

PART 1: GENERAL

1.1 WORK INCLUDED

- .1 This section specifies requirements for supplying, producing and placing gravel or quarried stone as a granular base and sub-base to lines, grades and typical cross sections indicated on plans or as directed by the Departmental Representative.

1.2 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

1.3 COMPLIANCE REQUIREMENTS

- .1 American Society for Testing and Materials (ASTM) International
  - .1 ASTM C117-04, 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 D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .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.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.4 SUBMITTAL GENERAL REQUIREMENTS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide the Departmental Representative with the following information before the commencement of the work and at any

time during the construction at the request of the Departmental Representative (at no cost to the Owner):

.1 Approved testing geotechnical firm to complete the following analyses and collect samples at the proposed site:

- .1 Source of supply of aggregate
  - .2 Sieve analysis
  - .3 Micro-Deval Analysis (not to exceed the requirements of Table 201-1 (25%) of the NBDTI Specifications (latest edition) for Aggregate Base Material
  - .4 Freeze-thaw - (not to exceed the requirements of Table 201-1 (20%) of the NBDTI Specifications (latest edition)
  - .5 Flat and Elongated Particles (not to exceed the requirements of Table 201-1 (35%) of the NBDTI Specifications (latest edition)
  - .6 Plasticity Index (not to exceed the requirements of Table 201-1 (3%) of the NBDTI Specifications (latest edition) for Aggregate Base Material
  - .7 Standard Proctor and Optimal Moisture values.
- .3 When submitting results to the Departmental Representative, the geotechnical testing firm must confirm that the materials meets the Specifications and that it is or is not suitable for the intended use. This is to be in letter report format submitted directly to the Departmental Representative.
- .4 The Owner reserves the right to reject any source of supply of aggregate base on the basis of past field performance, document by the records and experience of the Owner and/or the Departmental Representative with a specific material, regardless of compliance with physical requirements of grading limits.
- .5 Samples:
- .1 Allow continual sampling by Departmental Representative during production if required.
  - .2 Provide Departmental Representative with access to source and processed material for sampling.
  - .3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

#### 1.5 DELIVERY, STORAGE AND HANDLING

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- .1 Deliver, store and handle materials in accordance with this Section and as per NBDTI standards.
  - .2 Storage and Handling Requirements:
    - .1 Store materials in accordance with manufacturer's recommendations and erosion and sedimentation control plan.
    - .2 Replace defective or damaged materials with new.
  - .3 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

## PART 2: PRODUCTS

### 2.1 MATERIALS

- .1 Granular base and sub-base material: in accordance with NBDTI Standard Specifications, latest edition, Item 201 and following requirements:
  - .1 Crushed rock, crushed gravel, pit run or imported crushed sandstone.
    - .1 Consisting of clean, hard, sound and durable particles free from soft or disintegrated pieces, mud, dirt, organic or other deleterious materials as described in Item 201 of the NBDTI Standard Specifications (latest edition).
  - .2 Aggregate sub-base properties shall meet the requirements of Table 201-1 of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).
  - .3 The crushed rock, crushed gravel, pit run or crushed sandstone when tested in accordance with the N.B. Department of Transportation and Infrastructure's method with standard laboratory sieves, will conform to Table 201-2 (Crushed Rock, 75 mm % Passing gradation), Table 201-3 (Crushed Gravel, 75 mm % Passing gradation), Table 201-4 (Pit Run) and Table 201-5 (Crushed Sandstone Sub-base, 100 mm % Passing gradation) of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).
- .4 Other properties as noted in Clause 1.4.2.1.

### 2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 2 weeks minimum before starting production.
- .2 If, in the opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source or demonstrate that material from source in questions can be processed to meet specified requirements.
- .3 Advise Departmental Representative 2 weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

### PART 3: EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular base and sub-base installation 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.

#### 3.2 PREPARATION

- .1 Prior to the placing of granular base and sub-base, shape subgrade properly and compact so as to be firm and able to support the construction equipment without displacement.
- .2 Correct soft or yielding subgrade and make stable before sub-base construction proceeds.
- .3 Remove all ponded water from the area prior to placing any granular sub-base material.
- .4 Maintain sufficient crown at all times during construction to ensure ready runoff of surface water.

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- .5 Where the gradation of the subgrade soil and the sub-base are such that mixing of the two materials may occur, place an approved geotextile fabric.

### 3.3 PLACING

- .1 Place granular sub-base after all required piping has been placed and subgrade is inspected and approved by Departmental Representative.
- .2 Placing:
  - .1 Construct granular base and sub-base to depth and grade in areas indicated and dimensions as shown on the drawings or as directed by the Departmental Representative.
    - .1 Material placed wider or deeper than specified will not be measured for payment.
- .3 Ensure no frozen material is placed.
- .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 Shape sub-base by means of a blade grader (other than a tractor).
- .7 Ruts formed by hauling or traffic will be dragged full at least once a day or as often as necessary to prevent cutting through the surface material.
- .8 Place material to full width in uniform layers not exceeding 300 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
  - .2 Maximum lift thickness to be determined in the field by a test strip, to ensure the maximum effectiveness and compatibility of the compaction equipment with respect to the material being placed for each piece of equipment and each material type. The test strip shall be conducted in the presence of the Departmental Representative and the approved testing company's inspector, and shall occur prior to the placement of any further material in the work.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 When sub-base material is placed over geotextile fabric, carefully place the first layer of sub-base material and spread with a dozer so there is no traffic on the

geotextile until the first layer of 300 mm of sub-base has been spread and compacted.

