
Part 1 General

1.1 WORK INCLUDED

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

1.2 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 – Excavating, Trenching, Backfilling
- .2 Section 32 11 23 – Granular Base Course.

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 D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .7 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide the Departmental Representative with the following information before the commencement of the work and at any time during the construction at the request of the Departmental Representative (at no cost to PWGSC):
 - .1 Approved testing geotechnical firm to complete the following analyses and collect samples at the proposed site:
 - .1 Source of supply of aggregate
 - .2 Sieve analysis

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

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base material: in accordance with NBDTI Standard Specifications, latest edition, Item 201 and following requirements:
 - .1 Crushed rock.

- .1 Consisting of clean, hard, sound and durable particles free from soft or disintegrated pieces, mud, dirt, organic or other deleterious materials as described in Item 201 of the NBDTI Standard Specifications (latest edition).
- .2 Aggregate sub-base properties shall meet the requirements of Table 201-1 of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).
- .3 The crushed rock, when tested in accordance with the N.B. Department of Transportation and Infrastructure's method with standard laboratory sieves, will conform to Table 201-2 (Crushed Rock, 75 mm % Passing gradation), of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).
- .4 Other properties as noted in Clause 1.5.2.1.

2.2 SOURCE QUALITY CONTROL

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

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular sub-base installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Prior to the placing of granular sub-base, shape subgrade properly and compact so as to be firm and able to support the construction equipment without displacement.

- .2 Correct soft or yielding subgrade and make stable before sub-base construction proceeds.
- .3 Remove all ponded water from the area prior to placing any granular sub-base material.
- .4 Maintain sufficient crown at all times during construction to ensure ready runoff of surface water.
- .5 Where the gradation of the subgrade soil and the sub-base are such that mixing of the two materials may occur, place an approved geotextile fabric.

3.3 PLACING

- .1 Place granular sub-base after all required piping has been placed and subgrade is inspected and approved by Departmental Representative. Refer to Section 31 23 33.01 - Excavating, Trenching and Backfilling for further detail regarding placement of material.
- .2 Placing:
 - .1 Construct granular sub-base to depth and grade in areas indicated and dimensions as shown on the drawings or as directed by the Departmental Representative.
 - .1 Material placed wider or deeper than specified will not be measured for payment.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow or ice.
 - .4 Place granular sub-base materials using methods which do not lead to segregation or degradation.
 - .5 Shape sub-base by means of a blade grader (other than a tractor).
 - .6 Ruts formed by hauling or traffic will be dragged full at least once a day or as often as necessary to prevent cutting through the surface material.
 - .7 Place material to full width in uniform layers not exceeding 300 mm compacted thickness.
 - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .2 Maximum lift thickness to be determined in the field by a test strip, to ensure the maximum effectiveness and compatibility of the compaction equipment with respect to the material being placed for each piece of equipment and each material type. The test strip shall be conducted in the presence of the Departmental Representative and the approved testing company's inspector, and shall occur prior to the placement of any further material in the work.
 - .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .9 When sub-base material is placed over geotextile fabric, carefully place the first layer of sub-base material and spread with a dozer so there is no traffic on the geotextile until the first layer of 300 mm of sub-base has been spread and compacted.
 - .10 Remove and replace portion of layer in which material has become segregated during spreading.

3.4 **COMPACTION**

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

3.5 **PROOF ROLLING**

- .1 For proof rolling use a fully loaded tandem truck. Make sufficient passes of proof rolling equipment to subject every point on surface to at least one pass of loaded tire and confirm no greater than 25 mm deflection occurs. Perform proof rolling in the presence of Departmental Representative.
- .2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.
- .3 Proof roll at level in sub-base as indicated.
 - .1 If non standard proof rolling equipment is approved, Departmental Representative will determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective subgrade:
 - .1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
 - .2 Backfill excavated subgrade with sub-base material and compact in accordance with this section.
 - .3 Replace sub-base material and compact.
- .6 Where proof rolling reveals areas of defective sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace in accordance with this section at no extra cost.
- .7 Maintain the finished aggregate base conditions until asphalt concrete is applied.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.7 SITE TOLERANCES

