
1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 17 - Aggregate Materials.
- .2 Section 32 11 23 - Granular Base Course.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM).
 - .1 ASTM C117-95, Standard Test Methods for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).
 - .5 ASTM D4318-00, 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.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

2 Products

2.1 MATERIALS

- .1 Granular subbase material: in accordance with Section 31 05 17 - Aggregate Materials and following requirements:
 - .1 Crushed rock, screened pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

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.3 Table:

<u>Sieve Size</u>	<u>% Passing</u>
100 mm	100
90 mm	95 - 100
75 mm	80 - 100
50 mm	60 - 87
37.5 mm	50 - 81
19 mm	34 - 68
9.5 mm	25 - 58
4.75 mm	17 - 48
2.36 mm	13 - 39
1.18 mm	9 - 30
0.300 mm	4 - 17
0.075 mm	0 - 7

.4 Other properties as follows:

- .1 Liquid Limit: to ASTM D4318, Maximum 20.
- .2 Plasticity Index: to ASTM D4318, Maximum 5. Micro-Deval: to MTO LS-618, Maximum 30% loss.
- .3 Freeze/Thaw: to MTO LS-614, Maximum 20%.

3 Execution

3.1 PLACING

- .1 Place granular subbase after subgrade is inspected and approved by the Departmental Representative.
- .2 Construct granular subbase 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 Begin spreading subbase material on crown line or high side of one-way slope.
- .6 Place granular subbase materials using methods which do not lead to segregation or degradation. Place material to full width in uniform layers not exceeding 300 mm uncompacted thickness.
- .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. Compact to density of not less than 98% maximum dry density in accordance with ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted subbase.
- .3 Apply water as necessary during compaction to obtain specified density.

- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

- .1 Finished subbase surface to be within 25 mm of elevation as indicated but not uniformly high or low.

3.4 PROTECTION

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

END OF SECTION

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1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 17 - Aggregate Materials.
- .2 Section 32 11 19 - Granular Subbase.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM).
 - .1 ASTM C117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 (1998), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m^{3 - .5 ASTM D4318-00, 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.

1.3 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

1.4 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials.

2 Products

2.1 MATERIALS

- .1 Granular base: material in accordance with Section 31 05 17 - Aggregate Materials and following requirements:
 - .1 Crushed stone or gravel.

- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

- .3 Table.

<u>Sieve Size</u>	<u>% Passing</u>
37.5 mm	100
31.5 mm	95 - 100
25.0 mm	83 - 100
19.0 mm	70 - 90
12.5 mm	55 - 78
9.5 mm	45 - 72
4.75 mm	30 - 57
2.36 mm	20 - 46
1.18 mm	14 - 35
0.300 mm	5 - 19
0.075 mm	0 - 6

- .3 Other properties as follows:

- .1 Liquid Limit: to ASTM D4318, Maximum 20.
 .2 Plasticity Index: to ASTM D4318, Maximum 3. Micro-Deval: to MTO LS-618, Maximum 25% loss.
 .3 Freeze/Thaw: to MTO LS-614, Maximum 20%.
 .4 Gravel Base shall have a minimum of 40% of the particles, by mass, having at least one fractured face, when tested in accordance with ASTM D5821.

3 Execution

3.1 SEQUENCE OF OPERATION

- .1 Place granular base after subbase surface is inspected and approved by 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 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 Place material to full width in uniform layers not exceeding 300 mm uncompacted thickness.
 .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 .8 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment.
- .1 Compaction equipment to be capable of obtaining required material densities.

- .4 Compacting.
 - .1 Compact to density not less than 98% of maximum dry density in accordance with 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 by the 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 subbase surface to be within 19 mm of elevation as indicated but not uniformly high or low.

3.3 PROTECTION

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

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

- .1 ASTM C136-96a, Sieve Analysis of Fine and Coarse Aggregates.
- .2 ASTM D995-95b, Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .3 ASTM D1559-89, Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
- .4 ASTM D3203-94, Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

1.2 SOURCE SAMPLING

- .1 Inform Departmental Representative of proposed source of asphaltic concrete, and provide access for sampling at least two (2) weeks prior to commencing hauling this material to plant site.