- .11 Remove and replace portion of layer in which material has become segregated during spreading.

### 3.4 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 95 % maximum dry density in accordance with ASTM D698.
- .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.
  - .1 Make water truck(s) available to apply water for compaction purposes as required, incidental to the work.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .7 Compact each layer thoroughly over its entire width before placing the next layer.
  - .1 Operate sufficient compaction equipment at all times to thoroughly compact the material at the rate at which it is being placed.

### 3.5 PROOF ROLLING

- .1 For proof rolling use a fully loaded tandem truck. Make sufficient passes of proof rolling equipment to subject every point on surface to at least one pass of loaded tire and confirm no greater than 25 mm deflection occurs. Perform proof rolling in the presence of Departmental Representative.
- .2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.
- .3 Proof roll at level in sub-base as indicated.
  - .1 If non-standard proof rolling equipment is approved, Departmental Representative will determine level of proof rolling.

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- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
  - .5 Where proof rolling reveals areas of defective subgrade:
    - .1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
    - .2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.
    - .3 Replace sub-base material and compact.
  - .6 Where proof rolling reveals areas of defective sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace in accordance with this section at no extra cost.
  - .7 Maintain the finished aggregate base conditions until asphalt concrete is applied.

### 3.6 CLEANING

- .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.

### 3.7 SITE TOLERANCES

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

### 3.8 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 Departmental Representative.

**END OF SECTION**

PART 1: GENERAL

1.1 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

1.2 COMPLIANCE REQUIREMENTS

- .1 ASTM International
  - .1 ASTM C117-04, Standard Test Method for Material Finer Than 75  $\mu$ m (No. 200) 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 D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>(600 kN-m/m<sup>3  - .5 ASTM D1557-09, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2700 kN-m/m<sup>3  - .6 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.</sup></sup>
- .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.

1.3 SUBMITTAL GENERAL REQUIREMENTS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

PART 2: PRODUCTS

2.1 EQUIPMENT

- .1 Compaction equipment must be capable of obtaining required densities in materials on project.
- .2 Compaction equipment not specified herein is to be efficiency proved at no extra cost and written approval must be received from Departmental Representative before use.
- .3 Equip compaction units with device that records hours of actual work, not motor running hours.

### PART 3: EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for reshaping asphalt pavement installation 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.

#### 3.2 PULVERIZING AND RESHAPING

- .1 Pulverize scarified material to 50 mm maximum particle size and to a depth of 150 mm.
- .2 Blade and trim pulverized pavement material to elevation and cross section dimensions as directed by Departmental Representative.
- .3 Where deficiency of pulverized material exists, add and blend in new granular base material as directed by Departmental Representative. Do not use frozen material.

#### 3.3 COMPACTING

- .1 Compact to density not less than 100% maximum dry density in accordance with ASTM D698.
- .2 Compact reshaped material in accordance with written approval of Departmental Representative.



PART 1: GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 01 16.13 : Reshaping Asphalt Pavement
- .2 Section 32 12 13.16 : Asphalt Concrete Short Form

1.3 MEASUREMENT AND PAYMENT

- .1 Asphalt Tack Coats are to be considered incidental to placement of Asphalt Pavement and will not be measured separately for payment.

1.4 COMPLIANCE REQUIREMENTS

- .1 American Association of State Highway and Transportation Officials (AASHTO)
  - .1 AASHTO M081-92-UL-[04], Standard Specification for Cutback Asphalt (Rapid-Curing Type).
- .2 ASTM International
  - .1 ASTM D140/D140M-[09], Standard Practice for Sampling Bituminous Materials.
  - .2 ASTM D633-[11], Standard Volume Correction Table for Road Tar.
  - .3 ASTM D1250-[08], Standard Guide for Use of the Petroleum Measurement Tables.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-16.2-[M89], Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 SUBMITTAL GENERAL REQUIREMENTS

- .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 asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Sample asphalt tack coat material to: ASTM D140.

.2 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into work to ASTM D140.

#### 1.6 QUALITY ASSURANCE

- .1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect asphalt tack coats from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Deliver, store and handle materials in accordance with ASTM D140.
- .5 Provide, maintain and restore asphalt storage area.

#### 1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with the Waste Reduction Workplan.

### PART 2: PRODUCTS

#### 2.1 MATERIALS

- .1 Anionic emulsified asphalt: to CAN/CGSB-16.2 and ASTM D977, grade: RS-1.
- .2 Cut-back asphalt; to AASHTO M081-92-UL, grade RC-70 or RC-250.
- .3 Water: clean, potable, free from foreign matter.

