

PWGSC	GRANULAR	Sect 32 11 16.01
Neils Brook Bridge	SUB-BASE	Page 1
Replacement		
Job No. R.074443.001		2016-01-13

PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
	.2	Section 31 05 16 - Aggregate Materials.
	.3	Section 31 23 33.01 - Excavating, Trenching and Backfilling.
	.4	Section 31 24 13 - Temporary Roadway Embankment.
<u>1.2 REFERENCES</u>	.1	American Society for Testing and Materials (ASTM)
	.1	ASTM C 117-13, Standard Test Methods for Material Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing.
	.2	ASTM D6928-10, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
	.3	ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.4	ASTM D 422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
	.5	ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft ³) (600kN-m/m ³).
	.6	ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
	.7	ASTM D 4318-10, 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	Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
	.1	Standard Specification - Highway Construction and Maintenance, (latest edition).

1.3 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused granular material from landfill to local facility to the satisfaction of the Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular subbase material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Type 2 Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance, (latest edition), with the following modification: the allowable percentage passing the 80 µm sieve shall be 3 to 5%.

PART 3 - EXECUTION

3.1 PLACING

- .1 Place granular sub-base after subgrade is to the satisfaction of the Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean, unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

- 3.1 PLACING
(Cont'd)
- .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 to density of not less than 100% of Maximum Dry Density in accordance with ASTM D 698.
 - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
 - .4 Apply water as necessary during compaction to obtain specified density.
 - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.
 - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

- 3.3 SITE TOLERANCES
- .1 Finished sub-base surface to be within 25 mm of elevation as indicated but not uniformly high or low.

- 3.4 PROTECTION
- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the Departmental Representative.

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PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
	.2	Section 31 23 33.01 - Excavating, Trenching and Backfilling.
	.3	Section 31 05 16 - Aggregate Materials.
	.4	Section 31 24 13 - Temporary Roadway Embankment.
	.5	Section 32 11 16.01 - Granular Sub-base.
<u>1.2 REFERENCES</u>	.1	American Society for Testing and Materials (ASTM)
	.1	ASTM C 117-13, Standard Test Methods for Materials Finer Than 75-micron Sieve in Mineral Aggregates by Washing.
	.2	ASTM D 6928-10, Standard Test Method for Resistance of coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
	.3	ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.4	ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft ³) (600kN-m/m ³).
	.5	ASTM D 1883-07e1, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
	.6	ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
	.2	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
	.2	CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
	.3	Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
	.1	Standard Specification - Highway Construction and Maintenance, (latest edition).

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| 1.3 WASTE
MANAGEMENT AND
DISPOSAL | .1 | Divert unused granular material from landfill to local facility to satisfaction of Departmental Representative. |
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PART 2 - PRODUCTS

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| 2.1 MATERIALS | .1 | Granular base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
.1 Type 1 Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition), with the following modification: the allowable percentage passing the 80 µm sieve shall be 3 to 5%.
.2 Type 1S Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition). |
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PART 3 - EXECUTION

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| 3.1 SEQUENCE OF
OPERATION | .1 | Place granular base after sub-base surface is inspected and approved by the Departmental Representative. |
| | .2 | Placing
.1 Construct granular base to depth and grade in areas indicated.
.2 Ensure no frozen material is placed.
.3 Place material only on clean unfrozen surface, free from snow and ice.
.4 Place material using methods which do not lead to segregation or degradation of aggregate.
.5 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
.7 Remove and replace that portion of layer in which material becomes segregated during spreading. |

3.1 SEQUENCE OF
OPERATION
(Cont'd)

- .3 Compacting
- .1 Compaction equipment to be capable of obtaining required material densities.
 - .2 Compact to density not less than 100% of Maximum Dry Density in accordance with ASTM D 698.
 - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .4 Apply water as necessary during compacting to obtain specified density.
 - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the. Departmental Representative.
 - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by the Departmental Representative.