1.3 PRODUCTION SAMPLING

- .1 Use only material approved by Departmental Representative.
- .2 One or more samples per day are to be taken of mix, or components thereof, being produced to determine compliance with general and special requirements.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
 - .3 For products not identified on list, source products with highest recycled content available when practical.
 - .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

- .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- 2 Products
- 2.1 MATERIALS
 - .1 Hot Mix Asphaltic Concrete design mix formula to be provided to Departmental Representative two (2) weeks prior to commencing paving operations. Submit design mix for review providing at least the following information:
 - .1 Nominal aggregate size.
 - .2 Marshall strength at 60°C.
 - .3 Marshall stability at 60°C.
 - .4 Flow Index.
 - .5 Percent Air Voids in Mixture.
 - .6 Min. % Voids in Mineral Aggregate.
 - .7 Retained Stability.
 - .2 Departmental Representative may approve use of current grading requirements of New Brunswick Department of Transportation Standard Specification for Pavement mixture.
 - .3 Do not change job mix without prior approval of Departmental Representative. Should a change in a material source be contemplated, a new job mix formula to be provided to Departmental Representative and approved prior to installation.
- 3 Execution
- 3.1 EQUIPMENT
 - .1 Pavers: Provide mechanical grade controlled self-powered pavers capable of spreading mix, within specified tolerances, true to line, grade, and crown indicated on plans.
 - .2 Rollers: Provide sufficient number of rollers of type and weight to obtain specified density of compacted mix.
 - .3 Haul Trucks: Provide trucks of such size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and mass to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each box.
 - .4 Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.
 - .4 Hand Tools.
 - .1 Provide lutes or rakes with covered teeth during spreading operation when finishing by hand.
 - .2 Provide straight edges, 2.4 m in length to test finished surface.
 - .3 Provide tamping irons having weight not less than 12 kg and a bearing area not exceeding 310 sq. cm for consolidating material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, approved by Departmental Representative, may be used instead of tamping irons.

3.2 PREPARATION

- .1 When paving over existing asphalt surface, clean pavement surface to remove dust, contaminants, loose and foreign materials, oil and grease.
- .2 Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material which may affect mix.
- .2 Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as often as required. After this operation, elevate truck bed and thoroughly drain; no excess solution is permitted.

3.4 PLACING

- .1 General.
 - .1 Place asphalt mixtures only when base of lower course is dry and air temperature is above 5°C.
 - .2 When surface temperature on which material is to be placed falls below 10°C, provide extra rollers to compact mix before it cools too much to obtain required density.
 - .3 Do not mix and place hot-mix asphalt when moisture of aggregate in stockpile or from dryer interferes with quality of mix production or with normal plant operations, or when pools of water are observed on surface to be paved.
 - .4 Construct asphalt concrete to design depth, width, and grade.
 - .5 Place asphalt concrete mix at temperature not less than 120°C at time of placing.
 - .6 Place asphalt concrete mix in 2 mm thick layers.
 - .7 Commence spreading at high side of pavement or at crown.
 - .8 Employ experienced rakers to correct irregularities prior to rolling.
 - .9 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges to true line markings.
 - .2 When paving against a compacted mixture that has cooled, paint edge of previously laid lane with a thin coating of asphaltic material or heat joint with an Infra Red-type joint heater mounted on side of paving machine.
 - .3 When segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .4 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .5 Correct irregularities in surface of pavement course directly behind paver.
- .2 When hand spreading is used.
 - .1 Distribute material uniformly. Broadcasting of material will not be permitted.
 - .2 Provide heating equipment used for keeping hand tools free from asphalt. Prevent high heating temperatures which may burn material. Temperature of tools when used shall not be greater than temperature of mix being placed.

3.5 COMPACTING

- .1 Start rolling operations as soon as placed mixture can bear mass of roller without undue displacement of material or cracking of surface.
- .2 Operate roller slowly initially to avoid displacement of material. subsequent rolling not to exceed 5 km/h for steel-wheeled rollers and 8 km/h for pneumatic-tired rollers.