## 2.2 EQUIPMENT

- .1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.
- .2 Pressure distributor:
  - .1 Designed, equipped, maintained and operated so that asphalt material can be:
    - .1 Maintained at even temperature.
    - .2 Applied uniformly on variable widths of surface up to 5 m.
    - .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m<sup>2</sup> with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
    - .4 Distribute in uniform spray without atomization at temperature required.
  - .2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
  - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
  - .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
    - .1 Measure temperature to closest whole number.
  - .5 Equipped with accurate volume measuring device or calibrated tank.
  - .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
  - .7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.
  - .8 Cleaned if previously used with incompatible asphalt material.

## PART 3: EXECUTION

### 3.1 EXAMINATION

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- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt tack coat installation 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.

### 3.2 APPLICATION

- .1 Apply asphalt tack coat only on clean and dry surface.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application.
  - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .3 Apply asphalt tack coat evenly to pavement surface without streaking at rate as directed by Departmental Representative, between 0.15 and 0.25 L/m<sup>2</sup> but not to exceed 0.7 L/m<sup>2</sup>.
- .4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.
- .6 Apply asphalt tack coat only on unfrozen surface.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
  - .1 Control traffic in accordance with Section 01 35 00.06 - Special procedures for Traffic control.
- .9 Keep traffic off tacked areas until asphalt tack coat has set.
- .10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .11 Permit asphalt tack coat to set break before placing asphalt pavement.

- .12 Submit summary report within 7 days minimum of date of application and include information as follows:
  - .1 Total area tack coated.
  - .2 Quantity of tack coat used.
  - .3 Mean application rate.
  - .4 Actual product quantity used when using equipment on pressure distributors.
  - .5 Dipstick measurements or electronic printouts are acceptable.
- .13 Carry out measurements in presence of Departmental Representative upon request.
- .14 Inspect tack coat application to ensure uniformity.
  - .1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.
  - .2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

### 3.3 CLEANING

- .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.

**END OF SECTION**

PART 1: GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 01 16.13 : Reshaping Asphalt Pavement
- .2 Section 32 12 13.16 : Asphalt Tack Coats

1.2 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

1.3 COMPLIANCE REQUIREMENTS

- .1 American Association of State Highway and Transportation Officials (AASHTO)
  - .1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
  - .2 AASHTO R29-08, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
  - .3 AASHTO T245-97(2008), Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
- .2 Asphalt Institute (AI)
  - .1 AI MS-2-1994, Mix Design Methods for Asphalt Concrete and Other Hot-Mixes.
- .3 ASTM International
  - .1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>

1.4 SUBMITTAL GENERAL REQUIREMENTS

- .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 asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 4 weeks prior to beginning Work.

.3 Samples:

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks prior to beginning work.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver and stockpile aggregates in accordance with NBDTI Specifications Section 203 and erosion and sedimentation control plan. Stockpile minimum 50% of total amount of aggregate required before beginning asphalt mixing operation.
- .3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.
- .6 Submit to Departmental Representative copies of freight and waybills for asphalt cement as shipments are received.
  - .1 Departmental Representative reserves right to check weights as material is received.
- .7 Stockpile crushed RAP separately in accordance with Section 203 where directed by Departmental Representative.
- .8 Protect and cover stockpiles of crushed RAP from rain to approval of Departmental Representative in accordance with erosion and sedimentation control plan.

## PART 2: PRODUCTS

### 2.1 MATERIALS

- .1 Aggregates to: NBDTI Specifications Section 203.
- .2 Tack coat: NBDTI Specifications Section 259.
- .3 Asphalt concrete: NBDTI Specifications Section 261.

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- .4 Traffic paint: yellow and white to MPI # 32 in accordance with NBDTI Specifications Section 571.

### PART 3: EXECUTION

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving 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.

#### 3.2 FOUNDATIONS

- .1 Foundations for roadways:
  - .1 As indicated on the Drawings.
- .2 Foundations for parking lots:
  - .2 As indicated on the Drawings.
- .3 Construction of granular foundations: to NBDTI Specification Section 203.
- .4 Compaction: compact each lift of granular material to 100% maximum density to ASTM D698. Maximum lift thickness: 150 mm.

#### 3.3 PAVEMENT THICKNESS

- .1 Pavement thickness for roadways and parking lots:
  - .1 As indicated on the Drawings.

#### 3.4 PAVEMENT CONSTRUCTION

- .1 Application of prime coat and tack coat: NBDTI Specifications Section 259.
- .2 Construction of asphalt concrete: NBDTI Specifications Section 260.
- .3 Surface preparation: NBDTI Specifications Section 205.

### 3.5 TRAFFIC MARKINGS

- .1 Paint parking space divisions and other pavement markings in accordance with manufacturers recommendations and as indicated in accordance with NBDTI Specifications Section 571.
- .2 Use paint thinner in accordance with manufacturer's requirements.