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PART 1 - GENERAL

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|-----------------------------|----------------------|---|
| <u>1.1 RELATED SECTIONS</u> | .1
.2
.3 | Section 01 33 00 - Submittal Procedures.
Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
Section 32 12 16.01 - Asphalt Paving. |
| <u>1.2 REFERENCES</u> | .1
.2 | American Society for Testing and Materials International, (ASTM)
.1 ASTM D 140-2009, Standard Practice for Sampling Bituminous Materials.
.2 ASTM D 244-09, Standard Test Methods and Practices for Emulsified Asphalts.
Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specifications - Highway Construction and Maintenance, (latest edition). |
| <u>1.3 SUBMITTALS</u> | .1
.2
.3
.4 | If requested, submit samples in accordance with Section 01 33 00 - Submittal Procedures.
If requested submit two (2) - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth jars, bottles made with plastic or plastic lined cans to Departmental Representative, at least two (2) weeks prior to beginning Work.
Sample asphalt tack coat material to: ASTM D 140.
As required provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D 140. |

<u>1.4 QUALITY ASSURANCE</u>	.1	Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.
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<u>1.5 DELIVERY, STORAGE AND HANDLING</u>	.1	Deliver, store and handle materials in accordance with ASTM D 140.
	.2	Provide, maintain and restore asphalt tack coat material storage area.

<u>1.6 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management And Disposal.
	.2	Divert unused asphalt tack coat material from landfill to facility capable of recycling materials.

PART 2 - PRODUCTS

<u>2.1 MATERIALS</u>	.1	Emulsified asphalt: grade RS-1 to Division 4, Section 1 of NSTIR Standard Specifications - Highway Construction and Maintenance, (latest edition).
	.2	Water: clean, potable, free from foreign matter.

<u>2.2 EQUIPMENT</u>	.1	Pressure distributor: in accordance with Division 4, Section 1 of NSTIR Standard Specifications - Highway Construction and Maintenance (latest edition).
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PART 3 - EXECUTION

<u>3.1 APPLICATION</u>	.1	Obtain Departmental Representative's approval of surface before applying asphalt tack coat.
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3.1 APPLICATION (Cont'd)

- .2 Apply asphalt tack coat only on clean and dry surface.
- .3 Dilute asphalt emulsion with water at 1:1 ratio for application.
 - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .4 Apply asphalt tack coat evenly to pavement with a distributor at a rate of 140 mL/M² or as directed by the Departmental Representative and at a temperature not less than 20°C nor more than 70°C.
- .5 Paint contact surfaces of existing abutting asphalt surface with thin, uniform coat of asphalt tack coat material.
- .6 Do not apply asphalt tack coat when air temperature is less than 10 degrees C or when rain is forecast within 2 hours of application.
- .7 Apply asphalt tack coat only on unfrozen surface.
- .8 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .9 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
- .10 Keep traffic off tacked areas until asphalt tack coat has set.
- .11 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .12 Permit asphalt tack coat to set before placing asphalt pavement.
- .13 No more tack coat shall be applied than can be covered with asphalt pavement wearing surface in one day.

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PART 1 - GENERAL

<u>1.1 RELATED SECTIONS</u>	.1	Section 01 33 00 - Submittal Procedures.
	.2	Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
	.3	Section 32 11 16.01 - Granular Sub-Base.
	.4	Section 32 11 23 - Aggregate Base Courses.
	.5	Section 32 12 13.16 - Asphalt Tack Coats.
	.6	Section 32 17 23 - Pavement Markings.
<u>1.2 REFERENCES</u>	.1	American Society for Testing and Materials International, (ASTM)
	.1	ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)).
	.2	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-1.5-M91(March 1999), Low Flash Petroleum Spirits Thinner (Reaffirmation of December 1991).
	.2	CAN/CGSB-1.74-2001, Alkyd Traffic Paint.
	.3	Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
	.1	Standard Specifications - Highway Construction and Maintenance, (latest edition).
<u>1.3 SAMPLES</u>	.1	If requested, submit samples in accordance with Section 01 33 00 - Submittal Procedures.
	.2	If requested, submit to Departmental Representative, samples of material for sieve analysis at least 3 weeks before beginning Work.

