

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 16 - Aggregate Materials.
- .2 Section 32 12 16.01 - Asphalt Paving - Short Form.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-13, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
  - .5 ASTM D 698-12e1, 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 1883-14, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-10e1, 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 Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification for Highway Construction and Maintenance (latest edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
  - .2 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
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#### 1.4 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.
  - .1 Store materials in accordance with erosion and sedimentation control plan and Section 31 05 16 - Aggregate Materials.
  - .2 Replace defective or damaged materials with new.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- .1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
  - .1 Type 2 Gravel, in accordance with Division 3, Section 2.4.0 of NSTIR's Standard Specifications for Highway Construction and Maintenance.

### PART 3 - EXECUTION

#### 3.1 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by 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. Lift thickness shall be compatible with the compaction equipment available.
  - .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.
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### 3.2        COMPACTION

- .1    Compaction equipment to be capable of obtaining required material densities.
- .2    Compact to density of not less than 100% 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 approved by Departmental Representative.
- .6    Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.3        SITE TOLERANCES

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

### 3.4        PROTECTION

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

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 16 - Aggregate Materials.
- .2 Section 32 12 16.01 - Asphalt Paving - Short Form.

1.2 REFERENCES

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  - .2 ASTM C 131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-12e1, 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 1883-14, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .6 ASTM D 4318-10e1, 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 Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification for Highway Construction and Maintenance (latest edition).

1.3 ACTION AND INFORMATIONAL SUBMITTAL

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 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.
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- .2 Storage and Handling Requirements:
  - .1 Store materials in accordance with erosion and sedimentation control plan and Section 31 05 16 - Aggregate Materials.
  - .2 Replace defective or damaged materials with new.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Aggregate Base Courses: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
  - .1 Granular Base: Type 1 Gravel, in accordance with Division 3, Section 2.4.0 of NSTIR's Standard Specifications for Highway Construction and Maintenance.
  - .2 Shoulder Granular: Type 1S Gravel, in accordance with Division 3, Section 2.4.0 of NSTIR's Standard Specifications for Highway Construction and Maintenance.

## PART 3 - EXECUTION

### 3.1 PLACEMENT AND INSTALLATION

- .1 Place granular base after (sub-base) or subgrade surface is inspected and approved by 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 Begin spreading base material on crown line or on high side of one-way slope.
    - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
    - .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
    - .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
    - .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
    - .9 Remove and replace that portion of layer in which material becomes segregated during spreading.
  - .3 Compaction Equipment:
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.1 Ensure compaction equipment is capable of obtaining required material densities.

.4 Compacting:

.1 Compact to density not less than 100% maximum dry density to ASTM D698.

.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 approved in writing by Departmental Representative.

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

3.2 SITE TOLERANCES

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

3.3 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.

3.4 PROTECTION

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

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 11 16.01 - Granular Sub-Base.
- .2 Section 32 11 23 - Aggregate Base Courses.
- .3 Section 32 17 23 - Pavement Markings.

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 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.5-M91 (March 1999), Low Flash Petroleum Spirits Thinner (Reaffirmation of December 1991).
  - .2 CAN/CGSB-1.74-2001, Alkyd Traffic Paint.
- .3 Asphalt Institute (AI)
  - .1 AI MS-2-2015, Mix Design for Asphalt Concrete and Other Hot-Mixes.
- .4 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specifications - Highway Construction and Maintenance, (latest edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, print product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

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.
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- .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: SS-1 to Division 4, Section 2.4.0 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).
  - .4 Asphalt cement: PG 58-25 to Division 4, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).
  - .5 Asphalt concrete : Division 4, Section 4 of NSTIR Standard Specification - Highway Construction and Maintenance, (latest edition).
    - .1 Surface Course: Type C-HF.
    - .2 Base Course: Type B-HF.
  - .6 Traffic paint: to Section 32 17 23 - Pavement Markings.
  - .7 Paint thinner: to Section 32 17 23 - Pavement Markings.
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### PART 3 - EXECUTION

#### 3.1 FOUNDATIONS

- .1 Foundations for asphalt pavement to comprise:
  - .1 250 mm compacted thickness of granular sub-base.
  - .2 150 mm compacted thickness of granular base.
- .2 Construction of granular foundations: to Section 32 11 16.01 - Granular Sub-Base and Section 32 11 23 - Aggregate Base Courses.

#### 3.2 PAVEMENT THICKNESS

- .1 Thicknesses for asphalt pavement:
  - .1 Base course: as indicated.
  - .2 Wear course: as indicated.