### 3.6 CLEANING

- .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.

**END OF SECTION**

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PART 1: GENERAL

1.1 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

1.2 COMPLIANCE REQUIREMENTS

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.
  - .4 ASTM D698-00ae1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.
  - .2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 SUBMITTAL GENERAL REQUIREMENTS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 4 weeks prior to commencing work.
- .3 If materials have been tested by a testing laboratory approved by Departmental Representative within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

1.4 DELIVERY STORAGE AND HANDLING

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 47 22 - Construction/ Demolition Waste Management and Disposal.

## PART 2: PRODUCTS

### 2.1 MATERIALS

- .1 Concrete mixes and materials: supplied in accordance with NBDTI Section 31.2 and CSA A23.1, exposure class C-2.
- .2 Joint filler: prefabricated asphalt impregnated fibreboard, cut to fit the required cross sections of joints formed.
- .3 Granular base: material to Section 32 11 16.01 - Granular Base and Sub-base to the following requirements:
  - .1 0-31.5 mm crushed stone or gravel.
  - .2 Gradations: conform to NBDTI Standard Specifications, latest edition, Table 201-2 (Crushed Rock).
- .4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.
- .5 Fill material: to Section 31 00 00.01 - Earthwork following requirements:
  - .2 Crushed stone or gravel.
  - .3 Gradations: within limits specified when tested to ASTM C117. Sieve sizes to CAN/CGSB-8.1.
- .6 Boiled linseed oil: to ASTM D260.
- .7 Kerosene: to CAN/CGSB-3.3.

## PART 3: EXECUTION

### 3.1 GRADE PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.
  - .1 Dispose of surplus and unsuitable excavated material off site.
- .3 Place fill in maximum 150 mm layers and compact to at least 95% of maximum dry density to ASTM D698.

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### 3.2 GRANULAR BASE

- .1 Obtain Departmental Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 150mm layers to at least 95% of maximum density to ASTM D698.

### 3.3 CONCRETE

- .1 Obtain Departmental Representative's approval of granular base prior to placing concrete.
- .2 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .3 Provide edging as indicated with 10 mm radius edging tool.
- .4 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

### 3.4 TOLERANCES

- .1 Finish surfaces to within 3mm in 3m as measured with 3m straightedge placed on surface.

### 3.5 EXPANSION AND CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, as follows:
  - .1 Sidewalks: 1.5 m intervals, having a depth of not less than  $\frac{1}{4}$  that of the slab and width not greater than 6 mm.
  - .2 Curb: 3 m intervals, extending completely through the curb height, having a width not greater than 6 mm.
- .2 Install expansion joints as indicated on the Drawings.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

### 3.6 ISOLATION JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structures.
- .2 Install joint filler in isolation joints.
- .3 Seal isolation joints with sealant approved by Departmental Representative.

### 3.7 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.
- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

### 3.8 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling
- .2 Backfill to designated elevations with material as directed by Departmental Representative.
  - .1 Compact and shape to required contours as directed by Departmental Representative.

### 3.9 LINSEED OIL TREATMENT

- .1 Apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.
- .2 Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.
- .3 Apply treatment when air temperature above 10 degrees C.
- .4 Apply first coat at 135 mL/m<sup>2</sup>.
- .5 Apply second coat at 90 mL/m<sup>2</sup> when first coat has dried.

### 3.10 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.

- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## PART 1: GENERAL

### 1.1 WORK INCLUDED

- .1 This Section includes the supply of all labour, equipment and materials for topsoiling of property for the purposes of establishing or restoring ground cover. Property will be restored immediately following the installation of the pipe systems, road construction, curb and gutter or sidewalk or other portions of the work, as determined by the Departmental Representative.

### 1.2 RELATED SECTIONS

- .1 Section 31 23 33.01 : Excavating, Trenching and Backfilling
- .2 Section 32 92 19.16 : Hydraulic Seeding
- .3 Section 32 92 23 : Sodding
- .3 Section 32 98 00: Reinstatement

### 1.3 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

### 1.4 COMPLIANCE REQUIREMENTS

- .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.

### 1.5 DEFINITIONS

- .1 Compost:
  - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
  - .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminants.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

#### 1.6 SUBMITTAL GENERAL REQUIREMENTS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Inform the Departmental Representative of proposed source of topsoil and sod before work begins.
- .3 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.
  - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

#### PART 2: PRODUCTS

##### 2.1 TOPSOIL

- .1 Topsoil recovered from other Contract work and approved by the Departmental Representative shall be used before any imported topsoil material is brought to the site.
- .2 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, admixture of subsoil, refuse, roots, stumps, sod, and stones larger than 20 mm.
- .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.
- .5 pH: 6.0 to 7.0.
- .6 Topsoil may be salvaged and stockpiled from other Contract work if approved by the Departmental Representative.

- .1 If screening is required to remove objectionable material this shall be done incidental to the work. Topsoil recovered from other Contract work shall not be measured for separate payment.

