## PART 1 - GENERAL

### 1.1 SUMMARY

.1 This Section specifies requirements for supply, producing and placing gravel or quarried stone as a granular base and sub-base to lines, grades and typical cross sections indicated on the drawings.

### 1.2 RELATED SECTIONS

.1 Construction Waste Management and Disposal: Section 01 74 21

.2 Roadway Subgrade Reshaping: Section 31 22 16

.3 Asphalt Paving: Section 32 12 16

### 1.3 REFERENCES

.1 Nova Scotia Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance.

.2 American Society for Testing and Materials (ASTM)
.1 ASTM C117-2013, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
.2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
.3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
.5 ASTM D1557-2012, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft$^3$) (2,700kN-m/m$^3$).
.6 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
.7 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular base and sub-base material:

.1 Crushed, 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.

.3 Table

Type 1 (Granular Base):

| Sieve Size (mm) | % Passing |
|---|---|
| 20 000 | 100 |
| 14 000 | 50-85 |
| 5 000 | 20-50 |
| 160 | 5-12 |
| 80 | 3-8 |

Type 2 (Granular Sub-Base):

| Sieve Size (mm) | % Passing |
|---|---|
| 80 000 | 100 |
| 56 000 | 70-100 |
| 28 000 | 50-80 |
| 14 000 | 35-65 |
| 5 000 | 20-50 |
| 160 | 3-10 |
| 80 | 0-7 |

.4 Other Properties as follows:

.1 Liquid Limit: to ASTM D4318, Maximum 25.

.2 Plasticity Index: to ASTM D4318, Maximum 6.

.3 Los Angeles degradation: to ASTM C131. Max. % Loss by mass: 35.

.4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.

.5 Soaked CBR: to ASTM D1883, Min 40 when compacted to 100% of ASTM D1557.

## PART 3 - EXECUTION

### 3.1 PLACING

.1 Place granular base and sub-base after roadway subgrade is inspected and approved by Departmental Representative.

.2 Construct granular base and sub-base to depths and grades in areas indicated.

.3 Do not place any frozen material.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Place granular base and sub-base materials using methods which do not lead to segregation or degradation.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts 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 granular sub-base to density of not less than 98% corrected maximum dry density in accordance with ASTM D1557.

.3 Compact granular base to density of not less than 100% corrected maximum dry density in accordance with ASTM D1557.

.4 Shape and roll alternately to obtain smooth, even and uniformly compacted material.

.5 Apply water as necessary during compaction to obtain specified density.

.6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

3.2 COMPACTION (Cont'd)

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

3.3 PLACEMENT TESTING

.1 Provide material testing to minimum limits as follows:

| Material | Compaction Test Frequency | Moisture Content Test Frequency |
|---|---|---|
| Type 1 | 1 per $10m^3$ placed | 1 per $30m^3$ placed |
| Type 2 | 1 per $10m^3$ placed | 1 per $40m^3$ placed |

3.4 SITE TOLERANCES

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

3.5 PROTECTION

.1 Maintain finished base and sub-base in condition conforming to this section until respective succeeding materials are constructed.

3.6 SCHEDULING WORK

.1 Placement of granular base shall not commence until heavy civil works, buildling construction and other large vehicle/heavy traffic activities have been completed. Minimize contamination of granular materials.

.2 Do not use any portion of the granular base for temporary access during construction. Provide granular materials as required for such temporary access at no additional cost to the Contract.

END

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 This method covers measurement of loss of Marshall Stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.

.2 Numerical index of retained stability is obtained by comparing stability of specimens determined in accordance with usual Marshall procedures with stability of specimens that have been immersed in water for prescribed period.

### 1.2 RELATED SECTIONS

.1 Asphalt Paving: Section 32 12 16

### 1.3 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASTHO)
.1 AASHTO T245-97(R2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT

.1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for test.

.2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.

