

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 61 00 – Common Product Requirements.
- .2            Section 01 74 11 – Cleaning.
- .3            Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

**1.2                MEASUREMENT AND PAYMENT**

- .1            Work under this section shall be considered as incidental to the work.

**1.3                REFERENCES**

- .1            Not used.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Not used.

**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.

**Part 2            Products**

**2.1                MATERIALS**

- .1            Not used.

**Part 3            Execution**

**3.1                PAVEMENT SURFACE CLEANING**

- .1            Remove dust, contaminants, loose and foreign materials, oil and grease, in areas as directed by and by method approved by Departmental Representative. Use rotary power brooms and/or vacuum sweepers supplemented by hand brooming.

**3.2                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 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 61 00 – Common Product Requirements.
- .3        Section 01 74 11 – Cleaning.
- .4        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5        Section 31 05 16 – Aggregate Materials.
- .6        Section 31 24 13 – Roadway Embankments.
- .7        Section 32 11 23 – Aggregate Base Courses.

**1.2                MEASUREMENT AND PAYMENT**

- .1        Supply and installation of Granular Sub-Base (0-75 minus) shall be measured in tonnes and shall include haulage, spreading and compaction.
  - .1        Each truck driver shall be responsible for handing his tonnage slip to the Departmental Representative onsite immediately after his load has been dumped. Otherwise, this load shall not be measured for payment.
- .2        Supply and installation of Sandstone shall be measured in cubic metres in place as determined by Departmental Representative, and shall include haulage, spreading and compaction.
  - .1        No payment shall be made for the supply and installation of sandstone without prior authorization from Departmental Representative.
- .3        Excavation of sub-base and subgrade materials to correct deficiencies in subgrade caused by improper construction techniques or sequences (i.e.: compaction, handling of materials) shall not be measured for payment.
  - .1        Backfill of excavated area with materials approved by Departmental Representative, shall not be measured for payment.

**1.3                REFERENCES**

- .1        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 D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-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.
- .3 New Brunswick Department of Transportation Standard Specifications (January 2011).

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

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

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Sections 01 61 00 - Common Product Requirements and 31 05 16 – Aggregate Materials.
- .2 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Replace defective or damaged materials with new.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Granular sub-base material: Shall be 0-75 minus. Production, physical properties and gradations in accordance with Section 31 05 16 - Aggregate Materials and conforming to the latest NBDOT Standard Specification (January 2011) section 201.2.
- .2 Sandstone: Shall be type A1. Production, physical properties and gradation conforming to the latest NBDOT Standard Specification (January 2011) section 121.2.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under Section 31 24 13 – Roadway Embankments are acceptable for granular sub-base and sandstone 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 approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

- .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.
  - .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.

### **3.3 PLACING**

- .1 Place granular sub-base and sandstone after subgrade is inspected and approved by Departmental Representative.
  - .1 Sandstone shall be placed in areas where Undercut Excavation is required to correct defective subgrade.
- .2 Construct granular sub-base and sandstone to depth and grade in areas indicated and directed by Departmental Representative.
- .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 and sandstone materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 300 mm compacted thickness.
  - .1 Layer thickness shall not exceed 150 mm where mechanical tampers are used.
- .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.

### **3.4 COMPACTION**

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 97% maximum dry density in accordance with ASTM D1557.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base and sandstone.
- .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.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.5 PROOF ROLLING**

- .1 For proof rolling use a loaded double-axle tandem dump truck with a gross weight between 25,000 kg and 30,000 kg.
- .2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.
- .3 Proof roll at level in sub-base and sandstone as indicated. The Departmental Representative shall be presented during proof rolling activities, and shall determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to two separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective subgrade:
  - .1 Remove sub-base, sandstone and subgrade materials to depth and extent as directed by Departmental Representative.
  - .2 Backfill excavated subgrade with sandstone and compact to 95% maximum dry density in accordance with ASTM D1557.
  - .3 Replace sub-base material and compact.
- .6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

### **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 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **3.7 SITE TOLERANCES**

- .1 Finished sub-base surface to be within 25 mm of elevation as indicated but not uniformly high or low. Finished roadway crown to be within  $\pm 0.5\%$  of design crown.