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

3.8 PROTECTION

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

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

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

1.2 RELATED SECTIONS

- .1 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C 117-13, Standard Test Methods for Materials Finer Than 75-micron Sieve in Mineral Aggregates by Washing.
 - .2 ASTM D 6928-17, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro Deval Apparatus.
 - .3 ASTM C 136-06, Standard Test method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/mn).
 - .5 ASTM D 1883-16, 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-8.2-M88, Sieves, Testing, Woven Wire, Metric.

Part 2 Products

2.1 MATERIALS

- .1 Granular base: material in accordance with NBDTI Standard Specifications, latest edition, Item 201 and following requirements:
 - .1 Crushed stone:
 - .1 To consist of clean, hard, sound and durable particles free from soft or disintegrated pieces, mud, dirt, organic or other deleterious materials as described in Item 201 of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).
 - .2 Aggregate base properties: to Table 201-1 of the N.B. Department of Transportation and Infrastructure Standard Specifications (January 2011).

- .3 Under no circumstances will Pit Run material will be accepted as aggregate base.
- .4 The crushed rock, when tested in accordance with the N.B. Department of Transportation and Infrastructure's method with standard laboratory sieves, will conform to Table 201-2 (Crushed Rock, 31.5 mm % Passing gradation) of the N.B. Department of Transportation and Infrastructure Standard Specifications (latest edition).

Part 3 Execution

3.1 PLACING

- .1 Place granular base after all substrate material has been inspected and approved by Departmental Representative.
- .2 Placing:
 - .1 Construct granular base to depth and grade in areas indicated and dimensions as shown on the drawings or as directed by the Departmental Representative.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow or ice.
 - .4 Place granular base materials using methods which do not lead to segregation or degradation.
 - .5 Shape base by means of a blade grader (other than a tractor).
 - .6 Ruts formed by hauling or traffic will be dragged full at least once a day or as often as necessary to prevent cutting through the surface material.
 - .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .2 Maximum lift thickness to be determined in the field by a test strip, to ensure the maximum effectiveness and compatibility of the compaction equipment with respect to the material being placed for each piece of equipment and each material type. The test strip shall be conducted in the presence of the Departmental Representative and the approved testing company's inspector, and shall occur prior to the placement of any further material in the work.
 - .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .9 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 % maximum dry density in accordance with ASTM D698.

- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
 - .1 Make water truck(s) available to apply water for compaction purposes as required, incidental to the work.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .7 Compact each layer thoroughly over its entire width before placing the next layer.
 - .1 Operate sufficient compaction equipment at all times to thoroughly compact the material at the rate at which it is being placed.

3.3 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 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 accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 This section specifies requirements for supplying, producing and placing asphalt pavement to lines, grades and typical cross-sections as indicated on drawings or directed by the Departmental Representative.

1.2 RELATED SECTIONS

- .1 Section 32 11 16.01 – Granular Sub-base.
- .2 Section 32 11 23 – Granular Base Course.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).

1.4 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 3 weeks before beginning Work.

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base: to Section 32 11 16.01 – Granular Subbase
- .2 Granular base: to Section 32 11 23 – Granular Base Course
- .3 Asphalt cement: PG 52-40
- .4 Asphalt concrete: dense graded hot laid plant mix conforming to the requirements of the NBDTI Standard Specifications, Section 260.2.3 for Type “C” Base/ Surface Course, type to be used shall be in accordance with the Contract Drawings

Part 3 Execution

3.1 FOUNDATIONS

- .1 Foundations for asphalt pavement for roadway reinstatement:
 - .1 450 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 – Granular Base Course.
- .3 Compaction: Compact each lift of granular material to 100% maximum dry density to ASTM D 698.

