

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

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

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-13, Standard Test Methods for Material Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 422-63 (2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
  - .5 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .6 ASTM D 1883-14, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification - Highway Construction and Maintenance, (2011).

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

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

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

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

## **PART 3 - EXECUTION**

### **3.1 PLACING**

- .1 Place granular sub-base after subgrade is to the satisfaction of the Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean, unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

### **3.2 COMPACTION**

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

### **3.3 QUALITY CONTROL TESTING**

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

### **3.4 SITE TOLERANCES**

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

### **3.5 PROTECTION**

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

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

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

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 117-13, Standard Test Methods for Materials Finer Than 75-micron Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .5 ASTM D 1883-14, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
  - .6 ASTM D 4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-88, Sieves, Testing, Woven Wire, Metric.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specification - Highway Construction and Maintenance, (2011).

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

- .1 Divert unused granular material from landfill to local facility to satisfaction of Departmental Representative.
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## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

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

## **PART 3 - EXECUTION**

### **3.1 SEQUENCE OF OPERATION**

- .1 Place granular base after sub-base surface is to the satisfaction of the Departmental Representative.
  - .2 Placing
    - .1 Construct granular base to depth and grade in areas indicated.
    - .2 Ensure no frozen material is placed.
    - .3 Place material only on clean unfrozen surface, free from snow and ice.
    - .4 Place material using methods which do not lead to segregation or degradation of aggregate.
    - .5 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
    - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
    - .7 Remove and replace that portion of layer in which material becomes segregated during spreading.
  - .3 Compacting
    - .1 Compaction equipment to be capable of obtaining required material densities.
    - .2 Compact to density not less than 100% of Maximum Dry Density in accordance with ASTM D 698.
    - .3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
    - .4 Apply water as necessary during compacting to obtain specified density.
    - .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.
    - .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
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### **3.2 QUALITY CONTROL TESTING**

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

### **3.3 SITE TOLERANCES**

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

### **3.4 PROTECTION**

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

END

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## **PART 1 – GENERAL**

### **1.1 RELATED SECTIONS**

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

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D 140-15, Standard Practice for Sampling Bituminous Materials.
  - .2 ASTM D 244-09, Standard Test Methods and Practices for Emulsified Asphalts.
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specifications - Highway Construction and Maintenance, (2011).

### **1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 QUALITY ASSURANCE**

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

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

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

### **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Divert unused asphalt from landfill to facility capable of recycling materials.
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## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

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

### **2.2 EQUIPMENT**

- .1 Pressure distributor to be:
  - .1 Designed, equipped, maintained and operated so that asphalt material can be:
    - .1 Maintained at even temperature.
    - .2 Applied uniformly on variable widths of surface up to 5 m.
    - .3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m<sup>2</sup> with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.
    - .4 Distributed in uniform spray without atomization at temperature required.
  - .2 Equipped with meter, registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
  - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
  - .4 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
  - .5 Equipped with accurate volume measuring device or calibrated tank.
  - .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
  - .7 Equipped with nozzle spray bar, with operational height adjustment.
  - .8 Cleaned if previously used with incompatible asphalt material.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

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

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
  - .1 Standard Specifications - Highway Construction and Maintenance, (2011).

### **1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C, 4 weeks prior to beginning Work.

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

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
  - .3 Place materials defined as hazardous or toxic in designated containers.
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- .4 Divert unused aggregate materials from landfill to facility for reuse to satisfaction of Departmental Representative.
- .5 Dispose of unused paint and paint thinner materials at official hazardous material collections site in accordance with applicable federal, municipal and provincial guidelines.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose a health or environmental hazard.
- .8 Divert unused asphalt from landfill to facility capable of recycling materials in accordance with applicable federal, municipal and provincial guidelines.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

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

## **PART 3 - EXECUTION**

### **3.1 FOUNDATIONS**

- .1 Foundations for standard duty asphalt pavement as indicated.
  - .2 Construction of granular foundations: to Section 32 11 16.01 - Granular Sub-Base and Section 32 11 23 - Aggregate Base Courses.
  - .3 Compaction: compact each lift of granular material to 100% maximum dry density to ASTM D 698. Maximum lift thickness: 300 mm.
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### **3.2 PAVEMENT CONSTRUCTION**

