PWGSC will arrange and pay for delivery of compost to the site for this project.
- .2 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

2.2 SOURCE QUALITY CONTROL

- .1 Contractor is responsible for amendments to existing native soil surfaces and cover as specified.
- .2 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .3 Testing of on-site till will be carried out by testing laboratory designated by Departmental Representative. Soil sampling, testing and analysis to be in accordance with Provincial standards. Departmental Representative will pay for cost of tests.

PART 3 - EXECUTION

3.1 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work

until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

3.2 PLACING AND INCORPORATING OF COMPOST AND LIME

.1 Place compost and lime after Departmental Representative has accepted subgrade.

.2 Soil shall be amended by placing the lime and compost on the surface and cultivating into top 150 mm of depth by means of discing. Spread compost and lime in uniform layers at the specified application rate, over unfrozen subgrade free of standing water.

.3 Apply compost to area at a rate of 65 cubic metres per hectare.

.4 Apply agricultural lime to area at a rate of 6.5 tonnes per hectare.

3.3 FINAL GRADING FOR HYDRAULIC SEED

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

3.4 ACCEPTANCE

.1 Departmental Representative will inspect area and determine acceptance of material, depth of cultivation and finish grading.

3.5 SURPLUS MATERIAL

.1 Dispose of materials not required where directed by Departmental Representative.

3.6 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL1.1 RELATED
SECTIONS

- .1 Section 01 35 43 - Environmental Procedures.
- .2 Section 32 92 21 - Hydraulic Seeding.

1.2 DESCRIPTION

- .1 This item of work shall consist of the supply and application of a uniform layer of locally procured straw or hay mulch on exposed soil; anchoring it with an industry standard tackifier.
- .2 Mulch is also used for the stabilization of exposed soils and aids in the germination of areas that have been seeded down.
- .3 Dry mulching is to be applied to all areas receiving a hydraulic seed application.

1.3 MEASUREMENT
PROCEDURES

- .1 No measurement for mulching and application of aqueous slurry is required as this is a lump sum item.

1.4 REFERENCES

All references are latest edition:

- .1 Division 1, Section 5 Environmental Protection Plan as part of the Highway Construction and Maintenance Standard Specification.
- .2 Nova Scotia Weed Control Act.
- .3 Soil and Compost Use Guidelines 1st Edition as produced and distributed by Landscape Nova Scotia Horticultural Trades Association.

PART 2 - PRODUCTS2.1 MULCH

- .1 Mulch shall be supplied by the Contractor. It shall be hay or straw, in an unprocessed form such as in bales or rolls, free of noxious weeds, as defined by the Nova Scotia Weed Control Act and other undesirable species such as those specified as having an ecological or maintenance concerns, e.g. Purple Loosestrife or Sweet Clover. Materials should not be so wet, decayed or compacted as to inhibit even and uniform spreading. Material in processed form should be shredded straw or wood fibre packaged in plastic bags.
- .2 Requests to utilize an alternative product to the Standard of Acceptance: Earth Bond Tackifier as specified in Section 32 92 21 - Hydraulic Seeding shall be submitted to the Departmental Representative for approval before product is used.
- .3 The use of locally procured hay which contains species desirable for the revegetation of the site may be preferred to straw. These species may be wildflowers and locally hardy grasses.
- .4 The mulch binder or tackifier is applied as an overspray in aqueous slurry onto the mulch and serves as a bonding medium. It is used to adhere the straw or hay fibres to each other to form a continuous mat on the soil surface. The tackifier shall be applied at the Manufacturer's recommended application rate, sufficient to prevent the mulch from lifting the prepared soil surface.
- .5 Emulsified asphalt shall not be used as a binder.

PART 3 - EXECUTION3.1 CONSTRUCTION
METHODS

- .1 Mulching shall be carried out on all areas receiving a hydraulic seed application.
- .2 Mulch should be applied immediately following seeding to minimize the amount of exposed

soil at any one time. Mulch may also be placed as temporary erosion control on unseeded areas. Anchoring of the mulch shall be done immediately after the mulch is applied by the application of the tackifier by means of aqueous slurry.