3.2 PAVEMENT THICKNESS

- .1 Roadway
 - .1 Thicknesses for asphalt pavement:
 - .1 Type C Course: 85 mm (blend to existing)

3.3 PAVEMENT CONSTRUCTION

- .1 Finished asphalt surfaces to be within 6 mm of design elevation, but no uniformly high or low.

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.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 This section specifies requirements for maintaining dust control during the construction period of the contract.

1.2 RELATED SECTIONS

- .1 Section 32 11 16.01 - Granular Subbase
- .2 Section 32 11 23 - Granular Base Course

1.3 REFERENCES

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

1.4 DELIVERY STORAGE AND HANDLING

- .1 Dust control shall be performed as directed by the Departmental Representative.
- .2 Supply water or calcium chloride in quantities and at times as directed by Departmental Representative.
- .3 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.
- .4 Store bags of calcium chloride in weather- proof enclosures.
- .5 Supply calcium chloride as 35% aqueous solution.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

- .1 Calcium chloride, Type I: to CAN/CGSB-15.1, flake or 35% aqueous solution.

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- .2 Water: to Departmental Representative's approval.

Part 3 Execution

3.1 APPLICATION

- .1 Apply water at a rate as necessary for the site conditions.
- .2 Apply calcium chloride and water with equipment approved by Departmental Representative at rate of 300 g/sq.m.
- .3 Apply water or aqueous calcium chloride with distributors equipped with means of shut-off and with spray system to ensure uniform application.
- .4 Do not pump water from watercourses for dust control use unless approved by the Departmental Representative.

END OF SECTION

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 – Granular Base Course

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117- 13, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600 kN-m/m³).
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-04/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Standard Contract Specifications.
- .2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing work.

Part 2 Products

2.1 MATERIALS

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Curing Compound: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Granular base: material to Section 32 11 23 - Granular Base Course.

Part 3 Execution

3.1 GRADE PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.

.1 Dispose of surplus and unsuitable excavated material off site.

3.2 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 on drawings.
- .3 Compact granular base in maximum 150 mm layers to at least 95% of maximum density to ASTM D698.

3.3 CONCRETE

- .1 Obtain Departmental Representative's approval of granular base prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.4 TOLERANCES

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

3.5 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.

3.6 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.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Standard Contract Specifications.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.74-01, Alkyde Traffic Paint.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.2 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.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance 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 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: in accordance with NBDTI Standard Specifications, latest edition, Item 571 and the following requirements:
 - .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.
 - .3 Colour: As shown on drawings.
- .2 Thinner: to MPI listed manufacturer.

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 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.

3.3 APPLICATION

- .1 Pavement markings: laid out by Departmental Representative.
- .2 Apply paint in accordance with NBDTI Standard Specifications, latest edition, Item 571.
- .3 Do not thin paint unless approved by Departmental Representative.
- .4 Paint lines: of uniform colour and density with sharp edges.
- .5 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 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

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 WORK INCLUDED

- .1 This Section includes the supply of all labour, equipment and materials for topsoiling of property for the purposes of establishing or restoring ground cover.

1.2 RELATED SECTIONS

- .1 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

1.3 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.

1.4 SUBMITTALS

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

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .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 Contractor to make use of existing topsoil stripped from site and:
 - .1 Contain no toxic elements or growth inhibiting materials.
 - .2 Topsoil shall be produced from salvaged stripping material, stockpiled from other work on site. Screening is required to remove any objectionable material.
 - .3 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.

- .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
- .4 Consistence: friable when moist.
- .5 Contractor is to have the existing topsoil inspected by an approved landscape company to ensure topsoil is suitable for reuse. Contractor is to incorporate soil amendments to meet the requirements specified within these documents.

2.2 SOIL AMENDMENTS

- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - .5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .6 Ph value: 6.5 to 8.0.
- .2 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.
- .3 Sand: washed coarse silica sand, medium to course textured.
- .4 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.
- .5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .6 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
- .7 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 additional topsoil to be utilized with sufficient lead time for testing. All topsoil salvaged from site is to be utilized prior to importing any additional topsoil to complete the work described herein.
- .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 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 Refer to Section 01 35 43 - Environmental Protection for further details regarding erosion and sedimentation control.