- .3 Overlap successive trips of roller by at least one half width of roller and alternate trip lengths.
- .4 Keep wheels of roller slightly moistened with water to prevent pick-up of material, but do not over water.
- .5 Roll material continuously to a density not less than 98% of density obtained with Marshall specimen prepared from plant mix.
- .6 General.
 - .1 Provide a minimum of two rollers, paver, and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be a pneumatic-tired type.
 - .2 Operate rollers at a slow but uniform speed with drive roll or wheel nearest paver.
 - .3 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling. Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .7 Breakdown Rolling.
 - .1 Commence breakdown rolling immediately following rolling of longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
 - .4 Use only experienced roller operators for this work.
- .8 Second Rolling.
 - .1 Use pneumatic-tired, tandem or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix is still of a temperature that will result in maximum density from this operation.
 - .2 Rolling shall be continuous after initial rolling until mix placed has been thoroughly compacted.
- .9 Finish Rolling.
 - .1 Accomplish finish rolling with two-axle tandems or three-axle tandems while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, Departmental Representative shall specify use of pneumatic-tired rollers.
 - .2 Conduct rolling operations in close sequence.

3.6 JOINTS

- .1 General.
 - .1 Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
 - .2 Paint joint face with thin coat of hot asphalt cement or cut back asphalt or preheat joint face with approved heater, prior to placing of fresh mixture.
 - .3 Overlap previously laid strip with spreader by 100 mm.
 - .4 Rake fresh mixture against joint and thoroughly tamp and roll.
 - .5 Remove any material from surface of previously laid strip.
 - .6 Do not throw surplus material on freshly screened mat surface.

- .2 Longitudinal Joints.
 - .1 Roll longitudinal joints directly behind paving operation.
 - .2 Before rolling, carefully remove with a lute or rake, and discard coarse aggregate in material overlapping joint.
 - .3 Ensure joints are offset at least 150 to 200 mm from those *in* lower layers.

3.7 FINISH TOLERANCES

- .1 Finish pavement surfaces smooth and true to design line, crown, and grade.
- .2 Remove irregularities exceeding 5 mm when checked with a 2.4 m long straight edge placed in any direction and replace with new material and compact.
- .3 Use straight edge at transverse joints and along pavement to check for surface irregularities.

3.8 DEFECTIVE WORK

- .1 Repair areas showing checking or hairline cracking to the approval of the Departmental Representative.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 10 01 - General Requirements.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM C117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.
 - .4 ASTM D698-00ae1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.
 - .2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .3 Canadian Standards Association (CSA International).
 - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 10 01 - General Requirements.
- .2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least four (4) weeks prior to commencing work.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Separate waste materials for recycling in accordance with Section 01 10 01 - General Requirements.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
 - .3 For products not identified on list, source products with highest recycled content available when practical.

- .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
 - .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
 - .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- 2 Products
- 2.1 MATERIALS
- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
 - .2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.
 - .3 Granular base:
 - .1 Crushed stone or gravel as indicated.
 - .4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.
- 3 Execution
- 3.1 GRADE PREPARATION
- .1 Do grade preparation work in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.
- 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 150 mm layers to at least 95% of maximum density to ASTM D698.

3.3 CONCRETE

- .1 Obtain Departmental Representative approval of granular base prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 10 mm radius edging tool.
- .5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

3.4 TOLERANCES

- .1 Finish surfaces to within 3 mm in 3 m as measured with 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 1.5 m.
- .2 Install expansion joints as indicated.
- .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 permanent structure.
- .2 Install joint filler in isolation joints as indicated.

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 one (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 seven (7) days prior to backfilling.
- .2 Backfill to designated elevations with material as directed by Departmental Representative.

3.9 LINSEED OIL TREATMENT

- .1 Apply two coats of linseed oil mixture uniformly to surfaces of curbs, walks and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.
- .2 Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.
- .3 Apply treatment when air temperature above 10°C.
- .4 Apply first coat at 135 mL/m².
- .5 Apply second coat at 90 mL/m² when first coat has dried.

3.10 CLEANING

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

END OF SECTION

1 General

1.1 REFERENCES

- .1 All references to these Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.
- .2 CGSB1-GP-12c, Standard Paint Colours.
- .3 CGSB1-GP-71, Method of Testing Paints and Pigments.

1.2 SAMPLES

- .1 Samples are not required. Submit certified test reports as required by paragraph 2.1.