.3 Flat transfer plates of glass or metal. Keep one plate under each specimen during immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of specimens.

.4 Apparatus required to conduct Marshall test.

PART 3 - EXECUTION

3.1 PREPARATION OF TEST SPECIMENTS

.1 Prepare at least eight (8) specimens for each test in accordance with AASHTO T245, except where specified otherwise.

3.2 TEST PROCEDURE

.1 Do Marshall testing in accordance with AASHTO T245.

.2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.

.3 Calculate specific gravity of each specimen as follows:
.1 Specific Gravity = A / (A-B)
.2 Where A = weight of specimen in air in grams
.3 B = weight of specimen in water in grams

.4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group one (1) is essentially same as that of group two (2).

.5 Test group one (1) specimens for Marshall stability. Calculate S1 = Marshall stability of group one (1) (average).

.6 Immerse group two (2) specimens in water for 24 h at 60°C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group two (2) (average).

3.3 TEST FREQUENCY

.1 Provide one (1) test for each respective B-HF and C-HF mix design sample.

3.4 TEST REPORT

.1 Report test results to Departmental Representative.

.2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.

.3 Calculate index as follows:
.1 Index of Retained Stability = S2/S1 x 100.

END

## PART 1 - GENERAL

### 1.1 RELATED WORK

.1 Excavating, Trenching and Backfilling: Section 31 23 10

.2 Granular Materials: Section 32 11 00

### 1.2 REFERENCES

.1 Nova Scotia Department of Transportation and Infrastructure Renewal, Standard Specification.

.2 AASHTO T166-2013, Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Speciments.

.3 ASTM D2172-2011, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

.4 ASTM D2489-2008, Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures.

.5 ASTM D3203-2011, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

### 1.3 SAMPLES

.1 At least three (3) weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates, liquid asphalt and asphalt cement and provide access for sampling.

.2 Preliminary approval of any sample or samples of any material does not constitute a final approval of the material or its source of supply.

.3 All materials to be incorporated into the work will be continuously and regularly sampled and tested in the field and in the laboratory and comply with the requirements of the material specification.

### 1.4 MATERIAL CERTIFICATION

.1 At least three (3) weeks prior to commencing work, 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°C.

1.4 MATERIAL CERTIFICATION (Cont'd)

.2 Submit manufacturer's test data and certification that asphalt cement meets requirements of this section.

1.5 MIX DESIGNS

.1 Submit mix designs for asphalt Type B-HF and Type C-HF to Departmental Representative for record.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Asphalt material: hot mixed, hot-laid combination of mineral aggregates, uniformly coated and mixed with an asphaltic binder in a suitable mixing plant. Asphalt materials and aggregates shall meet the requirements of Division 4, Section 4 of the Nova Scotia Department of Transportation and Infrastructure Renewal Specification.

.2 Composition of asphalt mixture: to grading and asphalt content requirements in Table 4.4.1-Physical Requirements of Asphalt Concrete of the Nova Scotia Department of Infrastructure Renewal Specification, Type B-HF and Type C-HF mix. Minimum Marhsall Stability to be 7.5 kN @ 60°C formulated for truck route traffic.

.3 Liquid asphalt primer: to requirements in Table 4.5.1 of the Nova Scotia Department of Transportation and Infrastructure Renewal Specification.

.4 Liquid asphalt tack coat: to same requirements as liquid asphalt primer.

## PART 3 - EXECUTION

3.1 EQUIPMENT

.1 Pavers: mechanical self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Haul trucks: of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
.1 Boxes with tight metal bottoms.

3.1 EQUIPMENT (Cont'd)

.3 Haul trucks:(Cont'd)

.2 Covers of sufficient size and weight 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 truck box.

3.2 PREPARATION

.1 Make vertical saw cut to full depth of asphalt concrete in straight lines. Cut back 300 mm minimum from edge of excavation or beyond to eliminate tension cracks.