3.2 STRIPPING OF TOPSOIL

- .1 Strip and stockpile topsoil as directed by the Departmental Representative.

3.3 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products as per Section 01 35 43 – Environmental Protection.
 - .2 Remove debris which protrudes more than 75 mm above surface.
 - .3 Dispose of removed material off site.
- .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.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.

- .2 Spread topsoil in uniform layers not exceeding 100 mm or as indicated on the drawings.
- .3 Spread topsoil to following minimum depths after settlement.
 - .1 100 mm for seeded areas.
- .4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 FINISH GRADING

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

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 excess material in the approved grubbing disposal areas.

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

General

1.1 WORK INCLUDED

- .1 The work of this division includes, but is not necessarily limited to, the supplying of all labour, materials, tools and equipment to carry out the following:
 - .1 Hydraulic seeding of topsoil, ditches and existing soil disturbed areas as per the drawings.

1.2 RELATED SECTIONS

- .1 Section 32 91 19.13 – Topsoil Placement and Grading
- .2 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.3 PRODUCT DATA

- .1 Provide product data for:
 - .1 Seed.
 - .2 Mulch.
 - .3 Tackifier.
 - .4 Fertilizer.
- .2 Submit in writing to the Departmental Representative 10 days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in litres.
 - .2 Amount of material to be used per tank based on volume.
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.4 SCHEDULING

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

Part 2 Products

2.1 MATERIALS

- .1 Seed: in accordance with Government of Canada Seeds Act and Regulations.
 - .1 Mixture composition:
 - .1 Kentucky Blue grass: 50%
 - .2 Creeping Red Fescue (Turf Type): 30%
 - .3 Annual Ryegrass: 20%
 - .4 Seed Coating: 245 kg/ha

- .2 Mulch: specifically manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with the following properties:
 - .1 Type I mulch:
 - .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 95% plus or minus 0.5%.
 - .3 Value of pH: 6.0.
 - .4 Potential water absorption: 900%.
 - .2 Type II mulch:
 - .1 Made from newsprint, raw cotton fibre and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm minimum. Greater proportions of ingredients to be straw.
- .3 Hydraulic mulch mix shall be applied at a rate of 500 kg/ha.
- .4 Water: free of impurities that would inhibit germination and growth.
- .5 Fertilizer shall be 15-25-15 (N-P-K) mix applied at a rate of 375 kg/ha.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guiderails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of the Departmental Representative.
- .3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

- .1 Fine grass areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
- .2 Ensure areas to be seeded are moist to depth of 100 mm before seeding.
- .3 Obtain the Departmental Representative's approval of grade and topsoil depth before starting to seed.

3.3 PREPARATION OF SLURRY

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to the Departmental Representative. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After all other material is in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.4 SLURRY APPLICATION

- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
 - .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
 - .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
- .2 Slurry mixture applied per hectare:
 - .1 Seed: 200 kg.
 - .2 Mulch: Type I or II: 500 kg.
 - .3 Tackifier: Per manufacturer's specifications
 - .4 Fertilizer: 375 kg.
- .3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
 - .1 Using correct nozzle for application.
 - .2 Using hoses for surfaces difficult to reach and to control application.
- .4 Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.
- .5 Re-apply where application is not uniform.
- .6 Remove slurry from items and areas not designated to be sprayed.
- .7 Protect seeded areas from trespass satisfactory to the Departmental Representative.
- .8 Remove protection devices as directed by the Departmental Representative.

3.5 ACCEPTANCE

- .1 Seeded areas will be accepted by the Departmental Representative provided that:
 - .1 Seeded areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas demonstrate growth beyond 70 mm in height with no bare spots, weeds, etc.
 - .3 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.
- .3 The Contractor will be responsible for all over spraying of Hydraulic seeding and will clean up any excess that has been sprayed.

END OF SECTION