1.3 MEASUREMENT FOR PAYMENT

- .1 New pavement markings will be paid for as a lump sum item including removal of existing paint markings as shown on the drawings, survey layout, paint and all equipment and labour necessary to remove and install paint markings.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the Contractor's waste management final report.
- .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
 - .3 For products not identified on list, source products with highest recycled content available when practical.
 - .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
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 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

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2 Products

2.1 MATERIALS

- .1 Paint (Permanent).
 - .1 Low VOC waterborne traffic paint (VOC's of 150g/L or less).
 - .2 Use low temperature waterborne traffic paint between temperatures greater than 0°C and lower than 10°C.
 - .3 Use normal waterborne traffic paint when the temperature is greater than 10°C.
 - .4 Colour: to CGSB1-GP-12C.
 - .1 Yellow 505-308.
 - .2 White 513-301.
- .2 Colour as indicated on drawings.
- .3 Methods of Testing Paints and Pigments to CAN/CGSB –1-GP-71.

3 Execution

3.1 EQUIPMENT REQUIREMENTS

- .1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.
- .2 All equipment for use in the work shall be approved by the Departmental Representative and shall include a mechanical marking machine and such auxiliary hand painting equipment as may be necessary to satisfactorily complete the work.
- .3 The mechanical marker shall be an approved atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross sections and clear cut edges without running or spattering.
- .4 Suitable adjustments shall be provided on the sprayer(s) of a single machine or by furnishing additional equipment for painting the width required.
- .5 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

3.2 CONDITION OF SURFACES

- .1 Pavement surface shall be clean and dry during application of paint. Areas to be painted shall be clean, free from curing compound, ponded water, frost, ice, dust, oil, grease, rubber tire deposits and other foreign matter.

3.3 APPLICATION

- .1 The Contractor shall be responsible for setting the marks required to complete the work. Survey methods for setting out the marks shall be in a manner acceptable to the Departmental Representative.
- .2 All paint lines and pavement markings require two (2) separate coats of paint.
- .3 Unless otherwise approved by the Departmental Representative, apply paint only when air temperature is above 10°C, wind speed will not cause over-spray and no rain is forecast within next 4 hours.

- .4 Apply paint at a rate of not less than 0.37 L/m² per single coat of paint.
- .5 Apply second coat of paint, after the first coat has dried or after a minimum of one hour.
- .6 Apply paint to the locations and dimensions indicated in the Contract Documents or as directed by the Departmental Representative.
- .7 Do not thin paint unless approved by the Departmental Representative.
- .8 Symbols and letters to conform to dimensions indicated.
- .9 Paint lines to be of uniform colour and density with sharp edges.
- .10 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 TOLERANCE

- .1 Paint markings to be within ± 5 mm of dimensions indicated.
- .2 There shall be no overlap between the second and first coat. Both coats of paint shall be at the same width and alignment.

3.5 PROTECTION OF COMPLETED WORK

- .1 Protect pavement markings until dry.

END OF SECTION

1 General

1.1 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.

1.2 DEFINITIONS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Quality Control Submittals.
 - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in Item 2.3 - Source Quality Control.
 - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.
- .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.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
 - .3 For products not identified on list, source products with highest recycled content available when practical.

- .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
 - .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
 - .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- 2 Products
- 2.1 TOPSOIL
- .1 Topsoil for sodded areas and planting beds: mixture of particulates, microorganisms 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 to contain 2 to 10% organic matter by weight.
 - .2 To contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface to be 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 Consistency: friable when moist.
- 2.2 SOIL AMENDMENTS
- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .1 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - .2 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - .3 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - .4 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .2 pH value: 6.5 to 8.0.
 - .2 Peat moss:
 - .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 coarse textured.
- .4 Organic matter: compost Category A, B 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 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight - 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
- .6 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 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 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative and cost will be covered by Departmental Representative.
 - .1 Soil sampling, testing and analysis to be in accordance with provincial standards.

3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than 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.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil to following minimum depths after settlement.
 - .1 150 mm for seeded areas.
 - .2 135 mm for sodded areas.
 - .3 300 mm for flower beds.
 - .4 500 mm for shrub beds.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

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.

3.6 SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required offsite.

3.7 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

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- 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 32 91 19 - Topsoil Placement and Grading.
- 1.2 SUBMITTALS
 - .1 Product Data.
 - .1 Provide product data for:
 - .1 Seed.
 - .2 Mulch.
 - .3 Tackifier.
 - .4 Fertilizer.
 - .2 Submit in writing to Departmental Representative 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.
- 1.3 QUALITY ASSURANCE
 - .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - .3 Pre-Installation Meeting: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.
- 1.4 SCHEDULING
 - .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
 - .2 Schedule hydraulic seeding using grass mixtures during local growing season when moisture level is suitable for germination (April-June, September-October).
- 1.5 WASTE MANAGEMENT AND DISPOSAL
 - .1 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose a health or environmental hazard.
- 1.6 SUSTAINABLE DESIGN SUBMITTALS
 - .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
 - .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.