.2 Remove additional existing asphalt in locations where longitudinal strips less than 1 m wide and/or asphalt "islands" less than 10 m2 in size occur after saw cutting and replace with new asphalt.

.3 Cold mill an additional 300 mm wide by 40 mm deep longitudinal strip along all saw cut joints to facilitate an overlap joint in the surface asphalt.

.4 Place or remove gravel to depth indicated.

.5 Shape, fine grade and compact gravel surface to 100 percent standard proctor density.

3.3 PLACING

.1 Obtain Departmental Representative's approval of granular base and preparation prior to placing asphalt.

.2 Before placing asphalt, clean surface of loose and foreign material. Apply liquid asphalt primer to Nova Scotia Department of Transportation and Infrastructure Renewal specifications. Application rate: 1.0 l/$m^2$.

.3 Apply liquid asphalt tack coat to Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification between Class B-HF binder and Class C-HF surface courses, and as primer at all cold joints. Application rate: 0.5 l/$m^2$.

.4 Place asphalt concrete in compacted lifts to thicknesses, grades and lines as indicated or as directed by Departmental Representative.

.5 Place catch basin and manhole covers, and water distribution system fittings into final position prior to placement of Type C-HF asphalt.

3.3 PLACING (Cont'd)

.6 Placing conditions:

.1 Place asphalt mixtures only when air temperature is above 5°C.

.2 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.

.3 When the air temperature is 5°C, or less, or after the 31st of October, the Contractor will not be permitted to lay any asphalt pavement, unless otherwise directed by the Departmental Representative.

.4 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.7 Place, roll and compact asphalt concrete in accordance with Division 4, Section 4, Province of Nova Scotia, Department of Transportation and Infrastructure Renewal, Standard Specification.

.8 Rake all joints.

.9 The minimum density acceptable shall be 95% of the theoretical Maximum Relative Density determined according to ASTM D3203.

3.4 ASPHALT TETING

.1 Provide testing of placed asphalt in accordance with the following frequency table:

| Test | Standard | Frequency (Type B-HF asphalt) | Frequency (Type C-HF asphalt) |
|---|---|---|---|
| Bulk Specific Gravity | AASHTO T166 | 50 tonnes | 25 tonnes |
| Bitumen Content | ASTM D2172 | 200 tonnes | 100 tonnes |
| Aggregate Coating | ASTM D2489 | 200 tonnes | 100 tonnes |
| Air Voids | ASTM D3203 | 200 tonnes | 75 tonnes |

3.5 DIS-SIMILAR JOINTS

.1 Apply 2mm x 50mm TOK tape against faces of surfaces to be asphalted against.

3.6 ASPHALT PATCHING

.1 Remove existing asphalt by saw cutting in straight lines and removing cut asphalt with suitable excavating equipment to full depth of asphalt.

.2 Provide tack coat on edges of saw cut.

3.6 ASPHALT PATCHING (Cont'd)

.3 Reinstate asphalt to full depth of existing asphalt using mix type C-HF asphalt concrete.

.4 Dispose of excavated asphalt at approved disposal site.

3.7 FINISH TOLERANCES - GENERAL

.1 Finished asphalt surface to be within 6 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.

3.8 FINISH TOLERANCES - LAYDOWN AREA

.1 Finished asphalt to meet requirements of 3.3.

.2 Maximum slope tolerances for operational safety:
.1 1% +/- 0.1%, any area measured using 5m straight edge in roadways.
.2 0.5% +/- 0.1%, any area measured using 5m straight edge in laydown area.

.3 No ponding of rainwater exceeding 0.20$m^2$ surface area is to be observed within boundary of laydown area.

3.9 PROTECTION

.1 Restrict traffic during setting period to prevent damage as directed by the Departmental Representative.

3.10 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to specified density.

.2 Repair areas showing checking or rippling.