1.4 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Divert unused aggregate materials from landfill to facility for reuse to satisfaction of Departmental Representative.
- .5 Dispose of unused paint and paint thinner materials at official hazardous material collections site in accordance with applicable federal, municipal and provincial guidelines.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose a health or environmental hazard.
- .8 Divert unused asphalt from landfill to facility capable of recycling materials in accordance with applicable federal, municipal and provincial guidelines.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular subbase: to Section 32 11 16.01 - Granular Sub-Base.
 - .2 Granular base: to Section 32 11 23 - Aggregate Base Courses.
 - .3 Tack coat: to Section 32 12 13.16 - Asphalt Tack Coats.
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3.3 PAVEMENT
CONSTRUCTION
(Cont'd)

- .2 Finished asphalt surfaces to be within 6 mm of design elevation, but not uniformly high or low.
- .3 Construction of all asphalt concrete to be completed with the use of a Material Transfer Vehicle (MTV), in accordance with Division 4, Section 4 of NSTIR Standard Specifications and Maintenance (latest edition). No premium payment will be made for the use of MTV.

3.4 QUALITY CONTROL
TESTING

- .1 Inspection and testing shall be carried out by the Contractor.
- .2 Submit satisfactory test results to Departmental Representative showing compliance of asphalt paving with requirements of this Section.

3.5 TRAFFIC
MARKINGS

- .1 See Section 32 17 23 - Pavement Markings.
- .2 Paint parking space divisions and other pavement markings in accordance with manufacturers recommendations and as indicated.
- .3 Use paint thinner in accordance with manufacturer's requirements.

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Neils Brook Bridge	PAVING OF BRIDGE DECKS	Page 1
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PART 1 - GENERAL

1.1 GENERAL

- .1 This section consists of the application of asphalt concrete on the bridge deck (Neil's Brook Bridge) after the waterproofing membrane and tack coat are applied.

1.2 RELATED SECTIONS

- .1 Section 07 14 13 - Hot Fluid-Applied Rubberized Asphalt Waterproofing
- .2 Section 32 12 13.16 - Asphalt Tack Coats
- .3 Section 32 12 16 - Asphalt Paving

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specification, Highway Construction and Maintenance.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Asphalt Tack Coat: Rapid Setting Emulsified Asphalt RS-1 in accordance with Section 32 12 13.16 - Asphalt Tack Coat
- .2 Asphalt Binder: Performance Graded Asphalt Binder PG58-28, in accordance with NSTIR Standard Specification, Division 4 Section 2 - Performance Graded Asphalt Binder (PGAB).
- .3 Asphalt Concrete: hot mixed, hot-placed 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 NSTIR Standard Specification, Division 4 Section 4 - Asphalt Concrete Hot Mixed - Hot Placed (Method Specification).
- .4 Composition of Asphalt Concrete: to grading and asphalt content to meet requirements of NSTIR Standard Specification, Division 4 Section 4 - Asphalt Concrete Hot Mixed - Hot Placed (Method Specification), Asphalt Mix Type C-HF, as indicated.

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Neils Brook Bridge	PAVING OF BRIDGE DECKS	Page 2
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PART 3 - EXECUTION

3.1 CONSTRUCTION

- .1 Equipment, Transportation of Mix, Placing and Compacting to be in accordance with Section 32 12 16 - Asphalt Paving.
- .2 Apply a tack coat of RS-1emulsion to protection boards at a rate of 0.14 L/m2 or as directed by the Departmental Representative.
 - .1 Apply a tack coat of RS-1 emulsion to asphalt surface prior to placing the next lift of mix.
- .3 Place asphalt concrete paving of bridge deck and approach slabs within 48 hours of the completion of waterproofing or as otherwise directed by the Departmental Representative.
- .4 The deck shall be paved with Asphalt Mix Type C-HF at a rate of 110 kg/m2 max., with a minimum of 2 lifts required.
- .5 Trucks or pavers shall not start, stop or turn too quickly on the deck as it is could cause a rupture of the waterproofing . The paver shall travel at a maximum speed of 4 m per minute to provide maximum traction.
 - .1 Material Transfer Vehicle (MTV) shall be used in the placement of all asphalt concrete on this project.
- .6 Breakdown rolling of the asphalt concrete shall commence when the mat cools to 115°C, using a steel wheel roller weighing a minimum of 7 ton. The steel wheel roller shall make only one pass over the mat, running off the deck to stop and turn. Vibratory rollers are not permitted to be used on bridge decks. Final rolling shall be performed with a rubbertired roller, also running off the deck to stop and turn.
- .7 The final lift of asphalt mix shall provide a smooth transition between bridge and approaches.
- .8 Within 24 hours of paving of the deck and approach slabs, seal the interface between the asphalt concrete and the face of the curb by pouring waterproofing along the joint such that the material extends 25 to 50 mm from the face of the curb and

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to a thickness of 2 to 4 mm above the asphalt concrete.

