

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 31 05 16 - Aggregate Materials.
- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
  - .5 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification - Highway Construction and Maintenance, (2011).

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

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

---

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Granular subbase material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
  - .1 Type 2 gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance, (2011).

## **PART 3 - EXECUTION**

### **3.1 PLACING**

- .1 Place granular sub-base after subgrade is to the satisfaction of the Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean, unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 300 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

### **3.2 COMPACTION**

- .1 Compaction equipment to be capable of obtaining required material densities.
  - .2 Compact to density of not less than 100% of Maximum Dry Density in accordance with ASTM D 698.
  - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
  - .4 Apply water as necessary during compaction to obtain specified density.
  - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.
-

- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.3 QUALITY CONTROL TESTING**

- .1 Inspection and testing shall be carried out by the Contractor.
  - .1 Minimum Test Frequency: 1 test per 250 m<sup>2</sup>/Lift.
- .2 Submit satisfactory compaction test results to Departmental Representative for review.
- .3 Contractor shall conduct and submit satisfactory compaction test results to Departmental Representative prior to placement of subsequent materials. Payment will not be considered for placement of sub-base unless satisfactory test results are submitted to Departmental Representative.

### **3.4 SITE TOLERANCES**

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

### **3.5 PROTECTION**

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is to the satisfaction of the Departmental Representative.

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Section 31 05 16 - Aggregate Materials.
- .4 Section 32 11 16.01 - Granular Sub-base.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-04, Standard Test Methods for Materials Finer Than 75-micron Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .5 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
  - .6 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-88, Sieves, Testing, Woven Wire, Metric.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification - Highway Construction and Maintenance, (2011).

### **1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Divert unused granular material from landfill to local facility to satisfaction of Departmental Representative.
-

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Granular base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
  - .1 Type 1 gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (2011).

## **PART 3 - EXECUTION**

### **3.1 SEQUENCE OF OPERATION**

- .1 Place granular base after sub-base surface is to the satisfaction of the Departmental Representative.
- .2 Placing
  - .1 Construct granular base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, free from snow and ice.
  - .4 Place material using methods which do not lead to segregation or degradation of aggregate.
  - .5 Place material to full width in uniform layers not exceeding 300 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
  - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .7 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compacting
  - .1 Compaction equipment to be capable of obtaining required material densities.
  - .2 Compact to density not less than 100% of Maximum Dry Density in accordance with ASTM D 698.
  - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .4 Apply water as necessary during compacting to obtain specified density.
  - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.
  - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.2 QUALITY CONTROL TESTING**

- .1 Inspection and testing shall be carried out by the Contractor.
-

- .1 Minimum Test Frequency: 1 test per 250 m<sup>2</sup>/Lift.
- .2 Submit satisfactory compaction test results to Departmental Representative for review.
- .3 Contractor shall conduct and submit satisfactory compaction test results to Departmental Representative prior to placement of subsequent materials. Payment will not be considered for placement of Base Course, unless satisfactory test results are submitted by Contractor.

### **3.3 SITE TOLERANCES**

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

### **3.4 PROTECTION**

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

---

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D 140-2009, Standard Practice for Sampling Bituminous Materials.
  - .2 ASTM D 244-09, Standard Test Methods and Practices for Emulsified Asphalts.
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specifications - Highway Construction and Maintenance, (2011).

### **1.3 SUBMITTALS**

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 As requested submit two (2) - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth jars, bottles made with plastic or plastic lined cans to Departmental Representative, at least two (2) weeks prior to beginning Work.
- .3 Sample asphalt tack coat material to: ASTM D 140.
- .4 As requested provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D 140.

### **1.4 QUALITY ASSURANCE**

- .1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.

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

- .1 Deliver, store and handle materials in accordance with ASTM D 140.
- .2 Provide, maintain and restore asphalt storage area.