.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

.4 If, at any time before the Work is finally accepted, any ravelling, shoving or other fault develops in the pavement as laid, remove all mixed materials in such

3.10 DEFECTIVE WORK (Cont'd)

.4 (Cont'd)

places, cut edges of joints square and paint with tack coat. Place fresh asphalt mixture and compact. Do all such removal and replacement of unsatisfactory material at no additional expense to the Contract.

## PART 1 - GENERAL

1.1 RELATED WORK

.1 Hot Mix Asphalt Paving: Section 32 12 16

1.2 REFERENCES

.1 CAN/CGSB 1.74-2001, Alkyd Traffic Paint.

.2 Manual of Uniform Traffic Control Devices for Canada, 4th Edition, Transportation Association of Canada.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint:
.1 To CAN/CGSB 1.74, alkyd traffic paint.
.2 Colour: yellow 505-308 and white 513-301.
.3 Colour: black for black-out markings.

## PART 3 - EXECUTION

3.1 EQUIPMENT REQUIREMENTS

.1 Paint applicator to be an approved pressure type 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.

3.2 CONDITION OF SURFACES

.1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 APPLICATION

.1 Lay out pavement markings as indicated and to the approval of the Departmental Representative.

.2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within next 4 h.

.3 Apply traffic paint evenly at rate of 3 $m^2$/L where indicated on the Project Drawings.

3.3 APPLICATION (Cont'd)

.4 Do not thin paint unless approved by Departmental Representative.

.5 Symbols and letters to conform to dimensions indicated.

.6 Paint lines to be of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 TOLERANCE

.1 Paint markings to be within plus or minus 12mm of dimensions indicated.

.2 Remove incorrect markings as directed by Departmental Representative.

3.5 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry.

END

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 This Section specifies requirements for the supply and installaltion of chain link fences and gates.

### 1.2 RELATED SECTIONS

.1 Submittal Procedures: Section 01 33 00

.2 Construction/Demolition Waste Management and Disposal: Section 01 74 21

.3 Cast-in-Place Concrete: Section 03 30 00

### 1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM A53/A53M-2012, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
.2 ASTM A90/A90M-2011, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
.3 ASTM A121-07, Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
.4 ASTM A123/A123M-2012, 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.

### 1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Shop Drawings to indicate: dimensions, size of components and anchorage details.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00.

.2 Chain-link fence fabric: to CAN/CGSB-138.1.
.1 Type 1, Class A, Style 1, Grade 2.
.2 Height of fabric: as indicated.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.

.4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.

.5 Barbed Wire: to CAN/CGSB-138.2, 2.5mm diameter.

.6 Tie wire fasteners: steel wire.

.7 Gates to CAN/CGSB-138.4.

.8 Gate frames: to ASTM A53, galvanized steel pipe, standard weight 45mm outside diameter pipe for outside frame, 35mm outside diameter pipe for interior bracing.
.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.
.2 Fasten fence fabric to gate with twisted selvage at top.
.3 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.
.4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.

.9 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy, galvanized steel, malleable or ductile cast iron.
.1 Tension bar bands: 3 mm x 20 mm minimum galvanized steel or 5 mm 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.

2.1 MATERIALS (Cont'd)

.9 Fittings and hardware:(Cont'd)
.4 Provide projection with clips or recesses to hold three (3) strands of barbed wire spaced 100mm apart.
.5 Projection of approximately 300mm long to project from fence at 45 degrees above horizontal.
.6 Turnbuckles to be drop forged.

2.2 FINISHES

.1 Galvanizing:
.1 Chain link fabric: to CAN/CGSB-138.1.
.2 Pipe: to CAN/CGSB-138.2
.3 Barbed wire: to CAN/CGSB-138.2.
.4 For other fittings: to CAN/CGSB-138.2.

PART 3 - EXECUTION

3.1 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 50mm.

3.2 ERECTION OF FENCE

.1 Erect fence along lines as indicated and to CAN/CGSB-138.3.