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

### **3.3 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

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 43 – Environmental procedures.
- .3 Section 01 61 00 – Common product Requirements.
- .4 Section 01 74 11 – Cleaning.
- .5 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

### **1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-15.1-92, Calcium Chloride.
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with EPA 832/R92-005 authorities having jurisdiction and Section 01 35 43 – Environmental Procedures.
- .3 Construction Waste Management:
  - .1 Submit project Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
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## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Water: in accordance with Departmental Representative's approval.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

### **3.2 APPLICATION**

- .1 Apply water with equipment approved by Departmental Representative.
- .2 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
  - .2 Place materials defined as hazardous or toxic in designated containers.

END

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Section 32 12 16.01 - Asphalt Paving – Short Form.
- .4 Section 03 10 00 - Concrete Forming and Accessories.
- .5 Section 03 20 00 - Concrete Reinforcing.
- .6 Section 03 30 00 - Cast-in-Place Concrete.

### **1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM D698-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.2-98, Boiled Linseed Oil.
  - .2 CAN/CGSB-3.3-2007, Kerosene.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1/A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Practices for Concrete.

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

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Place materials defined as hazardous or toxic waste in designated containers.
  - .3 Ensure emptied containers are sealed and stored safely.
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## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Concrete mixes and materials: to Section 03 30 00 - Cast-in-Place Concrete.
- .2 Reinforcing steel: to Section 03 20 00 - Concrete Reinforcing.
- .3 Joint filler and Curing Compound: to Section 03 30 00 - Cast-in-Place Concrete.
- .4 Granular base: to Section 32 11 23 – Aggregate Base Courses.
- .5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
- .6 Fill material: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

## **PART 3 - EXECUTION**

### **3.1 GRADE PREPARATION**

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - 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 to at least 100% of maximum density to ASTM D 698.

### **3.3 CONCRETE**

- .1 Obtain Departmental Representative's approval of granular base and reinforcing steel prior to placing concrete.
  - .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
  - .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
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- .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 as measured with 3 m straightedge placed on surface.

### **3.5 EXPANSION AND CONTRACTION JOINTS**

- .1 Install tooled transverse contraction joints after floating, when concrete is still, but still plastic, at intervals in accordance with Halifax Standard.
- .2 Install expansion joints as directed by Departmental Representative at intervals in accordance with Halifax Standard.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

### **3.6 ISOLATION JOINTS**

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 – Cast-in-Place Concrete, as indicated.
- .3 Seal isolation joints with sealant approved by Departmental Representative.

### **3.7 CURING**

- .1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound approved 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.
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- .3 Apply curing compound evenly to form continuous film. In accordance with manufacturer's requirements.

### **3.8 BACKFILL**

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

### **3.9 LINSEED OIL**

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

### **3.10 CLEANING**

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

END

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 – Health and Safety Requirements.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 61 00 – Common Product Requirements.
- .5 Section 01 74 11 – Cleaning.
- .6 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .7 Section 01 78 00 – Closeout Submittals.

### **1.2 REFERENCES**

- .1 American Association of State Highway and Transportation Officials (AASHTO)
    - .1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
  - .2 Transportation Association of Canada
    - .1 Manual of Uniform Traffic Control Devices for Canada (Latest Edition).
  - .3 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-1.5-99, Low Flash Petroleum Spirits Thinner.
    - .2 CAN/CGSB 1.74-01, Alkyde Traffic Paint.
  - .4 Green Seal Environmental Standards (GS)
    - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
  - .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).
  - .6 The Master Painters Institute (MPI)
    - .1 Architectural Painting Specification Manual - current edition.
  - .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
    - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
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### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Low-Emitting Materials: submit listing of paints and coatings to comply with VOC and chemical component limits or restrictions requirements.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operations and Maintenance Data: submit information on materials relative to work of this Section for inclusion in operations and maintenance manual and as follows:

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Replace defective or damaged materials with new.
  - .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
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## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Paint:
  - .1 To MPI -EXT 2.1B, Alkyd zone/traffic marking.
  - .2 Paints: in accordance with MPI recommendation for surface conditions.
    - .1 Paints: maximum VOC limit 100 g/L to SCAQMD Rule 1113 to GS-11.
  - .3 Colour: to MPI listed, yellow, white, blue as indicated.
  - .4 Upon request, Departmental Representative will supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.
- .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 in accordance with MPI instructions prior to pavement markings installation.
  - .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

### **3.2 EQUIPMENT REQUIREMENTS**

- .1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

### **3.3 TRAFFIC CONTROL**

- .1 In accordance with Section 01 35 00.06 – Special Procedures For Traffic Control and Section 01 56 00 – Temporary Barriers and Enclosures.
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### **3.4 APPLICATION**

- .1 Pavement markings: Lay out pavement markings, to approval of Departmental Representative.
- .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3 m<sup>2</sup> /L.
- .4 Do not thin paint unless approved by Departmental Representative.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines: of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

### **3.5 TOLERANCE**

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings if required.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.7 PROTECTION OF COMPLETED WORK**

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

END

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 – Cast-in-Place Concrete.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **1.2 REFERENCES**

- .1 ASTM International
    - .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - .2 ASTM A 90/A 90M-13, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
    - .3 ASTM A 121-13, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
    - .4 A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - .5 ASTM C 618-12a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
    - .6 ASTM F 1664-08(2013), Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.
    - .7 ASTM A 123/A 123M-09(R2014), Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
    - .2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
    - .3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
    - .4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
    - .5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
  - .3 CSA International
    - .1 CSA A23.1/A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
    - .2 CAN/CSA-A3000-08, Cementitious Materials Compendium.
  - .4 Master Painters Institute (MPI)
    - .1 Architectural Painting Specification Manual - current edition.
  - .5 U.S. Environmental Protection Agency (EPA) / Office of Water
    - .1 EPA 832/R-92-005, Storm Water Management for Construction
-

Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .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.
  - .2 Store and protect fence and gate materials from damage.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan and Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

## **PART 2 - PRODUCTS**

### **2.1 CONCRETE**

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete CSA A23.1.
  - .1 Nominal coarse aggregate size: 20-5.
  - .2 Compressive strength: 20 MPa minimum at 28 days.
  - .3 Additives: fly ash to CSA A3000 ASTM C 618.
  - .4 Recycled content: incorporate SCM's in concrete mix, minimum of % post-industrial recycled content.



## **2.2 CHAIN LINK FENCE AND GATES**

- .1 Chain-link fence fabric: to CAN/CGSB-138.1.
    - .1 Type 2 as indicated.
    - .2 Height of fabric: as indicated.
  - .2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
  - .3 Screw anchors for bolted connections:
    - .1 Hot dipped galvanized.
    - .2 Dimensions as indicated.
    - .3 Allowance Stress Design Values (in 30 MPa concrete).
      - .1 Tensile resistance = 19 kN (min.)
      - .2 Shear resistance = 20 kN (min.)
  - .4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized aluminum coated vinyl coated steel wire.
  - .5 Tie wire fasteners: steel wire aluminum wire, aluminum alloy wire vinyl coated.
  - .6 Tension bar: to ASTM A 653/A 653M, 5 x 20 mm minimum galvanized steel.
  - .7 Gates: to CAN/CGSB-138.4.
  - .8 Gate frames: to ASTM A 53/A 53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.
    - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized painted with zinc pigmented paint after welding.
    - .2 Fasten fence fabric to gate with twisted selvage at top.
  - .9 Manual swing gate:
    - .1 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
    - .2 Furnish gates with chain hook to hold gates open and centre rest with drop bolt for closed position.
      - .1 Where open position will block adjacent paved access (vehicular or pedestrian), provide additional rest location at adjacent curb line as indicated.
  - .10 Automatic sliding gate: to Section 34 41 26.00 - Access Control Point, Control System.
-