**3.8 PROTECTION**

- .1 Maintain finished sub-base in condition conforming to this section until granular sub-base is accepted by Departmental Representative and subsequent construction of base as per Section 32 11 13 – Aggregate Base Courses.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 61 00 – Common Product Requirements.
- .3        Section 01 74 11 – Cleaning.
- .4        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5        Section 31 05 16 – Aggregate Materials.
- .6        Section 32 11 16.01 – Granular Sub-Base and Sandstone.

**1.2                MEASUREMENT AND PAYMENT**

- .1        Supply and installation of Granular Base (0-31.5 minus) shall be measured in tonnes and shall include haulage, spreading and compaction
  - .1        Each truck driver shall be responsible for handing his tonnage slip to the Departmental Representative onsite immediately after his load has been dumped. Otherwise, this load shall not be measured for payment.

**1.3                REFERENCES**

- .1        ASTM International
  - .1        ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm (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 D1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .5        ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .6        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.
- .3        New Brunswick Department of Transportation Standard Specifications (January 2011).

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

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

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**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 31 05 16 - Aggregate Materials.
- .2 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Granular Base material: Shall be 0-31.5 minus. Production, physical properties and gradation in accordance with Section 31 05 16 - Aggregate Materials and conforming to the latest NBDOT Standard Specification (January 2011) section 201.2.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Inspect, repair, and maintain erosion and sedimentation control measures during construction.
  - .2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.2 PLACEMENT AND INSTALLATION**

- .1 Place granular base after sub-base surface is inspected and approved by Departmental Representative in accordance with Section 32 11 16.01 – Granular Sub-Base and Sandstone.
- .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 150 mm compacted thickness.
  - .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 Compaction Equipment:

- .1 Ensure compaction equipment is capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 97% maximum dry density to ASTM D1557.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.3 SITE TOLERANCES**

- .1 Finished base surface to be within plus or minus 15 mm of established grade and cross section but not uniformly high or low. Roadway crown to be within  $\pm 0.5\%$  of design crown.

### **3.4 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 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Divert unused granular material from landfill to local quarry or facility approved by Departmental Representative.

### **3.5 PROTECTION**

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

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 61 00 – Common Product Requirements.
- .3        Section 01 74 11 – Cleaning.
- .4        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5        Section 32 01 11.01 – Pavement Cleaning and Marking Removal.
- .6        Section 32 12 16 – Asphalt Paving.

**1.2                MEASUREMENT PROCEDURES**

- .1        Supply and installation of asphalt tack coat shall not be measured for payment, but shall be considered as incidental to the work.

**1.3                REFERENCES**

- .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.
- .3        Canadian General Standards Board
  - .1        CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .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.

**1.5                QUALITY ASSURANCE**

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

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 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.

## **1.7 WASTE MANAGEMENT AND DISPOSAL**

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

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-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. Cleaned if previously used with incompatible asphalt material.

### **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 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.

#### **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 at rate, between 0.15 and 0.25 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 tack coat over all existing or newly constructed asphalt surfaces prior to constructing new asphalt surfaces.
- .6 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.
- .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 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 before placing asphalt pavement.
- .12 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.
- .3 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 45 00 – Quality Control.
- .3        Section 01 61 00 – Common Product Requirements.
- .4        Section 01 74 11 – Cleaning.
- .5        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .6        Section 31 05 16 – Aggregate Materials.
- .7        Section 32 01 11.01 – Pavement Cleaning and Marking Removal.
- .8        Section 32 11 23 – Aggregate Base Courses.
- .9        Section 32 12 13.16 – Asphalt Tack Coats.