.2 Excavate post holes to dimensions indicated by methods approved by Departmental Representative.

.3 Space line posts 3m apart, measured parallel to ground surface.

.4 Space straining posts at equal intervals not to exceed 150m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150m.

.5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.

.6 Install corner post where change in alignment exceeds 10 degrees.

.7 Install gate posts on both sides of gate openings.

.8 Install end posts at end of fence where fence ties into existing fence line.

3.2 ERECTION OF FENCE (Cont'd)

.9 Place concrete in post holes then embed posts into concrete to minimum 900mm depth.
.1 Extend concrete 50mm 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 Do not install fence fabric until concrete has cured minimum of five (5) days.

.11 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface.
.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 300mm 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 450mm intervals.
.1 Give tie wires minimum two twists.

.17 Install barbed wire strands and clip securely to lugs of each projection.

3.3 INSTALLATION OF GATES

.1 Install gates in locations as indicated.

.2 Level ground between gate posts and set gate bottom approximately 40mm above ground surface.

.3 Determine position of centre gate rest for double gate.
.1 Cast gate rest in concrete as directed.
.2 Dome concrete above ground level to shed water.

.4 Install gate stops where indicated.

3.4 CLEANING

.1 Clean and trim areas disturbed by operations.

.1 Dispose of surplus material as directed by Departmental Representative.

END

## PART 1 - GENERAL

1.1 WORK INCLUDED

.1 This section specifies requirements for providing topsoil and sod as specified.

.2 Obatin all topsoil from an off-site source as approved by Departmental Representative.

1.2 RELATED WORK

.1 Rough Grading: Section 31 23 13

1.3 SOURCE QUALITY CONTROL

.1 Obtain approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization.

.3 Advise Departmental Representative of source of topsoil to be used seven (7) days in advance of starting work.

.4 Be responsible for soil analysis requirement for amendments to topsoil as specified.

1.4 SCHEDULING

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation after frost has left ground and before June 30 or between August 15 and September 30.

## PART 2 - PRODUCTS

2.1 MATERIALS

.1 Topsoil:
.1 Friable loam, neither heavy clay nor of very light sandy nature, containing minimum 4% organic matter for clay loam, and 2% for sandy loam, to maximum 20% by volume.
.2 Containing no toxic elements or growth inhibiting materials.
.3 Free from debris, subsoil, vegetation, and stones and roots over 50 mm diameter.

2.1 MATERIALS (Cont'd)

.2 Soil amendments:
.1 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded particle minimum size: 5mm.
.2 Limestone:
.1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0mm sieve, 50% passing 0.125mm sieve.
.3 Fertilizer:
.1 Complete, commercial, with 35% soluble nitrogen.

.3 Number One Turfgrass Nursery Sod: Sod that has been especially sown and cultivated in nursery fields as turfgrass crop.
.1 Turfgrass Nursery Sod: Number One Kentucky Bluegrass Sod - Fescue 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 cultivar(s).
.2 Turfgrass Nursery Sod quality:
.1 Not more than 2 broadleaf weeds or 10 other weeds/40 $m^2$.
.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 40 mm.
.3 Mowing height limit: 35mm to 6mm.
.4 Soil portion of sod: 9 to 15mm in thickness.

.4 Water: potable, free of impurities.

.5 Fertilizer:
.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
.2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF EXISTING GRADE

.1 Verify grades are correct. 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. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

.4 Course cultivate entire area to receive topsoil to depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### 3.2 PLACING AND SPREADING OF TOPSOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 100 mm, over unfrozen subgrade free of standing water.

.3 For sodded areas keep topsoil 15 mm below finished grade.

### 3.3 SOIL AMENDMENTS

.1 Apply and thoroughly mix soil amendments and fertilizer into full specified depth of topsoil as determined by soil analysis.

### 3.4 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative. Leave surfaces smooth, uniform and firm against deep footprinting.