## 2.2 SOIL AMENDMENTS

- .1 Fertilizer:
  - .1 Fertility: major soil nutrients present in following amounts:
    - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
    - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
    - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
    - .5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
    - .6 Ph value: 6.5 to 8.0.
  - .2 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro nutrients suitable to specific plant species or application or defined by soil test.
    - .1 Approved product: Scotts Turfbuilder, Nutrite Nutri S Starter Fertilizer, Nu-Gro Turf Starter or approved equivalent.
    - .2 Formulating ratio of:
      - 2:4:1 80% SCU for spring and early fall planting (6-12-3)
      - 1:4:1 100% SCU for late fall planting (6-24-6)
- .3 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: 5 mm.
- .4 Organic matter: compost Category A, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

- .5 Sand: washed coarse silica sand, medium to coarse textured.
- .6 Limestone:
  - .1 Ground agricultural dolomitic limestone containing total 85% carbonates.
  - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
- .7 Erosion control agent: emulsified asphalt to CAN/CGSB-16.2, Type 2 or polyvinyl acetate polymer.
- .8 Water: clean, fresh and free from impurities that inhibit plant growth.
  - .1 Provide water at no cost to the Owner.

### 2.3 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil manufactured topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, N, P and K (nitrogen, phosphorous, potassium), and organic matter. If test results indicate amendments are required, work will not commence until corrected and accepted by the Departmental Representative.
- .4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
  - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

## PART 3: EXECUTION

### 3.1 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
- .2 Strip topsoil to depths as indicated.
  - .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
  - .2 Stripped topsoil shall be screened as required if necessary to reduce organic content to between 2-10% by weight, prior to stockpiling.

- .3 Stockpile in locations as indicated.
  - .1 Stockpile height not to exceed 1.65 m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.
- .5 Disposal of screened organic material to be incidental to the work.
- .6 Protect stockpiles from contamination and compaction.

### 3.2 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 Grade areas adjacent to existing finished areas to make a smooth connection with these areas and to ensure proper drainage across finished surfaces.
- .4 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.
- .5 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### 3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil on dry, unfrozen ground free of snow, ice, standing water or very wet and soft conditions after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 50 mm below finished grade.
- .4 Spread topsoil as indicated to following minimum depths after settlement.
  - .1 100 mm for seeded areas.

- .2 135 mm for sodded areas.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- .6 Fine grade topsoil to lines and elevations indicated, leaving surface smooth and uniform with a fine loose texture. Obtain approval of topsoil grade and depth before proceeding with seeding or sodding.

### 3.4 SOIL AMENDMENTS

- .1 For turf : apply and thoroughly mix soil amendments into full specified depth of topsoil at following rates:
  - .1 2.2 tonnes of lime per hectare of topsoiled area and as per the following:
    - .1 Rate determined with pH test results as determined by soil analysis.
    - .2 Lime shall be mixed thoroughly into full depth of topsoil prior to application of fertilizer.

### 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 surfaced smooth, uniform and firm against deep footprinting.

### 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 except topsoil not required where directed by Departmental Representative.

### 3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

PART 1: GENERAL

1.1 WORK INCLUDED

- .1 This Section includes the supply of all labour, equipment and materials for hydraulic seeding of property for the purposes of restoring ground cover. Property will be restored immediately following the installation of the pipe systems, road construction, curb and gutter or sidewalk or other portions of the work, as determined by the Departmental Representative.

1.2 RELATED SECTIONS

- .1 Section 31 23 33.01 : Excavating, Trenching and Backfilling
- .2 Section 32 91 19.13 : Topsoil Placement and Grading
- .3 Section 32 98 00 : Reinstatement

1.3 MEASUREMENT AND PAYMENT

- .1 Restoration of damage to landscaped areas by hydraulic seeding will be considered incidental to the Contract and will not be measured separately for payment.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
  - .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
  - .2 Schedule hydraulic seeding between dates recommended by New Brunswick Department of Transportation specifications.

1.5 SUBMITTAL GENERAL REQUIREMENTS

- .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.

Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

#### 1.6 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of New Brunswick Horticultural Trades Association.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 Prepared materials such as seed, fertilizer, lime, binder, dyes, etc., brought to the site shall be brought to the site in their factory containers/bags clearly marked as to material and mix components.
- .3 Storage and Handling Requirements:
  - .1 Store fertilizer in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

#### 1.8 WARRANTY

- .1 For seeding, 12 months warranty period is extended to 1 full growing season.
- .2 Contractor hereby warrants that seeding will remain free of defects for 1 full growing season.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

## 1.9 SCHEDULING

- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.