### **1.6 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 asphalt from landfill to facility capable of recycling materials.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Emulsified asphalt: grade SS-1 to Division 4, Section 1 of NSTIR Standard Specifications - Highway Construction and Maintenance, (2011).
- .2 Water: clean, potable, free from foreign matter.

### **2.2 EQUIPMENT**

- .1 Pressure distributor to be:
  - .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 an allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
    - .4 Distributed in uniform spray without atomization at temperature required.
  - .2 Equipped with meter, registering metres of travel 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 an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
  - .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.
  - .8 Cleaned if previously used with incompatible asphalt material.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

- .1 Obtain Departmental Representative's approval of surface before applying asphalt tack coat.



- 
- .2 Apply asphalt tack coat only on clean and dry surface.
  - .3 Dilute asphalt emulsion with water at 1:1 ratio for application.
    - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
  - .4 Apply asphalt tack coat evenly to pavement surface at rate, between 0.35 and 0.5 L/m<sup>2</sup> but not to exceed 0.7 L/m<sup>2</sup>.
  - .5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
  - .6 Do not apply asphalt tack coat when air temperature is less than 10 degrees C or when rain is forecast within 2 hours of application.
  - .7 Apply asphalt tack coat only on unfrozen surface.
  - .8 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
  - .9 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
  - .10 Keep traffic off tacked areas until asphalt tack coat has set.
  - .11 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
  - .12 Permit asphalt tack coat to set before placing asphalt pavement.
  - .13 No more tack coat shall be applied than can be covered with asphalt concrete wearing surface in one day.

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 32 11 16.01 - Granular Sub-Base.
- .4 Section 32 11 23 - Aggregate Base Courses.
- .5 Section 32 12 13.16 - Asphalt Tack Coats.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specifications - Highway Construction and Maintenance, (2011).

### **1.3 SAMPLES**

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative, samples of material for sieve analysis at least 2 weeks before beginning Work.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
  - .3 Place materials defined as hazardous or toxic in designated containers.
  - .4 Divert unused aggregate materials from landfill to facility for reuse to satisfaction of Departmental Representative.
  - .5 Dispose of unused paint and paint thinner materials at official hazardous material collections site in accordance with applicable federal, municipal and provincial guidelines.
  - .6 Fold up metal banding, flatten and place in designated area for recycling.
-

- .7 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose a health or environmental hazard.
- .8 Divert unused asphalt from landfill to facility capable of recycling materials in accordance with applicable federal, municipal and provincial guidelines.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Granular subbase: to Section 32 11 16.01 - Granular Sub-Base.
- .2 Granular base: to Section 32 11 23 - Aggregate Base Courses.
- .3 Tack coat: to Section 32 12 13.16 - Asphalt Tack Coats.
- .4 Asphalt concrete : Type C mix and Type B mix to Division 4, Section 4 of NSTIR Standard Specification - Highway Construction and Maintenance, (2011).

## **PART 3 - EXECUTION**

### **3.1 FOUNDATIONS**

- .1 Foundations for standard duty asphalt pavement to comprise:
  - .1 300 mm compacted thickness of granular sub-base.
  - .2 150 mm compacted thickness of granular base.
- .2 Foundations for heavy duty asphalt pavement to comprise:
  - .1 450 mm compacted thickness of granular sub-base.
  - .2 150 mm compacted thickness of granular base.
- .3 Construction of granular foundations: to Section 32 11 16.01 - Granular Sub-Base and Section 32 11 23 - Aggregate Base Courses.
- .4 Compaction: compact each lift of granular material to 100% maximum dry density to ASTM D 698. Maximum lift thickness: 300 mm.

### **3.2 PAVEMENT THICKNESS**

- .1 Thicknesses for standard duty asphalt pavement to match existing thickness:
  - .1 Asphalt Type: Type C mix.

### **3.3 PAVEMENT CONSTRUCTION**

- .1 Construction of asphalt concrete: to Division 4, Section 4 of NSTIR Standard Specifications - Highway Construction and Maintenance, (2011).
-

### **3.4 QUALITY CONTROL TESTING**

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