**1.2                MEASUREMENT AND PAYMENT**

- .1        Supply and installation of asphalt concrete pavement shall be measured in tonnes of asphalt concrete incorporated into the work and shall include haulage, spreading and compaction.
- .2        Each truck driver shall be responsible for handing his tonnage slip to the Departmental Representative onsite immediately after his load has been dumped into the spreader. Otherwise, this load shall not be measured for payment.
- .3        Asphalt binder shall not be measured for payment.
- .4        The cutting of asphalt shall not be measured for payment, but is considered as incidental to the work.
- .5        No payment shall be made for correction of defective work.

**1.3                REFERENCES**

- .1        American Association of State Highway and Transportation Officials (AASHTO)
  - .1        AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
  - .2        AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
  - .3        AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

- .2 Asphalt Institute (AI)
  - .1 AI MS-2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types. ASTM International
- .3 ASTM International
  - .1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
  - .4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  - .5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - .6 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .7 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.
  - .8 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
  - .9 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
  - .10 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
- .5 New Brunswick Department of Transportation (NBDOT)
  - .1 NBDOT Standard Specifications (January 2011).

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .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.

- .4 Test and Evaluation Reports:
  - .1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.
  - .2 Submit manufacturer's test data and certification that hydrated lime meets specified requirements.
  - .3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 4 weeks prior to beginning Work.
    - .1 Asphalt concrete mix design must include attestation to the compliance of the aggregates with the requirements of this section.

## **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 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. 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.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Performance graded asphalt cement: to AASHTO M320, grade PG58-28 when tested to AASHTO R29.
  - .1 Design ESALS (million based on 20 years): 0.3 to < 3.
- .2 Aggregates: in accordance with Section 31 05 16 - Aggregate Materials, the NBDOT Standard Specifications (2011) items 261.2.1.2, 261.2.1.3 and 261.2.1.6 and requirements as follows:
  - .1 Crushed stone or gravel.
  - .2 Gradations: within limits as specified in the NBDOT Standard Specifications Document (January 2011) Table 261-1 when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
  - .3 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.
  - .4 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.
  - .5 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.

- .6 Do not use aggregates having known polishing characteristics in mixes for surface courses.
- .7 Micro-Deval: to NBDOT Standard Specifications document (January 2011) Table 261-1.
- .8 Absorption: to ASTM C127. Max % by mass:
  - .1 Coarse aggregate, surface course: 1.50 %.
  - .2 Coarse aggregate, lower course: 1.50 %.
- .9 Freeze-Thaw: to NBDOT Standard Specifications document (January 2011) Table 261-1.
- .10 Flat and elongated particles: to NBDOT Standard Specifications document (January 2011).
  - .1 Coarse aggregate, surface course: 15 %.
  - .2 Coarse aggregate, lower course: 20 %.
- .11 Crushed fragments: to NBDOT Standard Specifications document (January 2011) Table 261-1.
- .12 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .3 Anti-stripping agent: to NBDOT Standard Specifications document (January 2011) Item 261.2.1.
- .4 Water: to approval of Departmental Representative.

## **2.2 EQUIPMENT**

- .1 Pavers: mechanical self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated. Rollers: minimum of 3 per paver of type and weight to obtain specified density of compacted mix.
- .2 Compaction equipment:
  - .1 Vibratory roller.
  - .2 Pneumatic tire roller.
  - .3 Steel-drum tandem finish roller that are inaccessible to rollers.
- .3 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
  - .1 Boxes with tight metal bottoms.
  - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
  - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
  - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .4 Hand tools:
  - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
  - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible

to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.

- .3 Straight edges, 3 m in length, to test finished surface.