- .9 Finish Tolerances and Defective Work to be in accordance with Section 32 12 16 - Asphalt Paving.

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 74 21 - Construction/Demolition Waste Management And Disposal. |
| <u>1.2 REFERENCES</u> | .1 | Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) |
| | .1 | Standard Specifications - Highway Construction and Maintenance (latest edition). |
| | .2 | Canadian General Standards Board (CGSB). |
| | .3 | CAN/CGSB-15.1-(92), Calcium Chloride. |
| <u>1.3 DELIVERY STORAGE AND HANDLING</u> | .1 | Supply calcium chloride as required to prevent blowing dust. |
| | .2 | Deliver calcium chloride to site in moisture-proof bags, bulk. Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer. |
| | .3 | Store bags of calcium chloride in weather-proof enclosures. |
| <u>1.4 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal. |
| | .2 | Collect and separate plastic, paper packaging, and corrugated cardboard in accordance with Waste Management Plan. |
| | .3 | Place materials defined as hazardous or toxic in designated containers. |
| | .4 | Fold up metal banding, flatten and place in designated area for recycling. |
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PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Calcium chloride: to Division 6, Section 8 of NSTIR Standard Specifications - Highway Construction and Maintenance (latest edition). |
| | .2 | Water: clean, potable, free from foreign matter. |

PART 3 - EXECUTION

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| <u>3.1 APPLICATION</u> | .1 | Apply calcium chloride and water with equipment approved by Departmental Representative when directed by Departmental Representative. |
| | .2 | Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application. |

PART 1 - GENERAL

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| <u>1.1 REFERENCES</u> | .1 | Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specifications - Highway Construction and Maintenance (latest edition). |
| <u>1.2 SUBMITTALS</u> | .1 | Submit in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Product Data:
.1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. |
| <u>1.3 DELIVERY, STORAGE AND HANDLING</u> | .1 | Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions. |

PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Paint: Low Temperature
.1 Water-Borne, Non-Coning Traffic Paint to Division 6, Section 6 of NSTIR Standard Specifications - Highway Construction and Maintenance (latest edition).
.2 Colour: yellow and white. |
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PART 3 - EXECUTION

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| <u>3.1 EXAMINATION</u> | .1 | Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials. |
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| <u>3.1 EXAMINATION
(Cont'd)</u> | .2 | Proceed with Work only after unacceptable conditions have been rectified to the satisfaction of the Departmental Representative. |
| <u>3.2 EQUIPMENT
REQUIREMENTS</u> | .1 | Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated. |
| <u>3.3 PAINTING
OPERATIONS</u> | .1 | Painting operations: to Division 6, Section 6 of NSTIR Standard Specifications - Highway Construction and Maintenance (latest edition). |
| <u>3.4 CLEANING</u> | .1 | Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day. |
| | .2 | Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. |
| <u>3.5 PROTECTION OF
COMPLETED WORK</u> | .1 | Protect pavement markings until dry. |
| | .2 | Repair damage to adjacent materials caused by pavement marking application. |

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PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 31 14 13 - Soil Stripping and Stockpiling.
	.2	Section 31 23 33.01 - Excavating, Trenching and Backfilling.
	.3	Section 32 92 19.16 - Hydraulic Seeding.
<u>1.2 REFERENCES</u>	.1	Agriculture and Agri-Food Canada .1 The Canadian System of Soil Classification, Third Edition, 1998.
	.2	Canadian Council of Ministers of the Environment .1 PN1340-2005, Guidelines for Compost Quality.
<u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u>	.1	Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Quality control submittals : .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
<u>1.4 QUALITY ASSURANCE</u>	.1	Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

PART 2 - PRODUCTS

<u>2.1 TOPSOIL</u>	.1	Topsoil to come from material previously stockpiled on site.
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| 2.1 TOPSOIL
(Cont'd) | .2 | Additional topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth. |
| | .1 | Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight. |
| | .2 | Contain no toxic elements or growth inhibiting materials. |
| | .3 | Finished surface free from: |
| | .1 | Debris and stones over 50 mm diameter. |
| | .2 | Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume. |
| | .4 | Consistence: friable when moist. |
| 2.2 SOURCE QUALITY
CONTROL | .1 | Contractor is responsible for amendments to supply topsoil as required. |
| | .2 | Provide for soil testing by recognized testing facility for PH, P and K, and organic matter. |
| | .1 | Soil sampling, testing and analysis to be in accordance with Provincial standards. |