## 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" and having a minimum germination of 75% and minimum purity of 97%. Provide Pure Live Seed (PLS) weight certificates for germination and purity.
    - .1 Grass seed mixture: Low maintenance seed mixture:
      - .2 40% Creeping Red Fescue.
      - .3 20% Hard Fescue.
      - .4 15% Canada Blue Grass.
      - .5 10% Alsike or White Clover.
      - .6 10% Annual Rye Grass.
      - .7 5% Red Top.
  - .2 Mulch (for seeding): 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: 800-900% (by weight).
    - .2 Type II mulch:
      - .1 Made from newsprint, raw cotton fibre or straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.
    - .3 Hay mulch (for ground cover or residual seeding): unprocessed form such as bales or rolls of straw or hay in air-dry condition, or other similar material approved by the Departmental Representative, and is

substantially free of noxious weed seeds and objectionable foreign matter.

- .4 Tackifier: water dilutable, liquid dispersion containing polyvinyl acetate terpolymer emulsion or colloidal polyacharide tackifier, adhering to mulch during manufacturing, non-toxic and without germination or growth inhibiting factors.
- .5 Water: free of impurities that would inhibit germination and growth.
- .6 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Regulations.
  - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
- .7 Inoculants: inoculant containers to be tagged with expiry date.

### PART 3: EXECUTION

#### 3.1 EXAMINATION

- .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.

#### 3.2 INSTALLERS

- .1 Use installers members in Good Standing of New Brunswick Horticultural Trades Association.

#### 3.3 PROTECTION OF EXISTING CONDITIONS

- .1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaced not intended for spray.
- .2 Immediately remove any material sprayed where not intended as directed by Departmental Representative.

- .3 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.
- .4 Fine grade areas to be seeded free of humps and hollows.
  - .1 Ensure areas are free of deleterious and refuse materials.
- .5 Cultivate areas identified as requiring cultivation to depth of 25 mm.
- .6 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .7 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.
- .8 Lime soil prior to hydroseed application. Perform soil test to determine pH and other deficient nutrients. Apply additives as per manufacturer's recommendations to correct deficiencies.

#### 3.4 FERTILIZING PROGRAM

- .1 Fertilize prior to fine grading applying fertilizer equally distributed in accordance with the agreed program between Contractor and Departmental Representative.
- .2 Fertilize during establishment and warranty periods applying fertilizer equally distributed in accordance with agreed program between Contractor and Departmental Representative.

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

#### 3.6 HYDRAULIC SEEDING EQUIPMENT

- .1 Slurry tank.

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- .1 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.
  - .2 Pumps capable of maintaining continuous non-fluctuating flow of solution.
  - .3 Supplied with not less than 6 spray pattern nozzles.
  - .4 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
  - .5 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
  - .6 Equipped with flotation tires so no tire depressions exceeding in 12 mm depth result.
- .3 Slurry mixture applied per hectare.
    - .1 Seed: Grass mixture: Application rate 150 kg/ha for Seed Type 1 and 245 kg/ha for Seed Type 2 or as recommended by manufacturer.
    - .2 Mulch: 1250 kg/ha depending on the slope and as recommended by the supplier.
    - .3 Tackifier: 20 kg, or as recommended by manufacturer.
    - .4 Water: Minimum 30,000 L or quantity as required to form slurry in accordance with manufacturer's recommendations.
    - .5 Fertilizer: apply at rate of 600 kg/ha, ration 5-20-20 or as recommended by the supplier.
  - .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 or irregular to travel upon and to control application.
  - .5 Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.
  - .6 Re-apply where application is not uniform.
  - .7 After hydraulic seeding has been applied, roll the area with a roller having a mass of 50 kg/m of width. The roller shall be pulled by equipment with high flotation tires so that no ruts, depressions, or other damage to the work surface results.
  - .8 Remove slurry from items and areas not designated to be sprayed.

- .9 Obtain approval from Departmental Representative prior to carrying out hydraulic seeding after the week of September 30th.
- .10 Hydraulic seeding done between May 1st and Labour Day must produce a satisfactory growth over at least 95% of the area hydroseeded in the growing season of that year.
  - .1 Reseed areas of poor or no growth which exceed five percent (measured cumulatively) of the area hydroseeded.
- .11 Cover all hydroseed with blown hay if hydroseed is being applied after Labour Day. Hay rate: 4500 kg/ha.

### 3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning
  - .1 Leave work area clean at end of each day
  - .2 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 in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean and reinstate areas affected by work.

### 3.8 PROTECTION

- .1 Protect seeded areas from trespass until plants are established.
- .2 Remove protection devices as directed by Departmental Representative.

### 3.9 STRAW/ HAY MULCH EROSION CONTROL

- .1 Mulch seeded areas within forty-eight 48 hours of the seeding having been placed. Mulch unseeded areas within forty-eight 48 hours of being directed by the Departmental Representative to do so.
- .2 Apply mulch uniformly to the designated areas at a rate of 4500 kg/ha ( $\pm$  15%). Thin or break apart and disperse lumps and thick clumps of mulch.
- .3 Apply binder in accordance with the manufacturer's recommendations. Add sufficient environmentally acceptable green dye to the mixture to confirm application.