- .11 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy galvanized steel malleable ductile cast iron.
  - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
  - .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
  - .3 Overhang tops to provide waterproof fit, to hold top rails and an outward inward projection to hold barbed wire overhang.
  - .4 Include projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.
  - .5 Projection of approximately 300 mm long to project from fence at 45 degrees above horizontal.
  - .6 Turnbuckles to be drop forged.
- .12 Organic zinc rich coating: to CAN/CGSB-1.181 MPI #18.
- .13 Barbed wire : to ASTM A 121 2 mm diameter galvanized steel wire or aluminum coated steel wire 4 point barbs 125 mm spacing.
- .14 Barbed wire: to CAN/CGSB-138.2, 2.5 mm diameter.
- .15 Grounding rod: 16 mm diameter copperwell rod, 3 m long to Section 26 05 27 - Grounding - Primary.

### **2.3 STEEL PEDESTRIAN GATE**

- .1 Galvanized steel pedestrian swing gate: to Section 34 41 26.00 - Access Control Point Control System.

### **2.4 FINISHES**

- .1 Galvanizing:
    - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
    - .2 For pipe: 550 g/m<sup>2</sup> minimum to ASTM A 90.
    - .3 For barbed wire: to ASTM A 121, Class 2 CAN/CGSB-138.2.
    - .4 For other fittings: to ASTM A 123/A 123M.
  - .2 Aluminum coating:
    - .1 For barbed wire: to ASTM A 121, Class 2.
  - .3 Vinyl coating: to ASTM F 1664.
    - .1 0.045 mm dry film thickness minimum.
-

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate 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 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Grading:
  - .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
    - .1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

### **3.3 ERECTION OF FENCE**

- .1 Erect fence along lines as indicated as directed by Departmental Representative and to CAN/CGSB-138.3.
  - .2 Remove existing pavements and sidewalks to suit post holes in accordance with Section 02 41 13 - Selective Site Demolition and Section 03 01 31 - Concrete Cutting.
-

- .3 Excavate post holes to dimensions indicated.
  - .4 Space line posts 3 m apart, measured parallel to ground surface.
  - .5 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.
  - .6 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.
  - .7 Install corner post where change in alignment exceeds 10 degrees.
  - .8 Install end posts at end of fence and at buildings.
    - .1 Install gate posts on both sides of gate openings.
  - .9 Place concrete in post holes then embed posts into concrete to depths indicated.
    - .1 Extend concrete 50 mm above ground level and slope to drain away from posts.
    - .2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
  - .10 Install fence fabric after concrete has cured, minimum of 5 days.
  - .11 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface at inclination as indicated.
    - .1 Install braces on both sides of corner and straining posts in similar manner.
  - .12 Install overhang tops and caps.
  - .13 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
  - .14 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
  - .15 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
    - .1 Knuckled selvedge at bottom.
    - .2 Twisted selvedge at top.
  - .16 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.
-

- .1 Give tie wires minimum two twists.
- .17 Install barbed wire strands and clip securely to lugs of each projection.
- .18 Install grounding rods as indicated.

### **3.4 INSTALLATION OF CHAIN LINK GATES (MANUAL)**

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3 Determine position of gate rests for gates.
  - .1 Cast gate rest in concrete as directed.
  - .2 Dome concrete above ground level to shed water.
- .4 Install gate stops where indicated.

### **3.5 TOUCH UP**

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.
  - .1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 29 83 – Payment Procedures for Testing Laboratory Services.
- .2 Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT).
- .3 Section 01 74 11 – Cleaning.
- .4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

### **1.2 REFERENCES**

- .1 Agriculture and Agri-Food Canada
  - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .2 Canadian Council of Ministers of the Environment
  - .1 PN1340-2005, Guidelines for Compost Quality.
- .3 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.3 DEFINITIONS**

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

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

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Quality control submittals :
    - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
-

## **1.5 QUALITY ASSURANCE**

- .1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

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

## **PART 2 - PRODUCTS**

### **2.1 TOPSOIL**

- .1 Topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
  - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
  - .2 Contain no toxic elements or growth inhibiting materials.
  - .3 Finished surface free from:
    - .1 Debris and stones over 50 mm diameter.
    - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
  - .4 Consistence: friable when moist.