PART 3 - EXECUTION

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| 3.1 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 requirements of authorities having jurisdiction and sediment and erosion control drawings. |
| | .2 | Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established. |
| | .3 | Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal. |

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3.2 STRIPPING OF TOPSOIL .1 Strip topsoil in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

3.3 PREPARATION OF EXISTING GRADE .1 Verify that grades are correct.
.1 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.
.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
.2 Remove debris which protrudes more than 75 mm above surface.
.3 Dispose of removed material off site.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL .1 Place topsoil after Departmental Representative has accepted subgrade.
.2 Spread topsoil in uniform layers not exceeding 150 mm.
.3 Spread topsoil as indicated to following minimum depths after settlement.
.1 100 mm for seeded areas.
.4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 FINISH GRADING .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
.1 Prepare loose friable bed by means of cultivation and subsequent raking.
.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
.1 Leave surfaces smooth, uniform and firm against deep footprinting.

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3.6 ACCEPTANCE .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.7 SURPLUS MATERIAL .1 Dispose of materials not required where directed by Departmental Representative off site.

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

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures |
| | .2 | Section 32 92 19.13 - Topsoil Placement and Grading |
| <u>1.2 REFERENCES</u> | .1 | Canadian Nursery Landscape Association - Canadian Standards for Nursery Stock - latest edition. |
| <u>1.3 QUALITY CONTROL</u> | .1 | Obtain approval from Department Representative of sod sources. |
| <u>1.4 DELIVERY, STORAGE AND HANDLING</u> | .1 | Schedule deliveries to minimize storage at job site without causing delays. |
| <u>1.5 SCHEDULING</u> | .1 | Schedule sodding operations to coincide with topsoil operations. |
| <u>1.6 SAMPLES</u> | .1 | Submit samples of sods in accordance with Section 01 33 00. |
| | .2 | Provide product data for fertilizer. |
| | .3 | Obtain approval of samples by Departmental Representative. |
| <u>1.7 WARRANTY</u> | .1 | Provide warrant that the sodded areas will be maintained to remain healthy and free of defects for one full growth season from Substantial Performance date. |

PART 2 - PRODUCTS

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| <u>2.1 SOD</u> | .1 | Number (#1) Kentucky Bluegrass - Sod grown from one or more Kentucky Bluegrass cultivars or Kentucky Bluegrass/Fine Fescue Sod - grown from a seed mixture containing 90-95% by weight of Kentucky Bluegrass cultivars and 5-10% by weight of creeping red chewing or hard fescue cultivars. |
| | .2 | Broken, dry, discoloured pieces will be rejected. |
| <u>2.2 WATER</u> | .1 | Free of impurities that would inhibit plant growth. |
| <u>2.3 SOD FERTILIZER</u> | .1 | Complete synthetic, slow release with maximum 35% water soluble nitrogen. |
| | .2 | Ratio for spring sodding: 1:2:2; fall sodding: |
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1:4:4.

- .3 Ratio for year one maintenance applications: May 3:0:0, July 3:1:3, September 1:2:3, or as recommended by the Nova Scotia Agricultural College Soils Department.

2.4 WOODEN PEGS_____ .1 17 x 17 x 150 mm or approved 150 mm long steel staples.

2.5 WIRE MESH_____ .1 40 mm, chicken wire, jute, synthetic, plastic.

PART 3 - EXECUTION_____

3.1 GENERAL_____ .1 The Contractor shall be a member in good standing of Landscape Nova Scotia Horticultural Trades Association.

3.2 PREPARATION OF SURFACES_____ .1 To Section 32 91 19.

3.3 SODDING_____ .1 Topsoiling and finish grading to Section 32 91 19.

.2 Apply fertilizer at rate recommended by soil sample test.

.3 Lay sod as soon as possible after lifting to ensure proper establishment.

.4 Where new sodding abuts existing lawn, cut edge of existing sod with sharp tool in straight line. Lay new sod flush with level of existing lawn.

