

PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Construction Waste Management and Disposal: Section 01 74 21
<u>1.2 REFERENCES</u>	.1	Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance.
	.2	American Society for Testing and Materials (ASTM)
	.1	ASTM C117-2013, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
	.2	ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
	.3	ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.4	ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
	.5	ASTM D1557-2012, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft ³) (2,700kN-m/m ³).
	.6	ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
	.7	ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
	.3	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
<u>1.3 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate and recycle waste materials in accordance with Section 01 74 21.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular base and sub-base material:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table

Type 1 (Granular Base):

<u>Sieve Size (mm)</u>	<u>% Passing</u>
20 000	100
14 000	50-85
5 000	20-50
160	5-12
80	3-8

Type 2 (Granular Sub-Base):

<u>Sieve Size (mm)</u>	<u>% Passing</u>
80 000	100
56 000	70-100
28 000	50-80
14 000	35-65
5 000	20-50
160	3-10
80	0-7

- .4 Other Properties as follows:
 - .1 Liquid Limit: to ASTM D4318, Maximum 25.
 - .2 Plasticity Index: to ASTM D4318, Maximum 6.
 - .3 Los Angeles degradation: to ASTM C131. Max. % Loss by mass: 35.
 - .4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.
 - .5 Soaked CBR: to ASTM D1883, Min 40 when compacted to 100% of ASTM D1557.

PART 3 - EXECUTION

3.1 PLACING

- .1 Place granular base and sub-base after roadway subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular base and sub-base to depths and grades in areas indicated.
- .3 Do not place any frozen material.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular base and sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact granular sub-base to density of not less than 98% corrected maximum dry density in accordance with ASTM D1557.
- .3 Compact granular base to density of not less than 100% corrected maximum dry density in accordance with ASTM D1557.
- .4 Shape and roll alternately to obtain smooth, even and uniformly compacted material.
- .5 Apply water as necessary during compaction to obtain specified density.

- 3.2 COMPACTION (Cont'd)
- .6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .7 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

- 3.3 PLACEMENT TESTING
- .1 Provide material testing to minimum limits as follows:

<u>Material</u>	<u>Compaction Test Frequency</u>	<u>Moisture Content Test Frequency</u>
Type 1	1 per 10m ³ placed	1 per 30m ³ placed
Type 2	1 per 10m ³ placed	1 per 40m ³ placed

- 3.4 SITE TOLERANCES
- .1 Finished base and sub-base surfaces to be within 10mm of elevations as indicated but not uniformly high or low.

- 3.5 PROTECTION
- .1 Maintain finished base and sub-base in condition conforming to this section until respective succeeding materials are constructed.

- 3.6 SCHEDULING WORK
- .1 Placement of granular base shall not commence until heavy civil works, building construction and other large vehicle/heavy traffic activities have been completed. Minimize contamination of granular materials.
- .2 Do not use any portion of the granular base for temporary access during construction. Provide granular materials as required for such temporary access at no additional cost to the Contract.

PART 1 - GENERAL

- 1.1 SOURCE QUALITY CONTROL
- .1 Obtain approval from Departmental Representative of sod at source. Obtain topsoil from an off-site source as approved by Departmental Representative.
 - .2 When proposed source of sod is approved, use no other source without written authorization.
 - .3 Advise Departmental Representative of source of topsoil to be used seven (7) days in advance of starting work.
 - .4 Be responsible for soil analysis requirement for amendments to topsoil as specified.
- 1.2 SCHEDULING
- .1 Schedule sod laying to coincide with preparation of soil surface.
 - .2 Schedule sod installation after frost has left ground and approved by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Topsoil:
 - .1 Friable loam, neither heavy clay nor of very light sandy nature, containing minimum 4% organic matter for clay loam, and 2% for sandy loam, to maximum 20% by volume.
 - .2 Containing no toxic elements or growth inhibiting materials.
 - .3 Free from debris, subsoil, vegetation, and stones and roots over 50 mm diameter.
 - .2 Soil amendments:
 - .1 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5mm.

2.1 MATERIALS
(Cont'd)

- .2 Soil amendments:(Cont'd)
 - .2 Limestone:
 - .1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0mm sieve, 50% passing 0.125mm sieve.
 - .3 Fertilizer:
 - .1 Complete, commercial, with 35% soluble nitrogen.
- .3 Number One Turfgrass Nursery Sod: Sod that has been especially sown and cultivated in nursery fields as turfgrass crop.
 - .1 Turfgrass Nursery Sod: Number One Kentucky Bluegrass Sod - Fescue Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivar(s).
 - .2 Turfgrass Nursery Sod quality:
 - .1 Not more than two (2) broadleaf weeds or ten (10) other weeds/40 m².
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 40 mm.
 - .3 Mowing height limit: 35mm to 6mm.
 - .4 Soil portion of sod: 9 to 15mm in thickness.
- .4 Water: potable, free of impurities.
- .5 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

PART 3 - EXECUTION

3.1 PREPARATION OF
EXISTING GRADE

- .1 Verify 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.
- .4 Course cultivate entire area to receive topsoil to depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND
SPREADING OF
TOPSOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 100 mm, over unfrozen subgrade free of standing water.
- .3 For sodded areas keep topsoil 15 mm below finished grade.