### **2.2 SOIL AMENDMENTS**

- .1 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 coarse textured.
- .4 Organic matter: compost Category 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 and manufactured topsoil to be utilized with sufficient lead time for testing.
  - .2 Contractor is responsible for amendments to supply topsoil as required.
  - .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 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush weeds and grasses and removed from site.
- .2 Strip topsoil to depths as indicated.
  - .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Stockpile in locations as directed by Departmental Representative as indicated.
  - .1 Stockpile height not to exceed 2 m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative .
- .5 Protect stockpiles from contamination and compaction.

### **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.
  - .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 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil as indicated to depths indicated.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

### **3.6 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.

### **3.7 ACCEPTANCE**

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

### **3.8 SURPLUS MATERIAL**

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

### **3.9 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

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## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 31 22 13 – Rough Grading.
- .2 Section 32 91 19.13 – Topsoil Placement and Grading.

### **1.2 MEASUREMENT AND PAYMENT**

- .1 Measure hydraulic seeding square metres of actual surface area for:
  - .1 Grass mixture including fertilizer.
  - .2 Legume mixture including fertilizer.
  - .3 Areas of blending into existing turf grass will not be measured for payment.
- .2 Measure maintenance during establishment period and warranty period of areas seeded in square metres.
- .3 Payment for seeding made at unit price bid of actual area surface measurements taken and computed by Departmental Representative.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.
- .2 Scheduling:
  - .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
  - .2 Schedule hydraulic seeding using grass mixtures and mixtures containing Crownvetch Trefoil between dates recommended by Provincial Territorial Regional Agricultural Department.

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

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
    - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
-

- .3 Submit in writing 14 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.
- .4 Samples:
  - .1 Submit 0.5 kg container of each type of fertilizer used, if requested.
- .5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

## **1.5 QUALITY ASSURANCE**

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

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

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements:
    - .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
    - .2 Inoculant containers to be tagged with expiry date.
  - .3 Storage and Handling Requirements:
    - .1 Store fertilizer off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Replace defective or damaged materials with new.
  - .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
-

- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.7 WARRANTY**

- .1 For seeding, 12 months warranty period is extended to 1 full growing season.
- .2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

## **PART 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 40% Creeping Red Fescue.
      - .2 15% Timothy.
      - .3 10% Kentucky Blue Grass.
      - .4 10% Alsike Clover.
      - .5 5% Red Top.
      - .6 5% Perennial Rye.
- 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.
    - .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 maximum. Greater proportions of ingredients to be straw.

- .3 Tackifier: It may be supplied in liquid or powder form and shall be applied at the Manufacturer's recommended application rate. It shall not contain any toxic or growth inhibiting chemicals or compounds.
- .4 Water: free of impurities that would inhibit germination and growth.
- .5 Fertilizer:
  - .1 Shall conform to Canada "Fertilizers Act" and Regulations.
  - .2 Fertilizer shall be formulated 15-25-15 (nitrogen-phosphorus-potassium) for all seeding done from April 15 to September 1 and 10-20-20 thereafter.
- .6 Inoculants: inoculant containers to be tagged with expiry date.
- .7 Liquid Soil Amendment and Micronutrients: \_\_\_\_\_.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding 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 INSTALLERS**

- .1 Use installers members in Good Standing of \_\_\_\_\_ Horticultural Trades Association.

#### **3.3 PROTECTION OF EXISTING CONDITIONS**

- .1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.
  - .2 Immediately remove any material sprayed where not intended as directed by Departmental Representative DCC Representative Consultant.
-

### **3.4 PREPARATION OF SURFACES**

- .1 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.
- .2 Fine grade areas to be seeded free of humps and hollows.
  - .1 Ensure areas are free of deleterious and refuse materials.
- .3 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .5 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

### **3.5 FERTILIZING PROGRAM**

- .1 Fertilize prior to fine grading applying fertilizer equally distributed in accordance with the following program:

Date Range	Date	Date	Application Rate	Formulation (NPK) Ratio
Between	April 1 and Sept 1		100 kg	15-25-15
Between	Sept 1 and Oct 1		100 kg	10-20-20