3.5 ACCEPTANCE OF TOPSOIL

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading. Approval of topsoil material subject to soil testing and analysis.

.2 Bear costs for soil testing and analysis.

3.6 PREPARATION FOR SODDING

.1 Do not perform Work under adverse field conditions such as frozen soil, excessively wet or dry soil or soil covered with snow, ice, or standing water.

.2 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 9 mm for Turfgrass Nursery Sod, surface to drain naturally.

.3 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.

.4 Cultivate fine grade approved by Departmental Representative to 25 mm depth immediately prior to sodding.

3.7 SOD PLACEMENT

.1 Lay sod within 36 hours of being lifted.

.2 Lay sod sections in rows, longitudinally, along contours of slopes, 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.

3.8 FERTILIZING PROGRAM

.1 Fertilize during establishment and period of maintenance to following program:

| Date | Rate | Ratio |
|---|---|---|
| May | 70 kg/ha | 3:0:0 |
| July | 70 kg/ha | 3:1:3 |
| September | 25 kg/ha | 1:2:3 |

3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance 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 to 100 mm.
.2 Cut grass to 40 mm when it reaches height of 65 mm. Remove clippings which will smother grass.
.3 Maintain sodded areas weed free.
.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.

3.10 ACCEPTANCE

.1 Turfgrass 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 and without weeds.
.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 40 mm.
.4 Sodded areas have been cut minimum three (3) times, and within 24 hours prior to acceptance.
.5 Fertilizing in accordance with fertilizer program has been carried out at least once.

.2 Areas sodded in fall will be accepted in following spring one (1) 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 maintenance period:
.1 Water sodded Turfgrass 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 approval of Departmental Representative.

.3 Cut grass and remove clippings that will smother grass to height as follows:
.1 Turfgrass Nursery Sod:
.1 40 mm during normal growing conditions.
.2 65 mm at end of growing season and during periods of high temperatures and low precipitation.
.2 Cut grass at two (2) week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

3.11 MAINTENANCE DURING WARRANTY PERIOD (Cont'd)

.3 (Cont'd)

.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

## PART 1 - GENERAL

1.1 WORK INCLUDED

.1 This Section specifies requirements for supplying, transporting and placing topsoil and applying seed by the hydraulic method.

.2 Hydroseed all finished areas including ditches and areas not located on the site, but disturbed during construction that are not to be paved, sodded or armoured.

1.2 RELATED WORK

.1 Rough Grading: Section 31 22 13

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00

.2 Provide product data for:
.1 Seed.
.2 Mulch.
.3 Tackifier.

.3 Submit in writing to the Departmental Representative four (4) days prior to commencing Work:
.1 Size of truck slurry tank in litres.
.2 Quantity of material to be used per tank based on size of slurry tank.
.3 Number of tank loads required per hectare to achieve specified slurry mixture per hectare.

1.4 SCHEDULING

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

1.5 DELIVERY AND STORAGE

.1 Deliver seed in original containers showing:
.1 Analysis of seed mixture
.2 Percentage of pure seed
.3 Year of production
.4 Net mass
.5 Date when tagged and location
.6 Percentage germination

1.6 TESTING

.1 Test soil prior to seeding. Apply lime or other soil amendment at rate determined from soil sample to bring pH level to 5.5 to 7.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Topsoil: as specified in Sections 32 91 23.

.2 Seed: Canada "Common No. 1" grade in accordance with Government of Canada "Seeds Act and Regulations".
.1 Grass seed mixture:
.1 40 % Creeping Red Fescue
.2 20 % Reubins Canada Bluegrass
.3 15 % Perennial Ryegrass
.4 15 % Birdsfoot Trefoil xx inoculated
.5 10 % Alsike Clover x inoculated
.2 In containers with original tags.