3.3 SOIL AMENDMENTS

- .1 Apply and thoroughly mix soil amendments and fertilizer into full specified depth of topsoil as determined by soil analysis.

3.4 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental

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- 3.4 FINISH GRADING (Cont'd) .2 (Cont'd)
(Cont'd) Representative. Leave surfaces smooth, uniform and firm against deep footprinting.
- 3.5 ACCEPTANCE .1 Departmental Representative will inspect and
OF TOPSOIL test topsoil in place and determine acceptance of material, depth of topsoil and finish grading. Approval of topsoil material subject to soil testing and analysis.
- .2 Bear costs for soil testing and analysis.
- 3.6 PREPARATION .1 Do not perform Work under adverse field
FOR SODDING conditions such as frozen soil, excessively wet or dry soil or soil covered with snow, ice, or standing water.
- .2 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 9 mm for Turfgrass Nursery Sod, surface to drain naturally.
- .3 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.
- .4 Cultivate fine grade approved by Departmental Representative to 25 mm depth immediately prior to sodding.
- 3.7 SOD PLACEMENT .1 Lay sod within 36 hours of being lifted.
- .2 Lay sod sections in rows, longitudinally, along contours of slopes, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.
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- 3.8 FERTILIZING PROGRAM .1 Fertilize during establishment and period of maintenance to following program:

Date	Rate	Ratio
May	70 kg/ha	3:0:0
July	70 kg/ha	3:1:3
September	25 kg/ha	1:2:3

- 3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD .1 Perform following maintenance operations from time of installation until acceptance:
- .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 mm to 100 mm.
 - .2 Cut grass to 40 mm when it reaches height of 65 mm. Remove clippings which will smother grass.
 - .3 Maintain sodded areas weed free.
 - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

- 3.10 ACCEPTANCE .1 Turfgrass Nursery Sod areas will be accepted by Departmental Representative provided that:
- .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots and without weeds.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 40 mm.
 - .4 Sodded areas have been cut minimum three (3) times, and within 24 hours prior to acceptance.
 - .5 Fertilizing in accordance with fertilizer program has been carried out at least once.
- .2 Areas sodded in fall will be accepted in following spring one (1) month after start of growing season provided acceptance conditions are fulfilled.