.5 Lay sod in rows, parallel with contours, smooth and flush with adjoining areas, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Butt sections against curb flush with top of curb, ensure topsoil is well compacted behind curbing. Cut out irregular or thin sections with a sharp knife, edger or equivalent. Where sod abuts concrete curb, compact soil behind curb and lay top of sod flush with top of curb.

.6 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.7 Water sod immediately after laying as dictated by

weather conditions to obtain moisture penetration through sod into 100 mm of topsoil.

- .8 Roll sod with a roller having a mass of 50 kg/m of width. Repeated rolling to correct irregularities in grade is not permitted.

3.4 SOD PLACEMENT ON
SLOPES AND PEGGING

- .1 For slopes steeper than (1) horizontal or (2) vertical, install and secure with mesh, in area indicated, in accordance with the manufacturer's instructions.
- .2 Start laying sod at bottom of slopes.
- .3 Peg sod on slopes steeper than (3) horizontal to (1)vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to the following pattern:
 - .1 100 mm below top edge at 200 mm on center for first sod sections along contours of slopes.
 - .2 Not less than 3-6 pegs per square metre.
 - .3 Not less than 6-9 pegs per square metre in drainage structures.
 - .4 Adjust pattern as directed by Departmental Representative.
 - .5 Drive pegs to 20 mm above soil surface of sod Section.

3.5 MAINTENANCE DURING_
ESTABLISHED PERIOD

- .1 Perform the following maintenance operations from time of sodding to acceptance:
 - .1 Repair dead or bare spots to allow establishment of sod prior to acceptance.
 - .2 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing shrinkage or erosion.
 - .3 Cut grass to 50 mm, a minimum of twice, when it reaches a height of 70 mm. Remove clippings.
 - .4 Fertilize sodded areas one month after sodding. Spread evenly at manufacturer's suggested rate. Postpone fertilizing until next spring if application falls within four-week prior to expected end of growth season.
 - .5 Control weeds by mechanical means utilizing acceptable integrated pest management practices.
 - .6 Where continued maintenance is required after Substantial Performance, commence maintenance immediately following installation of work. Continue it for one year following Substantial Performance date.

3.6 ACCEPTANCE

- .7 Notify Departmental Representative upon completion of maintenance period to arrange inspection and transfer maintenance responsibility to Departmental Representative.
- .1 Grassed areas will be accepted upon completion of the second mowing provided that:
 - .1 Growth is properly established.
 - .2 Area is free of bare and dead spots.
 - .3 Minimal surface soil is visible when grass has been cut to a height of 50 mm.
- .2 Areas sodded in the fall will be accepted the following spring, one month after the start of growing season provided that acceptance conditions have been met.
- .3 Continue maintenance and mowing until acceptance.

3.7 CLEAN UP

- .1 Remove surplus materials at no additional cost to the contract.

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 31 23 33.01 - Excavating, Trenching and Backfilling. |
| | .3 | Section 32 91 19.13 - Topsoil Placement and Grading. |
| <u>1.2 ADMINISTRATIVE REQUIREMENTS</u> | .1 | Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements. |
| | .2 | Scheduling:
.1 Schedule hydraulic seeding to coincide with preparation of soil surface. |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Submit in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. |
| | .3 | Submit in writing 10 days prior to commencing work:
.1 Volume capacity of hydraulic seeder in litres.
.2 Amount of material to be used per tank based on volume.
.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare. |
| | .4 | Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. |
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1.3 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 QUALITY
ASSURANCE

- .1 Qualifications:
.1 Landscape Contractor: to be a Member in Good Standing of Nova Scotia Horticultural Trades Association.
- .2 Soils Testing:
.1 Contractor is responsible for soils testing to determine appropriate ratios and application rates for fertilizer, lime, and any soil amendments that may be required.
.2 Soil test report to prescribe ratios and rates for initial applications as well as subsequent applications during establishment and warranty period.
.3 Submit soil test report to Departmental Representative in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY,
STORAGE AND
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
.2 Inoculant containers to be tagged with expiry date.
- .3 Storage and Handling Requirements:
.1 Store fertilizer off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

1.6 WARRANTY

- .1 For the work of this Section 32 92 19.16 - Hydraulic Seeding, the 12 month warranty period is extended to 24 months.