#### 3.3 PAVEMENT CONSTRUCTION

- .1 Construction of asphalt concrete: to Division 4, Section 4.5.0 of NSTIR Standard Specifications - Highway Construction and Maintenance, (latest edition).
- .2 Finished asphalt surfaces to be within 6 mm of design elevation, but not uniformly high or low.
- .3 The required compaction for the asphalt base and surface courses should be a minimum of 95% of the maximum theoretical density.

#### 3.4 QUALITY CONTROL TESTING

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

#### 3.5 TRAFFIC MARKINGS

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

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast-In-Place concrete.
- .3 Section 31 23 33.01 - Excavating, Trenching, and Backfilling.
- .4 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 117-13, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D 698-12e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-3.3-2014, Kerosene.
  - .2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .3 CAN/CGSB - 1.2-98 - Boiled Linseed Oil.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-09/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 SUBMITTALS

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

#### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 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 - Cast-In-Place Concrete.
    - .1 Aggregate for exposed aggregate concrete shall match existing.
  - .2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.
  - .3 Joint filler: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
  - .4 Granular Base: material to Section 32 11 23 - Aggregate Base Courses.
  - .5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.
  - .6 Fill material: to Section 31 23 33.01 - Excavating, Trenching and Backfilling and following requirements:
    - .1 Select Backfill Material.
  - .7 Boiled linseed oil: to CAN/CGSB - 1.2.
  - .8 Kerosene: to CAN/CGSB-3.3.
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### PART 3 - EXECUTION

#### 3.1 GRADE PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling and section 32 91 19.13 - Topsoil Placement and Grading.

#### 3.2 GRANULAR BASE

- .1 Obtain Departmental Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 200 mm layers to 100% of maximum density to ASTM D 698.

#### 3.3 CONCRETE

- .1 Obtain Departmental Representative's approval of granular base and reinforcing steel 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 match existing, including exposed aggregate sections.
  - .1 At minimum, broom finish to produce regular corrugations not exceeding 2 mm depth, by drawing broom in direction normal to center line.
- .4 Provide edging as indicated with 10 mm radius edging tool.

#### 3.4 TOLERANCES

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

#### 3.5 EXPANSION AND CONTRACTION JOINTS

- .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 3 m, except where closures require shorter spacing. The minimum acceptable spacing is 1 m.
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- .2 Install expansion joints where the concrete structure abuts a permanent structure, at construction joints. Expansion joints shall be installed at intervals of 6 m at a minimum.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

### 3.6 ISOLATION JOINTS

- .1 Install isolation joints along length adjacent to concrete curbs, catch basins, buildings, or other permanent structures.
- .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.

### 3.7 CURING

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

### 3.8 BACKFILL

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

### 3.9 LINSEED OIL TREATMENT

- .1 If concrete is placed late in the season, 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.
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- .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.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 32 12 16.01 - Asphalt Paving - Short Form.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.
  - .2 CAN/CGSB 1.74-01, Alkyde Traffic Paint.
- .2 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

1.3 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 two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Operations and Maintenance Data: submit information on materials relative to work of this Section for inclusion in operations and maintenance manual.
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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 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 off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Paint:
    - .1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.
    - .2 Paints: in accordance with MPI recommendation for surface conditions.
      - .1 Paints: maximum VOC limit 100 g/L to SCAQMD Rule 1113 to GS-11.
    - .3 Colour: to MPI listed, yellow, white, blue.
    - .4 Upon request, Departmental Representative will supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.
    - .5 Markings in pedestrian areas shall be comprised of anti-slip, textured traffic paint.
  - .2 Thinner: to MPI listed manufacturer.
  - .3 Glass reflective beads: type suitable for application to wet paint surface for light reflectance.
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### 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 in accordance with MPI instructions prior to pavement markings 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 mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.
- .2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

#### 3.3 APPLICATION

- .1 Pavement markings: Lay out pavement markings. Obtain approval of Departmental Representative prior to work proceeding.
  - .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 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.
  - .6 Paint lines: of uniform colour and density with sharp edges.
  - .7 Thoroughly clean distributor tank before refilling with paint of different colour.
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- .8 Apply glass beads at rate of 0.5 kg/l of painted area immediately after application of paint.

### 3.4 TOLERANCE

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.

### 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 and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### 3.6 PROTECTION OF COMPLETED WORK

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

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 32 92 23 - Sodding.