.3 Mulch:
.1 Fibre: wood or wood cellulose fibre free of germination or growth-inhibiting ingredients, capable of dispersing in water to form homogenous slurry, and forming blotter- like green ground cover allowing absorption and percolation of water.

.4 Fertilizer:
.1 Type 1: (in slurry) complete synthetic, minimum 65% water soluble nitrogen. Ratio 1:4:4.
.2 Type 2: (during establishment) complete synthetic, slow release, with maximum 35% water soluble nitrogen. Ratio 2:1:1.

.5 Tackifier: water dilutable liquid dispersion containing polyvinyl acetate terpolymer emulsion.

.6 Water: potable, free of impurities that would inhibit germination.

2.2 EQUIPMENT

.1 Truck:
.1 Slurry tank: approved commercial hydraulic equipment.
.2 Pumps capable of maintaining continuous non-fluctuating flow of solution.

## PART 3 - EXECUTION

### 3.1 WORKMANSHIP

.1 Take care to prevent contamination by seeding slurry of structures, signs, fences and utilities.

.2 Where contamination occurs, remove seeding slurry to satisfaction of, and by means approved by Departmental Representative.

.3 Do not perform Work under adverse field conditions such as wind speeds over 20 km/h, or on frozen ground or ground covered with snow, ice or standing water.

.4 Perform hydraulic seeding in the spring after snow has melted.

### 3.2 PLACING TOPSOIL

.1 Do not spread topsoil until subgrade has been inspected by Departmental Representative.

.2 Spread topsoil in uniform layer over dry subgrade where seeding is indicated. Do not place topsoil on frozen subgrade.

.3 Bring topsoil to finished grade.

.4 Apply topsoil to depth of 100 mm unless otherwise indicated.

.5 Fine grade topsoil to lines and elevations indicated, leaving material surface smooth and uniform with fine loose texture.

.6 Obtain Departmental Representative's approval of topsoil grade and depth before starting seeding.

### 3.3 SLURRY APPLICATION

.1 Slurry mixture applied per 100 $m^2$.
- .1 Seed: 2 kg.
- .2 Mulch: 10 kg.
- .3 Tackifier: 55 kg (if required)
- .4 Fertilizer: 0.5 kg, Type 1, 5-20-20.
- .5 Water: quantity as required to form slurry in accordance with manufacturer's recommendations.

.2 Apply seed slurry uniformly.

.3 Blend applications into adjacent grass, sodded areas and previous applications to form uniform surface.

3.3 SLURRY APPLICATION (Cont'd)

.4 Re-shoot areas where application is not uniform.

3.4 ESTABLISHMENT

.1 Perform following operations from time of seed application until final acceptance by Departmental Representative.
.1 Water seeded area as required to maintain optimum soil moisture level and to ensure germination and continued growth of grass. Control watering to prevent washouts.
.2 Fertilize seeded areas one month after seeding. Spread evenly and water in well. Use Type 2 fertilizer, ratio 2:1:1 at rate determined by soil test. Postpone fertilizing until following spring if application falls within four week period prior to expected end local growing season.
.3 Repair dead or bare spots to allow establishment of seed prior to acceptance.

3.5 ACCEPTANCE

.1 Areas will be accepted by the Departmental Representative at the end of the maintenance period as stated in Section 32 91 23, Clause 3.9.1 provided that:
.1 Seeded areas are properly established.
.2 Area is free of bare and dead spots.

.2 Areas seeded in the fall will be accepted the following spring one month after the start of the growing season provided acceptance

3.6 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of maintenance period:
.1 Water sodded Turfgrass 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.

.3 Cut grass and remove clippings that will smother grass to height as follows:
.1 Turfgrass Nursery Sod:
.1 40 mm during normal growing conditions.
.2 65 mm at end of growing season and during periods of high temperatures and low precipitation.

3.6 MAINTENANCE DURING WARRANTY PERIOD (Cont'd)

.3 (Cont'd)

.2 Cut grass at two (2) week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

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

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

END

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

.1 The Work specified under this Section consists of furnishing all materials, labour, tools and equipment and performing all operations necessary for the complete reinstatement of surfaces and structures disturbed by work of this Contract.