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- .3 For products not identified on list, source products with highest recycled content available when practical.
 - .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
 - .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
 - .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- 2 Products
- 2.1 MATERIALS
- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
 - .1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
 - .1 Mixture composition:
 - .1 30% Perennial Rye.
 - .2 20% Red Fescue.
 - .3 10% Chewing Fescue.
 - .4 15% Kentucky Blue Grass.
 - .5 25% New Kentucky Blue Grass.
 - .2 Seeding rate: 167 kg/ha.
 - .2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
 - .1 Type I mulch.
 - .1 Made from wood cellulose fibre.
 - .1 Organic matter content: 95% plus or minus 0.5%.
 - .2 Value of pH: 6.0.
 - .3 Potential water absorption: 90%.
 - .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 maximum. Greater proportions of ingredients to be straw.

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- .3 Tackifier: water dilutable, liquid dispersion water soluble vegetable carbohydrate powder.
 - .4 Water: free of impurities that would inhibit germination and growth.
 - .5 Fertilizer.
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
 - .6 Inoculants: Inoculants containers to be tagged with expiry date.
- 3 Execution
- 3.1 WORKMANSHIP
- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
 - .2 Clean up immediately any material sprayed where not intended, to satisfaction of 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 grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
 - .2 Cultivated areas identified as requiring cultivation to depth of 25 mm.
 - .3 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
 - .4 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.
- 3.3 FERTILIZING PROGRAM
- .1 Fertilize prior to fine grading incorporating fertilizer equally distributed.
 - .2 Fertilize during establishment and warranty periods as required.
- 3.4 PREPARATION OF SLURRY
- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.
 - .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
 - .3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

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3.6 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 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.
- .3 Blend application 300 mm into adjacent grass areas or sodded areas or previous applications to form uniform surfaces.
- .4 Re-apply where application is not uniform.
- .5 Remove slurry from items and areas not designated to be sprayed.
- .6 Protect seeded areas from trespass satisfactory to Departmental Representative.
- .7 Remove protection devices as directed by Departmental Representative.

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .2 Grass Mixture.
 - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .2 Mow grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Departmental Representative.
 - .3 Fertilize seeded areas after first cutting ten (10) weeks after germination provided plants have mature true leaves in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.
 - .4 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
 - .5 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.8 ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
 - .1 Plants are uniformly established and seeded areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas have been mown at least twice.
 - .3 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.9 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
 - .1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
 - .2 Mow areas seeded and remove clippings.
 - .3 Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.

3.10 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data.

- .1 Submit manufacturer's instructions, printed product literature and data sheets for fertilizer.
- .2 Submit two (2) copies of WHMIS MSDS.

.2 Certificates.

- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of sod quality.

1.3 QUALITY ASSURANCE

.1 Qualifications.

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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.

.4 Packaging Waste Management.

- .1 Remove for reuse of pallets.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction Waste Management Plan.

- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.

- .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products requiring recycled content".
- .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.

- .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
 - .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
 - .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- 2 Products
- 2.1 MATERIALS
- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf Grass Nursery Sod Types.
 - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
 - .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
 - .3 Number One Named Cultivars: Nursery Sod grown from certified seed.
 - .2 Turf Grass Nursery Sod Quality.
 - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 6 to 15 mm in thickness.
 - .2 Sod Establishment Support.
 - .1 Wooden pegs: 17 x 8 x 200 mm.
 - .3 Water.
 - .1 Supplied by Departmental Representative at designated source.
 - .4 Fertilizer.
 - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
 - .2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

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

3 Execution

3.1 INSTALLERS

- .1 Use installers who are Members in Good Standing of Landscape New Brunswick.

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 - 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, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials off site.

3.4 SOD PLACEMENT

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20°C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.5 SOD PLACEMENT ON SLOPES AND PEGGING

- .1 Start laying sod at bottom of slopes.