- .3 Hay or straw shall be spread by hand or by mulch blower uniformly over the hydroseeded area at a rate of 4500 kg/ha +/- 10%, after the application of hydroseed slurry. Rough ground and steep slopes require more mulch and tackifier than finished or flat ground and the Contractor shall adjust application thickness accordingly.
- .4 Do not apply mulch in windy conditions.
- .5 The tackifier shall be applied immediately after the mulch application as aqueous slurry. The spray shall be broadcast upwards over the previously placed hay or straw at a low pressure to insure large droplet sizing.
- .6 The aqueous slurry shall not be applied during or immediately after a rain event.
- .7 Thick clumps of mulch, bare or missed spots are not acceptable and must be re-mulched and the aqueous slurry re-applied by the Contractor before work is accepted.

PART 1 - GENERAL1.1 RELATED
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 43 - Environmental Procedures.
- .3 Section 32 91 21 - On-site Soil Amendment and Grading.
- .4 Section 32 91 24 - Dry Mulching.

1.2 MEASUREMENT
PROCEDURES

- .1 No measurement for hydraulic seeding is required as this is a lump sum item.

1.3 REFERENCES

- .1 ASTM D 4972, Test Method of pH of Soil.
- .2 ASTM D 2972, Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Materials.

1.4 SUBMITTALS

- .1 Product Data.
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Provide product data for:
 - .1 Seed.
 - .2 Mulch.
 - .3 Tackifier.
 - .4 Water.
 - .5 Fertilizer.
- .2 The Contractor shall submit upon request by the Departmental Representative a Certificate of Analysis for the seed mix identifying the component species and percentages, including weed and inert material content.
- .3 The Contractor shall submit upon request of the Departmental Representative the proposed binder rate for the tackifier.
- .4 The Contractor shall submit upon request by the Departmental Representative the proposed portioning of ingredients and proposed coverage per tankfull for selected equipment applying the hydraulic seed.

- 1.5 QUALITY CONTROL
- .1 Test Reports: Contractor to provide certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Certificates: Contractor to provide product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - .3 Pre-Installation Meetings: Contractor shall conduct pre-installation meeting with the Departmental Representative to verify project requirements, installation instructions and warranty requirements.
- 1.6 SCHEDULING
- .1 Once the Till Cover has been brought to grade, the soil should be amended and prepared for hydraulic seeding as soon as possible.
 - .2 Hydraulic seeding will not be permitted prior to April 15th of the year of construction, unless authorized by the Departmental Representative. A dormant seed mix planted prior to that date is acceptable provided that hay mulch and tackifier are applied as specified.
- 1.7 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.
 - .3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Seed: Each bag of seed used shall be labeled in accordance with the Canada Seed Act and Regulations.
 - .1 Grass Mixture: The Contractor shall

furnish the Departmental Representative a statement that certifies that each bag of seed is fully labeled in accordance with the Canada Seed Act and Regulations.

- .1 Mixture Composition #1:
 - .1 25% Birdsfoot Trefoil Inoculated.
 - .2 15% Chewings Fescue.
 - .3 15% Creeping Red Fescue.
 - .4 15% Sheeps Fescue.
 - .5 10% Perennial Ryegrass.
 - .6 10% Annual Ryegrass.
 - .7 10% Alsike Clover.
 - .2 Native Seed Composition #2:
 - .1 20% Broom Sedge.
 - .2 20% Side Oats Grama.
 - .3 20% Little Bluestem.
 - .4 20% Sand Dropseed.
 - .5 20% Slender Wheatgrass.
 - .3 Bags of seed shall be labeled, identifying mass (kg), mix components and percentages, date of bagging, the supplier's name and lot number.
 - .4 Seed previously subjected to water will not be accepted.
- .2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
 - .1 Made from 100 % recycled newsprint (cellulose) or wood fiber.
 - .2 Coloured green with environmentally acceptable dye.
 - .3 Contains no toxic or growth inhibiting chemicals or compounds
 - .3 Tackifier: Specifically manufactured to act as an adhesive to bind soil, fiber and seed together to control the effects of wind and water erosion during seed germination with the following properties:
 - .1 Supplied in liquid or powdered form.
 - .2 Contains no toxic or growth inhibiting chemicals or compounds.
 - .4 Water: free of impurities that would inhibit germination and growth.