### **2.3 MIX DESIGN**

- .1 Mix design to be approved in writing by Departmental Representative.
- .2 Mix design to be developed by testing laboratory approved in writing by Departmental Representative.
- .3 Design of mix: to NBDOT Standard Specifications document (January 2011) Item 261.2.2.
  - .1 Design ESALS (million based on 20 years): 0.3 to < 3.
  - .2 Mix physical requirements: to NBDOT Standard Specifications document (January 2011) Table 261-1.
  - .3 Measure physical requirements as follows:
    - .1 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
    - .2 Air voids: to ASTM D3203.
  - .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be reviewed by Departmental Representative.
  - .5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

## **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.

### **3.2 PLANT AND MIXING REQUIREMENTS**

- .1 Batch and continuous mixing plants:
  - .1 To ASTM D995.
  - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.
    - .1 Do not load frozen materials into bins.
  - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.

- .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
- .5 Before mixing, dry aggregates to moisture content not greater than 0.5 % by mass or to lesser moisture content if required to meet mix design requirements. Heat to temperature required to meet mixing temperature.
- .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
- .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
- .8 Heat asphalt cement and aggregate to mixing temperature as specified by asphalt supplier. Do not heat asphalt cement above 160 degrees C.
- .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to review temperature of completed mix at plant and at paver after considering hauling and placing conditions.
- .10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.
- .11 Mixing time:
  - .1 In batch plants, both dry and wet mixing times as directed by Mix Design Engineer. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
  - .2 In continuous mixing plants, mixing time as directed by Mix Design Engineer but not less than 45s.
  - .3 Mixing time as directed by Mix Design Engineer.
- .2 Dryer drum mixing plant:
  - .1 To ASTM D995.
  - .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
  - .3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
  - .4 Meter total flow of aggregate using electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump to ensure proportions of aggregate and asphalt entering mixer remain constant.
  - .5 Allow for easy calibration of weighing systems for aggregates without having material enter mixer.
  - .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
    - .1 Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time.
    - .2 Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2 %.
  - .7 Make provision for conveniently sampling full flow of materials from cold feed.

- .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream.
  - .1 Control heating to prevent fracture of aggregate or excessive oxidation of asphalt.
  - .2 Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator.
  - .3 Submit printed record of mix temperatures at end of each day.
- .11 Ensure mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer is 2 % maximum.
- .3 Temporary storage of hot mix:
  - .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
  - .2 Do not store asphalt mix in storage bins in excess of 3 hour.
- .4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Mixing tolerances:
  - .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve	3.0%
0.075 mm sieve	0.8%
  - .2 Permissible variation of asphalt cement from job mix: 0.30%.
  - .3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

### 3.3 PREPARATION

- .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.
  - .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.
- .2 Reshape granular roadbed in accordance with Section 32 11 23 – Aggregate Base Courses.
- .3 When paving over existing asphalt surface, clean pavement surface in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

- .1 When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.
- .4 Apply tack coat in accordance with Section 32 12 13.16 - Asphalt Tack Coats prior to paving.
- .5 Prior to laying mix, clean surfaces of loose and foreign material.

### **3.4 TRANSPORTATION OF MIX**

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required.
  - .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light for night placing.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
  - .1 Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact.
  - .1 Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 115 degrees C, and no more than 160 degrees C.

### **3.5 TEST STRIP**

- .1 Construct and assess test strip to approval of Departmental Representative.
- .2 During construction of test strip, Departmental Representative will establish optimum rolling pattern by taking nuclear densimeter readings and observations to:
  - .1 Determine sequence and number of passes.
  - .2 Determine correct operating characteristics of vibratory rollers.
  - .3 Ensure smooth surface finish.