- .2 Peg sod on slopes steeper than 3 horizontal to 1 vertical, and within 1 m of drainage channels and ditches to following pattern.
 - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
 - .2 Not less than 4 pegs per square metre.
 - .3 Not less than 6 pegs per square metre in drainage structures.
 - .4 Drive pegs to 50 mm above soil surface of sod sections.

3.6 FERTILIZING PROGRAM

- .1 Fertilize during establishment and warranty periods to following program.

<u>Date</u>	<u>Ratio</u>
Spring	12-4-8
Summer	12-4-8
Fall	12-4-8

3.7 CLEANING

- .1 Progress 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.
 - .1 Upon completion remove surplus materials, rubbish, tools and equipment.
 - .2 Clean and reinstate areas affected by Work.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of installation until acceptance.
 - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 mm.
 - .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
 - .3 Maintain sodded areas weed free 95%.
 - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
 - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.9 ACCEPTANCE

- .1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
 - .4 Sodded areas have been cut minimum two (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.
- .4 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.10 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
 - .1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
 - .2 Repair and re-sod dead or bare spots to satisfaction of Departmental Representative.
 - .3 Cut grass and remove clippings as directed by Departmental Representative to height as follows:
 - .1 Turf Grass Nursery Sod.
 - .1 50 mm during normal growing conditions.
 - .2 Cut grass at a maximum of two (2) week intervals, 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.

END OF SECTION

1 General

1.1 DEFINITIONS

- .1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.

1.2 REFERENCE STANDARDS

- .1 Agriculture and Agri-Food Canada (AAFC).
 - .1 Plant Hardiness Zones in Canada-2000.
- .2 Canadian Nursery Landscape Association (CNLA).
 - .1 Canadian Standards for Nursery Stock, 8th Edition, 2006.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Product Data.
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples.
 - .1 Submit samples of mulch and mycorrhiza.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction Waste Management Plan.
 - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements; Construction for "List of products requiring recycled content".
 - .2 If products within this section are indicated on the "List of products requiring recycled content", only products with recycled content will be acceptable.
 - .3 For products not identified on list, source products with highest recycled content available when practical.
 - .4 Include following information with product data submission.
 - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
 - .1 Refer to Section 01 47 15 - Sustainable Requirements: Construction for "List of products required to be locally sourced".
 - .2 If products within this section are indicated on the "List of products required to be locally sourced", include following information with Product Data submission:
 - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

- .4 Adhesives and Sealants.
 - .1 Include following information with Product Data submission for materials specified under this section:
 - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements.
- .2 Delivery Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Protect plant material from frost, excessive heat, wind and sun during delivery.
 - .2 Protect plant material from damage during transportation:
 - .1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
 - .2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
 - .3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
- .3 Storage and Handling Requirements.
 - .1 Immediately store and protect plant material which will not be installed within one hour in accordance with supplier's written recommendations and after arrival at site in storage location approved by Departmental Representative.
 - .2 Protect stored plant material from frost, wind and sun and as follows:
 - .1 For pots and containers, maintain moisture level in containers.
 - .2 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.6 WARRANTY

- .1 For plant material as itemized on plant list the 12 months warranty period is extended to 24 months.
- .2 End-of-warranty inspection will be conducted by Departmental Representative.
- .3 Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

2 Products

2.1 PLANT MATERIAL

- .1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
 - .1 Source of plant material: grown in appropriate Zone in accordance with Plant Hardiness Zones in Canada.
 - .2 Plant material must be planted in zone specified as appropriate for its species.
 - .3 Plant material in location appropriate for its species.
- .2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