- 1.6 WARRANTY
(Cont'd)
- .2 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
- .1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
- .1 Mixture composition:
- .1 40% Creeping Red Fescue.
- .2 15% Timothy.
- .3 15% Tall Fescue.
- .4 10% Kentucky Blue Grass.
- .5 10% Alsike Clover.
- .6 5% Red Top.
- .7 5% perennial Rye.
- .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 Type I mulch:
- .1 Made from wood cellulose fibre.
- .2 Organic matter content: 95% plus or minus 0.5%.
- .3 Value of pH: 6.0.
- .4 Potential water absorption: 900%.
- .3 Tackifier: water dilutable, liquid dispersion.
- .4 Water: free of impurities that would inhibit germination and growth.
- .5 Fertilizer:
- .1 To Canada "Fertilizers Act" and Regulations.
- .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
- .6 Lime: of agriculture source, purity and fineness suitable for growth of turf grass.

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| <u>2.1 MATERIALS</u>
(Cont'd) | .7 | Have a representative sample of topsoil tested and determine application rate for fertilizer. Submit test results to Departmental Representative. |
| | .8 | Inoculants: inoculant containers to be tagged with expiry date. |

PART 3 - EXECUTION

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| <u>3.1 EXAMINATION</u> | .1 | Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative. |
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| <u>3.2 INSTALLERS</u> | .1 | Use installers members in Good Standing of Nova Scotia Horticultural Trades Association. |
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| <u>3.3 PROTECTION OF EXISTING CONDITIONS</u> | .1 | Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray. |
| | .2 | Immediately remove any material sprayed where not intended as directed by Departmental Representative. |

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| <u>3.4 PREPARATION OF SURFACES</u> | .1 | Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water. |
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- 3.4 PREPARATION OF SURFACES
(Cont'd)
- .2 Prepare surface in accordance with Section 32 91 19.13 - Topsoil Placement and Grading.
 - .3 Fine grade areas to be seeded free of humps and hollows.
 - .1 Ensure areas are free of deleterious and refuse materials.
 - .4 Cultivated areas identified as requiring cultivation to depth of 25 mm.
 - .5 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
 - .6 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

- 3.5 FERTILIZING PROGRAM
- .1 Fertilize prior to fine grading applying fertilizer equally distributed in accordance with the rate and ratio determined from soils tests.
 - .2 Fertilize during establishment and warranty periods applying fertilizer equally distributed in accordance with the rate and ratio determined from soils tests.

- 3.6 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 materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

- 3.7 SLURRY APPLICATION
- .1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.
 - .2 Hydraulic seeding equipment:
 - .1 Slurry tank.

- 3.7 SLURRY APPLICATION
(Cont'd)
- .2 (Cont'd)
- .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.
- .3 Slurry mixture applied per 100m2.
- .1 Seed: 2.0kg or as recommended by seed supplier.
- .2 Mulch: 10kg.
- .3 Tackifier: as recommended by manufacturer.
- .4 Water: Minimum 100 L.
- .5 Fertilizer: in accordance with rate and ratio determined from soils tests.
- .4 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.
- .5 Blend application 300 mm into adjacent grass areas or sodded areas or previous applications to form uniform surfaces.
- .6 Re-apply where application is not uniform.
- .7 Remove slurry from items and areas not designated to be sprayed.
- 3.8 CLEANING
- .1 Progress Cleaning: leave Work area clean at end of each day.
- .1 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .1 Clean and reinstate areas affected by Work.
- 3.9 PROTECTION
- .1 Protect seeded areas from trespass until plants are established.

3.9 PROTECTION
(Cont'd)

- .2 Remove protection devices as directed by Departmental Representative.

3.10 MAINTENANCE
DURING
ESTABLISHMENT
PERIOD

- .1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.
- .2 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .3 Grass Mixture:
 - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .2 Fertilize seeded areas after 10 weeks after germination provided plants have mature true leafs. Spread half of required amount of fertilizer in one direction and remainder at right angles; water in well.
 - .3 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
 - .4 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.11 ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
 - .1 Plants are uniformly established and seeded areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.12 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.

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3.12 MAINTENANCE	.1	(Cont'd)
DURING WARRANTY		.2 Fertilize seeded areas as required.
PERIOD		Spread half of required amount of fertilizer
(Cont'd)		in one direction and remainder at right
		angles and water in well.