### **3.6 PLACING**

- .1 Obtain Departmental Representative's approval of base, existing surface and tack coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
- .3 Placing conditions:

- .1 Place asphalt mixtures only when air temperature is 5 degrees C minimum and rising.
- .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling. Placement of asphalt shall not be permitted when the temperature of the material to be overlaid is below 5 degrees C.
- .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as follows:
  - .1 Type B Asphalt : 65 mm.
  - .2 Type D Asphalt : 35 mm.
- .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
- .6 Place individual strips no longer than 500 m.
- .7 On airport runways and taxiways, aprons and parking lots commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.
- .8 Spread and strike off mixture with self propelled mechanical finisher.
  - .1 Construct longitudinal joints and edges true to line markings.
    - .1 Contractor to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
    - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.
      - .1 Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
    - .3 Maintain constant head of mix in auger chamber of paver during placing.
    - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
    - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
    - .6 Correct irregularities in surface of pavement course directly behind paver.
      - .1 Remove excess material forming high spots using shovel or lute.
        - .1 Fill and smooth indented areas with hot mix.
        - .2 Do not broadcast material over such areas.
    - .7 Do not throw surplus material on freshly screeded surfaces.
  - .9 When hand spreading is used:
    - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.
      - .1 Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

- .2 Distribute material uniformly without broad casting material.
- .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.
  - .1 Reject material that has formed into lumps and does not break down readily.
- .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
- .5 Provide heating equipment to keep hand tools free from asphalt.
  - .1 Control temperature to avoid burning material.
  - .2 Do not use tools at higher temperature than temperature of mix being placed.

### **3.7 COMPACTING**

- .1 Roll asphalt continuously using established rolling pattern for test strip.
- .2 Do not change rolling pattern unless mix changes or lift thickness changes.
  - .1 Change rolling pattern only as directed by Departmental Representative.
- .3 Roll asphalt continuously to density not less than 92.5 % of the laboratory Maximum Theoretical Density.
- .4 General:
  - .1 Provide at least 3 rollers and as many additional rollers as necessary to achieve specified pavement density.
  - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
  - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 8 km/h for finish rolling.
  - .4 Use static compaction for levelling coarse less than 25 mm thick.
  - .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 30 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
  - .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
  - .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
  - .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
  - .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
  - .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
    - .1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
- .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .5 Breakdown rolling:
  - .1 Begin breakdown rolling with vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
  - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
  - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
  - .4 Use only experienced roller operators.
- .6 Intermediate rolling:
  - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
  - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .7 Finish rolling:
  - .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks.
    - .1 If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
  - .2 Conduct rolling operations in close sequence.

### **3.8 JOINTS**

- .1 General:
  - .1 Remove surplus material from surface of previously laid strip.
    - .1 Do not deposit on surface of freshly laid strip.
  - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
  - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 1000 mm.
  - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
  - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:

- .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
  - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
    - .1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
  - .3 Overlap previously laid strip with spreader by 25 to 50 mm.
  - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
  - .5 Roll longitudinal joints directly behind paving operation.
  - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
- .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix.
    - .1 Place and compact joint to ensure joint is smooth and without visible breaks in grade.
    - .2 Locate feather joints as indicated.
  - .5 Construct butt joints as indicated.

### **3.9 FINISH TOLERANCES**

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 3 mm when checked with 3 m straight edge placed in any direction.

### **3.10 DEFECTIVE WORK**

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
  - .1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.
- .4 Asphalt density rejection limits:
  - .1 For each lift and type of asphalt, an overall average density of no less than 92.5% shall be achieved. A lift or type of asphalt with an overall average density of less than 92.5% shall be considered rejectable by the Departmental Representative.

- .2 For each lift and type of asphalt, individual density test results of no less than 89.5% shall be achieved. Individual density test results of less than 89.5% shall be considered rejectable by the Departmental Representative. The Departmental Representative shall determine the extent of the rejected asphalt.
- .3 Density shall be determined on cores taken in accordance with ASTM D5361, 100 mm diameter. Bulk densities will be determined in accordance with ASTM D2726.

### **3.11 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 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 61 00 – Common Product Requirements.
- .3        Section 01 74 11 – Cleaning.
- .4        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

**1.2                PRICE AND PAYMENT PROCEDURES**

- .1        Work under this section shall not be measured for payment, but shall be considered as incidental to the work.