- .3 Trees: with straight trunks, well and characteristically branched for species.
 - .4 Refer to Plant Schedule on drawings for plant material.
- 2.2 WATER
- .1 Free of impurities that would inhibit plant growth.
- 2.3 TREE SUPPORT AND PROTECTION
- .1 Provide stakes, guy wires, wire tighteners, clamps, anchors, guying collars and trunk protection as necessary to support trees and prevent damage to root system and trunks.
- 2.4 MULCH AND EDGING
- .1 Mulch:
 - .1 Type 1: Peas stone; of colour selection as selected by Departmental Representative.
 - .2 Type 2: Shredded mulch: from bark of hemlock trees.
 - .2 Landscape filter fabric: non-woven, spun-bonded synthetic fibre fabric, UV and rot resistant; minimum weight 100 g/m².
 - .3 Edging:
 - .1 Fabricated from recycled rubber; coloured. Colour as selected by Departmental Representative.
 - .2 Profile:
 - .1 Type 1: L-shape cross-section, 82 mm high x 75 mm deep; capable of bending 70° without cutting.
 - .2 Type 2: roll-up cross-section, 114 mm high x 108 mm deep; capable of bending 60° without cutting.
 - .3 Accessories:
 - .1 Anchors: installation stakes/spikes; head colour to match edging where exposed.
 - .2 Connectors.
- 2.5 FERTILIZER
- .1 Synthetic commercial type as recommended by soil test report.
 - .1 Ensure new root growth is in contact with mycorrhiza.
 - .2 Use mycorrhiza as recommended by manufacturer's written recommendations.
- 2.6 ANTI-DESICCANT
- .1 Wax-like emulsion.
- 2.7 SOURCE QUALITY CONTROL
- .1 Obtain approval from Departmental Representative of plant material prior to planting.
 - .2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting 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 PRE-PLANTING PREPARATION

- .1 Proceed only after receipt of written acceptability of plant material from Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 Locate and protect utility lines.
- .5 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.
- .6 Temporary Erosion and Sedimentation Control.
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

- .1 Establish sub-grade for planting bed and prepare planting beds as required.
- .2 For individual planting holes.
 - .1 Stake out location prior to excavating.
 - .2 Excavate to depth and width as indicated.
 - .3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
 - .4 Scarify sides of planting hole.
 - .5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

3.4 PLANTING

- .1 For jute burlapped root balls, cut away top one-third of wrapping and wire basket without damaging root ball.
 - .1 Do not pull burlap or rope from under root ball.

- .2 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
 - .3 Plant vertically in locations as indicated.
 - .1 Orient plant material to give best appearance in relation to structure, roads and walks.
 - .4 For trees and shrubs.
 - .1 Backfill soil in 150 mm lifts.
 - .1 Tamp each lift to eliminate air pockets.
 - .2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
 - .3 After water has penetrated into soil, backfill to finish grade.
 - .2 Form watering saucer as indicated.
 - .5 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
 - .6 Water plant material thoroughly.
 - .7 After soil settlement has occurred, fill with soil to finish grade.
- 3.5 TRUNK PROTECTION
- .1 Install trunk protection on deciduous trees as indicated.
 - .2 Install trunk protection before installation of tree supports.
- 3.6 TREE SUPPORTS
- .1 Install tree supports as indicated or required.
 - .2 After tree supports have been installed, remove broken branches with clean, sharp tools.
- 3.7 MULCH AND EDGING
- .1 Ensure soil settlement has been corrected prior to mulching.
 - .2 Install filter fabric and edging. Spread mulch as indicated.
 - .3 Use Type 1 edging with Type 1 mulch; Type 2 edging with Type 2 mulch.
- 3.8 EXISTING TREES AND SHRUBS
- .1 If existing trees or shrubs are damaged during construction, make a Landscape Professional available to assess viability of trees or shrubs.
 - .2 Following completion of construction activities, prune and shape existing shrubs and trees to clean up damaged components.
- 3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD
- .1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.
 - .1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
 - .1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.
 - .2 Remove weeds monthly or as required.
 - .3 Replace or re-spread damaged, missing or disturbed mulch.

- .4 For non-mulched areas, cultivate as required to keep top layer of soil friable.
- .5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
- .6 Remove dead/broken branches from plant material.
- .7 Keep trunk protection and guy wires in proper repair and adjustment.
- .8 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.10 MAINTENANCE DURING WARRANTY PERIOD

- .1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
 - .2 Reform damaged watering saucers.
 - .3 Remove weeds monthly or as required.
 - .4 Replace or re-spread damaged, missing or disturbed mulch.
 - .5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.
 - .6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
 - .7 Apply fertilizer in early spring as indicated by soil test.
 - .8 Remove dead/broken/hazardous branches from plant material.
 - .9 Keep trunk protection and tree supports in proper repair and adjustment.
 - .10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
 - .11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
 - .12 Submit monthly written reports to Departmental Representative identifying:
 - .1 Maintenance work carried out.
 - .2 Development and condition of plant material.
 - .3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.11 CLOSEOUT ACTIVITIES

- .1 Submit maintenance reports for trees, shrubs, and other plantings.

END OF SECTION