1.2 REFERENCES

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

1.3 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), and contain no toxic or growth inhibiting contaminates.
  - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A).

1.4 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.
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## 1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Waste to be removed off DND property and disposed of at an appropriate licensed facility.
- .2 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 Stockpiled Topsoil: Stripped topsoil from site is to be re-used with amendments as required. If insufficient quantity is available, Contractor to supply material as specified herein.
- .2 Imported Topsoil: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
  - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
  - .2 Contain no toxic elements or growth inhibiting materials.
  - .3 Finished surface free from:
    - .1 Debris and stones over 50 mm diameter.
    - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
  - .4 Consistence: friable when moist.

### 2.2 SOIL AMENDMENTS

- .1 Peatmoss:
    - .1 Derived from partially decomposed species of Sphagnum Mosses.
    - .2 Elastic and homogeneous, brown in colour.
    - .3 Free of wood and deleterious material which could prohibit growth.
    - .4 Shredded particle minimum size: 5 mm.
  - .2 Sand: washed coarse silica sand, medium to course 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.
  - .4 Limestone:
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- .1 Ground agricultural limestone.
- .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

- .5 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.

### 2.3 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Perform pH test to determine required treatment to bring pH value of soil to 5.5 - 7.0 level. Test stockpiled soil after it has been spread in place.
- .5 Testing of topsoil will be carried out by testing laboratory designated by the Contractor.
  - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
    - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
  - .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
  - .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
    - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
    - .2 Remove debris which protrudes more than 75 mm above surface.
    - .3 Dispose of removed material off site.
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- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

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

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

### 3.3 SOIL AMENDMENTS

- .1 Apply lime or other soil amendments at specific rate as determined by the soil sample test.
- .2 Mix soil amendment well into full depth of topsoil prior to fertilizer application.

### 3.4 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.

### 3.5 ACCEPTANCE

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

- .1 Dispose of materials except topsoil not required where directed by Departmental Representative off site.

3.7 CLEANING

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

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 32 91 19.13 - Topsoil Placement and Grading.

1.2 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.

1.3 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 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 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.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
    - .1 Landscape Contractor: to be a Member in Good Standing of Landscape Nova Scotia.
    - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
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.3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

#### 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 accordance with supplier's recommendations.
  - .2 Replace defective or damaged materials with new.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
    - .1 Turf Grass Nursery Sod types:
      - .1 Number One Kentucky Bluegrass Sod - 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 cultivars.
      - .2 Turf Grass Nursery Sod quality:
        - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square meters.
        - .2 Density of sod sufficient so that no soil is visible from height of 1500mm when mown to height of 50mm.
        - .3 Mowing height limit: 35 to 65mm.
        - .4 Soil portion of sod: 6 to 15mm.
        - .5 Broken, dry, discoloured pieces of sod will be rejected.
  - .2 Sod establishment support:
    - .1 Wooden pegs: 17 x 8 x 200 mm.
  - .3 Water:
    - .1 Free of impurities that would inhibit plant growth.
  - .4 Fertilizer:
-

- .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
- .2 Complete, synthetic, slow release with 35% of nitrogen content in water-insoluble form.

## 2.2 SOURCE QUALITY CONTROL

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

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- .1 Use installers who are Member in Good Standing of Landscape Nova Scotia.

### 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, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod, and to allow surface to drain naturally.
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- .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.

### 3.4 SOD PLACEMENT

- .1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.
- .2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .4 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

### 3.5 FERTILIZING PROGRAM

- .1 Fertilize during establishment and warranty periods to following program:
  - .1 Ratio for spring sodding: 1:2:2.
  - .2 Ratio for fall sodding: 1:4:4.
  - .3 Ratio for year one maintenance applications: May 3:0:0, July 3:1:3, September 1:2:3, or as recommended by an approved soils lab.

### 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 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.

### 3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of installation until acceptance.
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- .1 Water sodded areas in sufficient quantities immediately after laying 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.

### 3.8 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 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

### 3.9 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
  - .1 Water sodded Turf Grass Nursery Sod. Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
- .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
- .3 Cut grass and remove clippings that will smother grass to height as follows:
  - .1 Turf Grass Nursery Sod:
    - .1 50 mm during normal growing conditions.
    - .2 Cut grass at 2 week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

.3 Fertilize areas in accordance with fertilizing program.  
Spread half of required amount of fertilizer in one direction  
and remainder at right angles and water in well.

.4 Eliminate weeds by mechanical means to extent acceptable  
to Departmental Representative.