**1.3                REFERENCES**

- .1        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-15.1-92 Calcium Chloride.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1        Supply calcium chloride in quantities and at times as directed by Departmental Representative.
  - .2        Deliver calcium chloride to site in moisture-proof bags. Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer.
- .3        Storage and Handling Requirements:
  - .1        Store bags of calcium chloride in weather-proof enclosures.

**Part 2            Products**

**2.1                MATERIALS**

- .1        Calcium chloride, Type I: to CAN/CGSB-15.1, flake or 35% aqueous solution.
- .2        Water: in accordance with Departmental Representative approval.

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**Part 3 Execution**

**3.1 PREPARATION**

- .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.

**3.2 APPLICATION**

- .1 Apply calcium chloride and/or water with equipment approved by Departmental Representative at rate of 1.3 L/m<sup>2</sup> for liquid and 0.65 kg/m<sup>2</sup> for flake when directed by Departmental Representative.
- .2 Apply water or aqueous calcium chloride with distributors equipped with means of shut-off and with spray system to ensure uniform application.

**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.
- .3 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Dispose of materials defined as hazardous or toxic at designated facilities.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 01 47 21 – Construction/Demolition Waste Management and Disposal.
- .4 Section 01 74 11 – Cleaning.
- .5 Section 03 30 00.01 – Cast-In-Place Concrete Short Form.
- .6 Section 31 05 16 – Aggregate Materials.
- .7 Section 31 24 13 – Roadway Embankments.
- .8 Section 32 11 16.01 – Granular Sub-Base and Sandstone.
- .9 Section 32 11 23 – Aggregate Base Courses.

**1.2 REFERENCES**

- .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 D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700 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-8.1-88M, Sieves, Testing, Woven Wire, Metric 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 MEASUREMENT AND PAYMENT**

- .1 Supply and installation of Concrete Sidewalk shall be measured in square metres installed.
- .2 The supply and installation of Barrier Curb shall be measured in linear metres installed.

- .3 Removal and disposal of existing concrete sidewalks and curbs shall not be measured for payment, but shall be considered as incidental to the work.
- .4 Common Excavation shall be measured for payment as per Section 31 24 13 – Roadway Embankments.
- .5 Supply and installation of Granular Sub-Base shall be measured for payment as per Section 32 11 16.01 – Granular Sub-Base and Sandstone.
- .6 Supply and installation of Granular Base shall be measured for payment as per Section 32 11 23 Aggregate Base Courses.

#### **1.4 SUBMITTALS**

- .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 an accredited testing laboratory 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.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse, recycling and disposal in accordance with Section 01 47 21 - Construction/Demolition Waste Management and Disposal.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Concrete mixes and materials: in accordance with Section 03 30 00.01 - Cast-in-Place Concrete Short Form.
- .2 Joint filler and Curing Compound: in accordance with Section 03 30 00.01 - Cast-in-Place Concrete Short Form.
- .3 Granular base: material to Section 31 05 16 - Aggregate Materials and Section 32 11 23 – Aggregate Base Courses.
- .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 Boiled linseed oil: to ASTM D260.
- .6 Kerosene: to CAN/CGSB-3.3.

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**Part 3 Execution**

**3.1 GRANULAR SUB-BASE AND GRANULAR BASE**

- .1 Obtain Departmental Representative approval of subgrade before placing granular sub-base and granular base.
- .2 Place granular sub-base and granular base materials to lines, widths, and depths as indicated.
- .3 Compact granular sub-base and granular base in maximum 150 mm layers to at least 97% of maximum density to ASTM D1557.

**3.2 CONCRETE**

- .1 Obtain Departmental Representative approval of granular base prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 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.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 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.