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- .4 When applied the mulch shall form an absorptive mat, which will allow moisture to percolate into the underlying soil.
  - .5 Mulch may be combined with the other materials and distributed in a single operation using a hydroseeding unit, or the mulch may be applied separately and the coloured binder solution sprayed on the placed mulch within 48 hours of its placement.
  - .6 Rough ground and/or steep slopes require more mulch and binder per hectare than finished and/or flatter ground. Adjust material application quantities as required to ensure that the specified application rates are achieved. The additional quantities of mulch and binder shall be taken into account in the unit price tendered for this work, based on the site conditions.
  - .7 Take reasonable care to prevent application of overspray onto structures or unintended areas. Immediately remove any overspray applications on structures or areas not intended for coverage, in a method approved by the Departmental Representative.
  - .8 Maintenance:
    - .1 Maintain the mulched area under the maintenance requirements of this contract until the work has been accepted by the Owner ("Date of Substantial Completion") or until no longer required as determined by the Departmental Representative.
    - .2 Monitor and maintain the mulched area by repairing all damaged mulch and by re-mulching bare spots resulting from the wind, water or other causes. This will include adding additional mulch as required, using the procedures as specified herein.

### 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 Monitor all seeded areas during the maintenance period. Water grassed and seeded areas adequately to assure continued growth. Control watering to prevent washouts. Water will not be provided by the Owner.

- .2 Mow grass to height of 60 mm when it first reaches a height of 80 mm. Clippings which could smother grass shall be removed.
- .3 Do not cut when the site is so wet that mowing will cause ruts in the soil.
- .4 Fertilize grassed areas after first mowing using a turf starter type fertilizer, at the manufacturer's recommended rate.
- .5 Carry out subsequent cuttings of the seeded areas until the work has been accepted by the Owner "Date of Substantial Completion".
- .6 If, within eight (8) weeks of placement, any seeded areas fail to grow acceptable in the opinion of the Departmental Representative, they shall be re-seeded by the Contractor under the maintenance requirements of this Contract.

### 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 mown at least twice.
  - .3 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.
  - .2 Fertilize seeded 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.

**END OF SECTION**

PART 1: GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 91 19.13 : Topsoil and Finish Grading
- .2 Section 32 92 19.16 : Hydraulic Seeding

1.2 MEASUREMENT AND PAYMENT

- .1 Refer to Section 01 11 50 - Measurement and Payment.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
  - .1 Schedule sod laying to coincide with preparation of soil surface.
  - .2 Schedule sod installation when frost is not present in ground.

1.4 SUBMITTAL GENERAL REQUIREMENTS

- .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 sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Samples.
  - .1 Submit:
    - .1 Sod for each type specified.
      - .1 Install approved samples in 1 square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.
    - .2 Bio-degradable geotextile fabric.
    - .3 0.5 kg container of each type of fertilizer used.
  - .2 Obtain approval of samples by Departmental Representative.

- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.
- .5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of New Brunswick Horticultural Trades Association.

1.6 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with supplier's recommendations.
  - .2 Replace defective or damaged materials with new.

PART 2: PRODUCTS

2.1 MATERIALS

- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
  - .1 Turf Grass Nursery Sod types:
    - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
    - .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Cheeping Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and

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- 30% Chewing Fescue or Creeping Red Fescue cultivar[s].
  - .3 Number One Named Cultivars: Nursery Sod grown from certified seed.
  - .2 Turf Grass Nursery Sod quality:
    - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
    - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
    - .3 Mowing height limit: 35 to 65 mm.
    - .4 Soil portion of sod: 6 to 15 mm in thickness.
  - .2 Commercial Grade Turf Grass Nursery:
    - .1 Mow sod at height directed by Departmental Representative within 36 hours prior to lifting, and remove clippings.
    - .2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.
  - .3 Sod establishment support:
    - .1 Geotextile fabric: biodegradable
    - .2 Wooden pegs: [17 x 8 x 200] mm.
    - .3 Biodegradable starch pegs: [17 x 8 x 200] mm.
  - .4 Water:
    - .1 Supplied by Departmental Representative at designated source.
  - .5 Fertilizer:
    - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
    - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

## 2.2 SOURCE QUALITY CONTROL

- .1 Obtain written approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

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PART 3: EXECUTION

3.1 INSTALLERS

- .1 Use installers who are Member in Good Standing of New Brunswick Horticultural Trades Association.

3.2 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation 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.

3.3 PREPARATION

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading]. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 15 mm, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; in location as directed by Departmental Representative in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 SOD PLACEMENT

- .1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

- .2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .4 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.

### 3.5 SOD PLACEMENT ON SLOPES AND PEGGING

- .1 Do not use pegs within the Institution property unless prior approval is granted by Departmental Representative.
- .2 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- .3 Start laying sod at bottom of slopes.
- .4 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 following pattern:
  - .1 100 mm below top edge at 200 mm on centre 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. Adjust pattern as directed by Departmental Representative.
  - .4 Drive pegs to 20 mm above soil surface of sod sections.

### 3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 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 in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean and reinstate areas affected by Work.
  - .2 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.