### **3.6 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 materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

### **3.7 SLURRY APPLICATION**

- .1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.
  - .2 Hydraulic seeding equipment:
    - .1 Slurry tank.
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- .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".
- .3 Slurry mixture applied per hectare.
  - .1 Seed: grass mixture 100 kg.
  - .2 Mulch: Type I and II 1350 kg.
  - .3 Tackifier: As per manufacturer's specification.
  - .4 Water: Minimum 30,000 L.
  - .5 Fertilizer: \_\_\_\_\_ kg, ratio \_\_\_\_\_.
  - .6 Liquid Soil Amendment/Micronutrients: \_\_\_\_\_ kg ratio \_\_\_\_\_.
- .4 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.
- .5 Blend application 300 mm into adjacent grass areas or sodded areas previous applications to form uniform surfaces.
- .6 Re-apply where application is not uniform.
- .7 Remove slurry from items and areas not designated to be sprayed.

### **3.8 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    - .1 Leave Work area clean at end of each day.
    - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.
  - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
    - .1 Clean and reinstate areas affected by Work.
  - .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
    - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.
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### **3.9 PROTECTION**

- .1 Protect seeded areas from trespass until plants are established.
- .2 Remove protection devices as directed by Departmental.

### **3.10 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.
- .2 Perform following operations from time of seed application until acceptance by Departmental Representative.
- .3 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 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; water in well .
  - .4 Control weeds by mechanical 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.

### **3.11 ACCEPTANCE**

- .1 Seeded areas will be accepted by Departmental Representative provided that:
    - .1 Plants are uniformly established. 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.
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### **3.12 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 Fertilize seeded 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.
    - .1 If chemical means are used, comply with Section 31 31 19.13 - Chemical Vegetation Control.

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 61 00 - Common Product Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .5 Section 32 91 19.13 - Topsoil Placement and Grading.

### **1.2 SCHEDULING**

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

### **1.3 QUALITY ASSURANCE**

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

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with supplier's recommendations.
  - .2 Replace defective or damaged materials with new.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

- .1 Number (#1) Kentucky Bluegrass - nursery sod grown from one or more Kentucky Bluegrass cultivars or Kentucky Bluegrass/Fine Fescue Sod - grown
-

from a seed mixture containing 90-95% by weight of Kentucky Bluegrass cultivars and 5-10% by weight of creeping red chewing or hard fescue cultivars.

- .2 Sod establishment support:
  - .1 Wooden pegs: 17 x 17 x 150 mm.
- .3 Water:
  - .1 Supplied by Contractor.
- .4 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
  - .2 Complete, synthetic, slow release with 35 % of nitrogen content in water-insoluble form.

## **2.2 SOURCE QUALITY CONTROL**

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

## **PART 3 - EXECUTION**

### **3.1 INSTALLERS**

- .1 Use installers who are Member in Good Standing of Nova Scotia Horticultural Trades Association.

### **3.2 EXAMINATION**

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

### **3.3 PREPARATION**

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
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- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by Departmental Representative in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

### **3.4 SOD PLACEMENT**

- .1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.
- .2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .4 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 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- .2 Start laying sod at bottom of slopes.
- .3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:
  - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
  - .2 Not less than 3-6 pegs per square metre.
  - .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.
  - .4 Drive pegs to 20 mm above soil surface of sod sections.

### **3.6 FERTILIZING PROGRAM**

- .1 Apply fertilize at rate recommended by soil sample test.
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### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  - .1 Clean and reinstate areas affected by Work.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

### **3.8 PROTECTION BARRIERS**

- .1 Protect newly sodded areas from deterioration with fence as directed by Departmental Representative.
- .2 Remove protection after inspection as directed by Departmental Representative.

### **3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following operations from time of installation until acceptance.
  - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
  - .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
  - .3 Maintain sodded areas weed free 95%.
  - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
  - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

### **3.10 ACCEPTANCE**

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

**3.11 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 resod dead or bare spots to satisfaction of Departmental Representative.

END