**3.3 TOLERANCES**

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

**3.4 EXPANSION AND CONTRACTION JOINTS**

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m for sidewalks (or match existing), at intervals of 3 m and at every manhole or catch basin cover for curbs and gutters.
- .2 Install expansion joints at intervals of 6 m.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

**3.5 ISOLATION JOINTS**

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.

- .3 Seal isolation joints with sealant approved by Departmental Representative.

### **3.6 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.

### **3.7 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 indicated or as directed by Departmental Representative.

### **3.8 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.

### **3.9 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**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 35 29 – Health and Safety Requirements.
- .3        Section 01 61 00 – Common Product Requirements.
- .4        Section 01 74 11 – Cleaning.
- .5        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .6        Section 32 01 11.01 – Pavement Cleaning and Marking Removal.

**1.2                MEASUREMENT FOR PAYMENT**

- .1        Supply and installation of Pavement Markings shall be measured as a lump sum item.
  - .1        Pavement markings shall be installed after the completion of type “B” asphalt placement for each phase, and again after the placement of type “D” asphalt over the entire parking lot area.

**1.3                REFERENCES**

- .1        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.
  - .2        CAN/CGSB 1.74-01, Alkyd Traffic Paint.
  - .3        CGSB1-GP-12C-68, Standard Paint Colours.
- .2        Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .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 one copy of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements.

**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: 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 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Paint:
  - .1 To CAN/CGSB 1.74-01, alkyd traffic paint.
  - .2 Color: to CGSB1-GP-12C, yellow 505-308, white 513-301, blue 502-304.
- .2 Thinner: to CAN/CGSB-1.5.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation.
  - .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

### **3.2 EQUIPMENT REQUIREMENTS**

- .1 Paint applicator: approved pressure type 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.
- .2 Applicator to be capable of applying marking components to produce an even and uniform film thickness at the required application rates specified, and apply markings of uniform cross-sections and clear-cut edges without running, spattering, over-spray, and to dimensions as indicated. Applicator shall include a wind screen or shroud suitable to prevent displacement of materials by wind.

### **3.3 APPLICATION**

- .1 Pavement pre-marking: to be laid out by Contractor and approved by Departmental Representative prior to paint application.

- .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 30 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .4 Do not thin paint unless approved by Departmental Representative.
- .5 Symbols and letters to dimensions indicated.
  - .1 Provide new barrier-free parking paint on new asphalt. New symbols to be international symbols (i.e. sizes, colors, etc.).
- .6 Paint lines: of uniform colour and density with sharp edges.
  - .1 Line width: 200 mm.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

### **3.4 TOLERANCE**

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings as directed by Departmental Representative.

### **3.5 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 Waste Management: separate waste materials for reuse, recycling and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **3.6 PROTECTION OF COMPLETED WORK**

- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

**END OF SECTION**

**Part 1            General**

**1.1                MATERIAL SUPPLIED BY DEPARTMENTAL REPRESENTATIVE /  
ENGINEER / CONSULTANT**

- .1            Topsoil will be imported as required.

**1.2                RELATED SECTIONS**

- .1            Section 01 33 00 – Submittal Procedures.
- .2            Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .3            Section 32 92 23 – Sodding.

**1.3                MEASUREMENT PROCEDURES**

- .1            Preparation of sub-grade for placing of topsoil shall not be measured for payment, but shall be considered as incidental to the Topsoil unit price.
- .2            Topsoil stripping shall not be measured for payment, but shall be considered as incidental to the work.
- .3            Supply and installation of Topsoil will be measured in square metres. Measurements will be taken by Departmental Representative.

**1.4                PAYMENT PROCEDURES**

- .1            Testing of topsoil: Owner will pay for cost of soils tests.

**1.5                REFERENCES**

- .1            Agriculture and Agri-Food Canada
  - .1            The Canadian System of Soil Classification, Third Edition, 1998, or latest.
- .2            Canadian Council of Ministers of the Environment
  - .1            PN1340-2005, Guidelines for Compost Quality.

**1.6                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 25:1), and contain no toxic or growth inhibiting contaminants.