.3 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

### 3.8 PROTECTION BARRIERS

- .1 Protect newly sodded areas from deterioration with as directed by Departmental Representative.
- .2 Remove protection after inspection as directed by [Departmental Representative.

### 3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following 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 to 100 mm.
  - .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
  - .3 Maintain sodded areas weed free 95%.
  - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.
  - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

### 3.10 ACCEPTANCE

- .1 Turf Grass 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.
  - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
  - .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.

- .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
- .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .5 Fertilizing in accordance with fertilizer program has been carried out at least once.
- .3 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.
- .5 Areas sodded in fall will be accepted in following spring one 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 warranty period:
  - .1 Water sodded areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
  - .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
  - .3 Cut grass and remove clippings that will smother grass, or as directed by Departmental Representative, to height as follows:
    - .1 Turf Grass Nursery Sod:
      - .1 50 mm during normal growing conditions.
    - .2 Commercial Grade Turf Grass Nursery Sod:
      - .1 60 mm during normal growing conditions.
    - .3 Cut grass at 2 week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.
    - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.
    - .5 Eliminate weeds by mechanical means to extent acceptable to Departmental Representative.

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PWGSC  
GROUND REMEDIATION  
DORCHESTER PENITENTIARY, NB  
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SODDING

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**END OF SECTION**

PART 1: GENERAL

1.1 WORK INCLUDED

- .1 This section specifies requirements for reinstatement of surfaces, property, and structures damaged or disturbed by operations under this Contract. Work includes but is not limited to reinstatement of paved, gravelled and grassed surfaces; sidewalks, curbs and gutters; and ditches and culverts except as stated herein.

1.2 RELATED SECTIONS

- .1 Section 31 00 00.01 : Earthwork and Related Work
- .2 Section 32 91 19.13 : Topsoil Placement and Grading
- .3 Section 32 92 19.16: Hydraulic Seeding
- .4 Section 33 05 16 : Manholes and Catchbasin Structures
- .5 Section 33 42 13 : Pipe Culverts

1.3 MEASUREMENT AND PAYMENT

- .1 There shall be no payment for reinstatement. Unless otherwise paid under a separate item in the Tender Form, reinstatement to pre-existing conditions or better shall be considered incidental to the Work. Grassed surfaces shall be reinstated in accordance with Sections 32 91 19.13 and 32 92 19.16.

PART 2: PRODUCTS

2.1 MATERIALS

- .1 Granular Base and Subbase to Section 32 11 16.01
- .2 Culverts to Section 33 42 13
- .3 Topsoil to Section 32 91 19.13
- .4 Hydraulic Seeding to Section 32 92 19.16

PART 3: EXECUTION

3.1 GENERAL

- .1 Reinststate all surfaces to lines, elevations, and dimensions which existed prior to construction and to match abutting surfaces.

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- .2 Make good all damage or disturbances to surfaces, survey markers, properties and structures disturbed during construction.
  - .3 Conduct and confine all construction operations within the limits of the work as shown on the Drawings or as laid out by the Departmental Representative.
  - .4 Fully restore the entire site and all properties, facilities, structures, fences, shrubs, lawns, trees, signs, driveways, sidewalks, ditches, culverts, appurtenances, etc. affected by the work to original or better condition before issuance of the "Certificate of Final Acceptance".

### 3.2 GRAVEL SURFACES

- .1 Place, spread, and fine grade Base type gravel to minimum compacted thickness of 150 mm for shoulders and other gravel surfaces. Compact to 100 % Standard Proctor Density.

### 3.3 ASPHALT CONCRETE SURFACES

- .1 Make vertical saw cut to full depth of asphalt concrete in straight lines. Cut back 300 mm minimum from edge of excavation or beyond to eliminate tension cracks.
- .2 Place or remove gravel to depth indicated.
- .3 Shape, fine grade and compact gravel surface to 100 % Standard Proctor Density.
- .4 Clean contact surfaces and apply tack coat prior to placing asphalt concrete.
- .5 Place and compact hot-mix, hot-placed asphalt concrete to Section 32 12 16, and to the following minimum thickness as indicated:
  - .1 Sidewalk: 50 mm.
  - .2 Other surfaces: 75 mm unless indicated otherwise on the drawings.

### 3.4 LANDSCAPED SURFACES

- .1 .1 Fine grade to smooth surface all areas to be reinstated.
- .2 Reinstated landscapes to Sections 32 91 19.13 and 32 92 19.16.

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.1 Fine grade to smooth surface all areas to be reinstated.

.2 Reinststate landscapes by placing 100 mm thick topsoil (after settlement) and hydroseeding to Section 32 92 19.16.

### 3.5 DITCHES

.1 Re-establish ditches to provide drainage that existed prior to construction.

### 3.6 CULVERTS

.1 Repair or replace all damaged culverts with new culvert of same material and to lines, elevations, and dimensions as original unless otherwise indicated.

### 3.7 CLEANING

.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.

**END OF SECTION**