- .5 Fertilizer:
 - .1 To Canada "Fertilizers Act and Regulations".
 - .2 Formulated 12-24-24 (N-P-K ratio) for seeding done April 15th to September 1st.
 - .3 50 % of the nitrogen shall be derived from sulphur coated urea.
 - .4 Phosphorus to be slow release.
 - .5 Bags of fertilizer shall be labeled, identifying mass (kg), mix components and percentages, date of bagging, supplier's name and lot number.
 - .6 Fertilizer previously subjected to water will not be accepted.
- .6 Fertilizer requirements subject to modification based on soil test results on cover material, as directed by the Departmental Representative.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.
- .3 Hydraulic seeding is not permitted on hardened slopes, under windy conditions, during periods of rainfall or severe drought, on areas covered with standing water or frozen surfaces or other adverse conditions at the discretion of the Departmental Representative.
- .4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

- .1 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .2 Obtain Departmental Representative's

approval of grade before starting to seed.

- 3.4 HYDRAULIC SEEDING
- .1 The Contractor shall notify the Departmental Representative 24 hrs in advance of all intended hydraulic seeding.
 - .2 Schedule hydraulic seeding to coincide with the final dressing of the slopes once the till is brought to grade to enable hydraulic seeding to be carried out in stages.
 - .3 Apply hydraulic seed when winds are less than 10 km/hour using hydroseed equipment suitable for the area to be seeded and that meets the approval of the Departmental Representative.
 - .4 The Contractor shall proportion the ingredients in the hydroseed tank according to the size of the tank and the area anticipated to be covered with each tankfull of mix, so that all ingredients are proportioned correctly.
 - .5 The seed mix fertilizer, mulch and tackifier shall be thoroughly mixed with water in a hydroseed tank that is capable of continually agitating the mixture during the seeding operation to ensure a homogeneous slurry is produced
 - .6 The Contractor shall adjust quantities of ingredients per tankfull if the actual coverage (m²/tank) is different from that anticipated.
 - .7 The slurry shall be applied uniformly on prepared slopes from hydroseed equipment capable of reaching the extremities of the site whether through the tower nozzle or extension hose.
 - .8 Application of the various components of the slurry shall be applied at the following rates per hectare.
 - .1 Grass Seed Composition #1, as specified - 220 kilograms.
 - .2 Native Seed Composition #2, as specified - 15 kilograms.
 - .3 Mulch, as specified - 1075 kilograms.

.4 Binder (Tackifier), as specified - as per Manufacturer's Specifications.

.5 Fertilizer, as specified 225 kilograms.

.9 Areas that are hydraulically seeded shall be stabilized with dry mulching and aqueous mixture as per Section 32 91 24 - Dry Mulching.

.10 The Contractor shall schedule hydraulic seeding when the forecast calls for no rain. Temporary straw rolls will be placed at a spacing determined by the Departmental Representative if rain is forecast prior to area being stabilized with dry mulching and aqueous mixture.

3.5 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.6 SLURRY APPLICATION

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.

.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.

.2 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

.1 Using correct nozzle for application.

.2 Using hoses for surfaces difficult to reach and to control application.

- .3 Blend application 300 mm into adjacent grass areas or sodded areas or previous applications to form uniform surfaces.
- .4 Re-apply where application is not uniform.
- .5 Remove slurry from items and areas not designated to be sprayed.
- .6 Protect seeded areas from trespass satisfactory to Departmental Representative.
- .7 Remove protection devices as directed by Departmental Representative.

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .2 Grass Mixture:
 - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .2 The Contractor will be responsible for keeping soil moistened during germination period (3 weeks) and adequately watered until accepted by the Departmental Representative.
 - .3 The Contractor shall apply water to ensure moisture penetration of 75 to 100 mm.
 - .4 Fertilizing Program:
 - .1 Within 30 days of germination, area to receive 12-24-24 SCU 35% at an application rate of 500 kg per hectare.
 - .2 September 2010: area to receive 17-17-17 SCU 35% at an application rate of 500kg per hectare.
 - .3 June 2011: area to receive 17-17-17 SCU 35% at an application rate of 500kg per hectare.
 - .4 September 2011: area to receive 17-17-17 SCU 35% at an application rate of 500kg per hectare.

3.8 ACCEPTANCE

- .1 Hydraulic seeding carried out after September 1st must produce a satisfactory

growth of over 95% of the area hydroseeded by June 15th of the following year.

.1 Areas of poor growth or no growth that exceed 5 percent (measured cumulatively) of the area hydroseeded shall be reseeded.

.2 Hydroseeding will be carried out at the same rates as the original hydroseeding for deficiencies noted above.

.2 Hydraulic seeding carried out between April 15th and September 1st must produce a satisfactory growth of over 95% of the area hydroseeded in the growing season of that year.

3.9 MAINTENANCE
DURING WARRANTY
PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.

3.10 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.