## **1.7 SUBMITTALS**

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

## **1.8 QUALITY ASSURANCE**

- .1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

## **1.9 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

## **Part 2 Products**

### **2.1 TOPSOIL**

- .1 Topsoil for seeded areas, planting beds : 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 30 to 50 % sand, minimum 10 % clay, and contain 3 to 5 % 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 SOIL AMENDMENTS**

- .1 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 Fertilizer as recommended by soils tests for:
  - .1 Trees and shrubs.
  - .2 Lawn.
- .2 Limestone:
  - .1 Ground agricultural limestone containing minimum 85% of total carbonates.
  - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
  - .3 Limestone to be applied as recommended by soil test. Application rate will be determined by the Dept. of Agricultural based on Ph tests.
- .2 Sand: washed coarse silica sand, medium to coarse textured.
- .3 Organic matter: compost Category A in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

### **2.3 SOURCE QUALITY CONTROL**

- .1 Advise Departmental Representative of sources of 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, P, N, and K, and organic matter.
- .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 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.
- .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.

### **3.2 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 50 mm above surface.
  - .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 50 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 after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil as indicated to following minimum depths after settlement.
  - .1 150 mm for seeded areas.
  - .2 150 mm for sodded areas.
  - .3 450 mm for planting beds.
  - .4 As indicated for tree pits.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

### **3.4 SOIL AMENDMENTS**

- .1 For planting beds and turf: apply and thoroughly mix soil amendments into full specified depth of topsoil.

### **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.

### **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 off site.

**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                RELATED REQUIREMENTS**

- .1        Section 01 33 00 – Submittal Procedures.
- .2        Section 01 35 29 – Health and Safety Requirements.
- .3        Section 01 74 11 – Cleaning.
- .4        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5        Section 32 91 19.13 – Topsoil Placement and Grading.

**1.2                MEASUREMENT AND PAYMENT**

- .1        Supply and installation of Sodding will be measured in square metres. Measurements will be taken by Departmental Representative.

**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.
  - .3        Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .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, 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 - 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        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 the Canadian Nursery Landscaping Association (CNLA) and must be Canadian Horticultural Technician Certified.
  - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
  - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with 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. Turf Grass Nursery Sod types:
  - .1 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivar(s).
  - .2 Number One Named Cultivars: Nursery Sod grown from certified seed.
- .2 Turf Grass Nursery Sod quality:
  - .1 Not more than 2 broadleaf weed or 10 other weeds per 40 square meters.
  - .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 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 Wooden pegs: 17 x 8 x 200 mm.
- .4 Water:
  - .1 Supplied by Contractor.
- .5 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
  - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.
  - .3 Ratio: as per soils test recommendations for turf.

## **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.

## **Part 3 Execution**

### **3.1 INSTALLERS**

- .1 Use installers who are Member in Good Standing of the Canadian Nursery Landscaping Association (CNLA) and must be Canadian Horticultural Technician Certified.

### **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 8 mm, for Turf Grass Nursery Sod and plus or minus 15 mm for Commercial Grade Turf Grass Nursery, 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; off site in location as directed by Departmental Representative.

### **3.4 SOD PLACEMENT**

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 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.
- .3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

### **3.5 SOD PLACEMENT ON SLOPES AND PEGGING**

- .1 Start laying sod at bottom of slopes.
- .2 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.

### **3.6 FERTILIZING PROGRAM**

- .1 Fertilize during establishment and warranty periods as required:

### **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 Waste Management: separate waste materials for reuse, compost and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

### **3.8 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 and water in well.
  - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

### **3.9 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.

**3.10 MAINTENANCE DURING WARRANTY PERIOD**

- .1 No maintenance required by Contractor during warranty period. Proprietor is to maintain sodded areas once areas have been accepted by Departmental Representative as indicated in 3.9 – “Acceptance”.

**END OF SECTION**