3.11 MAINTENANCE
DURING WARRANTY
PERIOD

- .1 Perform following operations from time of acceptance until end of maintenance period:
 - .1 Water sodded Turfgrass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
- .2 Repair and resod dead or bare spots to approval of Departmental Representative.
- .3 Cut grass and remove clippings that will smother grass to height as follows:
 - .1 Turfgrass Nursery Sod:
 - .1 40 mm during normal growing conditions.
 - .2 65 mm at end of growing season and during periods of high temperatures and low precipitation.
 - .2 Cut grass at two (2) week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.
 - .3 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
 - .4 Eliminate weeds by mechanical means to extent acceptable to Departmental Representative.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Cast-in-Place Concrete: Section 03 30 00
 - .2 Excavating, Trenching and Backfilling: Section 31 23 10
 - .3 Granular Base and Sub-Base Materials: Section 32 11 16
 - .4 Topsoil and Sodding: Section 32 91 23
- 1.2 REFERENCES
- .1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications, latest edition.
- 1.3 MAINTENANCE
- .1 Maintain all reinstated areas until final acceptance of the Work.
 - .2 Repair damaged areas to the approval of the Departmental Representative.
- 1.4 SAMPLES
- .1 At least three (3) weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates, liquid asphalt and asphalt cement, and provide access for sampling.
 - .2 Preliminary approval of any sample or samples of any materials will not constitute a final approval of the material or its source of supply.
 - .3 All materials to be incorporated into the work will be continuously and regularly sampled and tested in the field and in the laboratory, and comply with the requirements of the material specification.
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PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Granular material: in accordance with the requirements of Section 32 11 16.
 - .2 Concrete material: as specified in Section 03 30 00.
 - .3 Asphalt material:
 - .1 Hot mixed, hot-laid combination of mineral aggregates, uniformly coated and mixed with an asphaltic binder in a suitable mixing plant. Asphalt materials and aggregates shall meet the requirements of Division 4, Section 4 of the Nova Scotia Department of Transportation and Infrastructure Renewal Specification.
 - .2 Composition of asphalt mixture: to grading and asphalt content requirements in Table 4.4.1-Physical Requirements of Asphalt Concrete of the Nova Scotia Department of Infrastructure Renewal Specification, Type B-HF and Type C-HF mix. Minimum Marhsall Stability to be 7.5 kN @ 60°C formulated for truck route traffic.
 - .3 Liquid asphalt primer: to requirements in Table 4.5.1 of the Nova Scotia Department of Transportation and Infrastructure Renewal Specification.
 - .4 Liquid asphalt tack coat: to same requirements as liquid asphalt primer.
 - .4 Grass surface materials: as specified in Section 32 91 23.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 Maintain surfaces to be reinstated level with adjoining existing surfaces gravel until final reinstatement.
 - .2 Repair damage or disturbance to surfaces, properties and structures, within limits of the Site or elsewhere on other properties occupied, traversed or otherwise used by the Contractor during the Contract period to a condition equal to or better than that before
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3.1 GENERAL (Cont'd)	.2	(Cont'd) Work began, at no additional cost to the Contract.
3.2 CONCRETE SURFACES	.1	Carry out final reinstatement of concrete surfaces as follows: .1 Cut back broken edges of original pavement to full depth, in straight lines. .2 Before placing final surface material, remove existing gravel to a depth indicated over disturbed area, grade and recompact. Add gravel to compacted depths indicated. Compact to not less than 100% Maximum Corrected Dry density. .3 Place and finish concrete in accordance with Section 03 30 00. .4 Confirm finished surface is even, dense and matches grade of existing road or surface, as approved by the Departmental Representative.
3.3 ASPHALT SURFACES	.1	Keep surface of asphalt paved roads and surfaces in good condition by repairing settlement of trench backfilling as described in Section 31 23 10.
	.2	Carry out final reinstatement of asphalt surfaces as follows: .1 Cut back broken edges of original pavement to full depth, in straight lines. Cut back 300 mm minimum from edge of excavation to eliminate tension cracks. Clean contact surfaces and apply tack coat before placing asphalt concrete. .2 Before placing final surface material, remove existing gravel to a depth indicated over disturbed area, grade and recompact. Add gravel to compacted depths indicated. Compact to not less than 100% Maximum Corrected Dry density. .3 Asphalt placement: .1 Obtain Departmental Representative's approval of granular base and preparation prior to placing asphalt. .2 Before placing asphalt, clean surface of loose and foreign material. Apply liquid asphalt primer to Nova Scotia Department of Transportation and

3.3 ASPHALT
SURFACES
(Cont'd)

.2 (Cont'd)

.3 Asphalt placement:(Cont'd)

.2 (Cont'd)

Infrastructure Renewal specifications.

Application rate: 1.0 l/m².

.3 Apply liquid asphalt tack coat to Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification between Class B-HF binder and Class C-HF surface courses, and as primer at all cold joints. Application rate: 0.5 l/m².

.4 Place asphalt concrete in compacted lifts to thicknesses, grades and lines as indicated or as directed by Departmental Representative.

.5 Place catch basin and manhole covers, and water distribution system fittings into final position prior to placement of Type C-HF asphalt.

.6 Placing conditions:

.1 Place asphalt mixtures only when air temperature is above 5°C.

.2 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.

.3 When the air temperature is 5°C, or less, or after the 31st of October, the Contractor will not be permitted to lay any asphalt pavement, unless otherwise directed by the Departmental Representative.

.4 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.7 Place, roll and compact asphalt concrete in accordance with Division 4, Section 4, Province of Nova Scotia, Department of Transportation and Infrastructure Renewal, Standard Specification.

.8 Rake all joints.

.9 The minimum density acceptable shall be 95% of the theoretical Maximum Relative Density determined according to ASTM D3203.

.4 Compact asphalt concrete in lifts not exceeding 50 mm in thickness.

.5 Ensure finished surface is even, dense and matches grade of existing road or surface,

3.3 ASPHALT SURFACES (Cont'd)

.2 (Cont'd)

.5 (Cont'd)

as approved by the Departmental Representative.

3.4 GRAVEL SURFACES

.1 Reinstatement gravel surfaces by placing 200 mm compacted thickness of gravel at an elevation such that gravel surface is smooth and even with adjacent surfaces.

.2 Place and compact gravel for surfaces in accordance with the requirements of Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications.

3.5 GRASS SURFACES

.1 Sodding: to Section 32 91 23. Fine grade areas to be reinstated to smooth surface. Grade to allow for topsoil and sod to be placed so finish grade is smooth and even with existing surfaces.