.2 Repair damage or disturbance to surfaces, properties and structures, within limits of the Site or elsewhere on other properties occupied, traversed or otherwise used by the Contractor during the Contract period to a condition equal to or better than that before Work began, at no additional cost to the Contract.

### 1.2 RELATED WORK

.1 Cast-in-Place Concrete: Section 03 30 00

.2 Excavating, Trenching and Backfilling: Section 31 23 10

.3 Granular Base and Sub-Base Materials: Section 32 11 16

.4 Hot Mix Asphalt Paving: Section 32 12 16

.5 Topsoil and Sodding: Section 32 91 23

.6 Hydraulic Seeding: Section 32 92 19

### 1.3 REFERENCES

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications, latest edition.

### 1.4 MAINTENANCE

.1 Maintain all reinstated areas until final acceptance of the Work.

.2 Repair damaged areas to the approval of the Departmental Representative.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Granular material: in accordance with the requirements of Section 32 11 16.

.2 Concrete material: as specified in Section 03 30 00.

.3 Asphalt material: as specified in Section 32 12 16.

.4 Grass surface materials: as specified in Sections 32 91 23 and 32 92 19.

## PART 3 - EXECUTION

### 3.1 GENERAL

.1 Maintain surfaces to be reinstated level with adjoining existing surfaces gravel until final reinstatement.

### 3.2 CONCRETE SURFACES

.1 Carry out final reinstatement of concrete surfaces as follows:
.1 Cut back broken edges of original pavement to full depth, in straight lines.
.2 Before placing final surface material, remove existing gravel to a depth indicated over disturbed area, grade and recompact. Add gravel to compacted depths indicated. Compact to not less than 100% Maximum Corrected Dry density.
.3 Place and finish concrete in accordance with Section 03 30 00.
.4 Confirm finished surface is even, dense and matches grade of existing road or surface, as approved by the Departmental Representative.

### 3.3 ASPHALT SURFACES

.1 Keep surface of asphalt paved roads and surfaces in good condition by repairing settlement of trench backfilling as described in Section 31 23 10.

.2 Carry out final reinstatement of asphalt surfaces as follows:
.1 Cut back broken edges of original pavement to full depth, in straight lines. Cut back 300 mm minimum from edge of excavation to eliminate tension cracks. Clean contact surfaces and apply tack coat before placing asphalt concrete.

3.3 ASPHALT SURFACES (Cont'd)

.2 (Cont'd)

.2 Before placing final surface material, remove existing gravel to a depth indicated over disturbed area, grade and recompact. Add gravel to compacted depths indicated. Compact to not less than 100% Maximum Corrected Dry density.

.3 Supply, place, roll and compact asphalt mixture in accordance with Section 32 12 16.

.4 Compact asphalt concrete in lifts not exceeding 50 mm in thickness.

.5 Ensure finished surface is even, dense and matches grade of existing road or surface, as approved by the Departmental Representative.

3.4 PAVEMENT MARKINGS

.1 Reinstate pavement markings to Section 32 17 23.

3.5 GRAVEL SURFACES

.1 Reinstate gravel surfaces by placing 200 mm compacted thickness of gravel at an elevation such that gravel surface is smooth and even with adjacent surfaces.

.2 Place and compact gravel for surfaces in accordance with the requirements of Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications.

3.6 GRASS SURFACES

.1 Sodding: to Section 32 91 23. Fine grade areas to be reinstated to smooth surface. Grade to allow for topsoil and sod to be placed so finish grade is smooth and even with existing surfaces.

.2 Seeding: to Section 32 92 19. Fine grade ares to be reinstated to smooth surface. Grade to allow for topsoil placement to match existing grades so finish is smooth and even with existing grades.

END