

This specification outlines the requirements for the supply and the placing of Selected Granular Base Course Class "A", Granular Sub-~~B~~base Class "B", and Maintenance Grade No. 3.

## PART 1 REFERENCES

This specification refers to the following standards, specifications, or publications:

Government of Newfoundland and Labrador, Department of Transportation and Infrastructure (TI), Highway Design and Construction Division, Highway Specifications Book

ASTM International

C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No.200) Sieve in Mineral Aggregates by Washing
C131/C131M	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
D698	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> ))
D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D4718	Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
American Association of State Highway and Transportation Officials (AASHTO)	
T180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in) Drop
T193	Standard Method of Test for the California Bearing Ratio

## PART 2 GENERAL

### .1 Not Applicable

PART 3 PRODUCTS

3.1 MATERIALS

- .1 The granular materials shall be composed of clean, hard, uncoated particles and shall be free from organic matter, clay lumps, and deleterious materials such as shale, slate, ochre and schists.
- .2 Materials from deposits acceptable as to the quality of the particles, but deficient in sizes to provide the required gradation, may be accepted if the Contractor furnishes and satisfactorily incorporates into the product supplementary sizes from other sources to produce the required grading. If the deficiencies occur in Class "A" or Class "B" materials, corrections may be attempted by crushing to a smaller maximum particle size. In that event, the Owner will furnish special grading limits on the actual maximum particle size.
- .3 Materials shall be considered unsuitable, even though particle sizes are within the specified gradation limits, if particle shape or any other characteristic precludes satisfactory compaction or fails to provide a roadway suitable for traffic. If, in the opinion of the Owner, an improved particle shape can be achieved by using a different crushing unit from that proposed by the Contractor, then the Contractor shall supply and use a crushing unit of the type directed by the Owner.
- .3.4 The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, having a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11.
- .4.5 Class "A", Class "B", and Maintenance Grade No. 3 shall be processed by crushing and, when necessary to eliminate surplus fines passing the 4.76 mm sieve, shall be screened and washed.
- .5.6 Granular base material (Class "A") to following requirements:
  - .1 The gradation will be within the limits indicated for Granular "A" in Table 1 Gradation Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course when tested to ASTM C136 and ASTM C117. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11.
  - .2 The physical requirements will meet those indicated for Granular "A" in Table 2 Physical Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course.
  - .2.3 Other properties as follows:
    - .1 Liquid Limit ASTM D4318 Maximum 25.

- .2 Plasticity Index ASTM D4318 Maximum 0.
- .3 Los Angeles Abrasion ASTM C131/C131M maximum 35 % loss by weight.
- .4 Crushed Fragments: 50 %. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.
- .5 CBR: AASHTO T193 minimum 100 when compacted to 100 % of AASHTO T180, Method D.

**.6.7** Granular sub-base material (Class "B") to following requirements:

- .1 The gradation will be within the limits indicated for Granular "B" in Table 1 Gradation Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course when tested to ASTM C136 and ASTM C117. ~~The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, having a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11.~~
- .2 The physical requirements will meet those indicated for Granular "A" in Table 2 Physical Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course.

**.2.3** Other properties as follows:

- .1 Liquid Limit ASTM D4318 Maximum 25
- .2 Plasticity Index ASTM D4318 Maximum 0
- .3 Los Angeles Abrasion ASTM C131/C131M Max 35 % Loss by Weight.
- .4 Crushed fragments: 50 %. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.
- .5 CBR: AASHTO T193 minimum 100 when compacted to 100 % of AASHTO T180 Method D.

**.7.8** Granular sub-base material (Maintenance Grade No. 3) to following requirements:

- .1 The gradation will be within the limits indicated for Maintenance Grades No. 3 in Table 1 Gradation Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course when tested to ASTM C136 and ASTM C117. ~~The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11.~~

.2 The physical requirements will meet those indicated for Granular "A" in Table 2 Physical Requirements in TI, Highway Specifications Book Section 315 Selected Granular Base Course.

.2.3 Other properties as follows:

- .1 Liquid Limit ASTM D4318 Maximum 25.
- .2 Plasticity Index ASTM D4318 Maximum 0.
- .3 Los Angeles Abrasion ASTM C131/C131M maximum 35 % loss by weight.
- .4 Crushed Fragments: 50 %. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.
- .5 CBR: AASHTO T193 minimum 100 when compacted to 100 % of AASHTO T180, Method D.

## PART 4 EXECUTION

### 4.1 INSPECTION OF UNDERLYING SUB-BASE OR SUB-GRADE

- .1 The Contractor shall prepare the road surface in accordance with Section 02231 to the satisfaction of the Owner before commencing placement of any selected granular base course materials.

### 4.2 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Owner.
- .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 The Contractor shall place all granular bases in such a manner as to prevent contamination by other materials and to prevent segregation or degradation. If, in the opinion of the Owner, the methods and techniques used by the Contractor cannot overcome contamination or segregation, or degradation, then the Owner may direct a modification in these methods, which may require the use of an approved spreader box or other acceptable device.
- .6 Remove and replace portion of layer in which material has become segregated during spreading.
- .7 All granular bases shall be placed to full width in uniform layers such that the thickness of the compacted layer does not exceed 150 mm.

- .3.8 Prior to closing down operations for each business day, all granular materials shall be bladed and compacted to the specified density.
- .4.9 The materials shall be sprayed with water when and as directed by the Owner, either to aid compaction or reduce dust nuisance or both. When water is added to aid compaction, it shall be applied immediately ahead of the compacting unit.
- .5.10 Each layer of granular base shall be bladed shaped and compacted as necessary to produce the required profile and cross-section. The finished surface shall not deviate at any place on a 3 m straight edge by more than 20 mm for Class "B" and 10 mm for Class "A". The upper layer shall be maintained to these tolerances and to the specified density until completion of the contract, or until the surface is paved. This may require keeping the moisture content at the appropriate value during periods of dry weather in addition to regrading and recompacting as frequently as may be deemed necessary by the Owner.
- .6.11 Calcium chloride shall be applied uniformly by mechanical means when, and as directed by the Owner.

#### 4.3 SHOULDERING

- .1 Unless otherwise directed by the Owner the placing of granular materials for shoulder construction shall be carried out by means of an approved spreader. Spreader shall consist of a box to hold shouldering material and a suitable mechanism to control the width and rate of application and to prevent material getting onto the pavement.
- .2 Granular materials for shoulder construction shall be placed directly on the shoulder and any spillage and materials dragged onto the pavement surface shall be immediately removed, without damage to the pavement, and the area so affected shall be thoroughly cleaned by the use of a power broom or other suitable method.
- .3 The shoulders shall be sloped to the specified lines, grades and cross-section.
- .4 Shouldering operations shall not commence along any section of pavement until 24 hours have elapsed from the time of completion of the final pavement course in that section, but the shouldering operations shall be completed within the next 24 hours on sections that are open to traffic.

#### 4.4 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.

.2 All Class "A", Class "B", and Maintenance Grade No. 3 materials placed on the roadway, or placed on shoulders, shall be compacted to ~~not less than 100 % of the maximum Standard Proctor dDry dDensity in accordance with~~ ASTM D698, ~~Method D~~.

.4.3 Shape and roll alternately to obtain smooth, even, and uniformly compacted subbase.

.2.4 Compaction operations shall be carried out as closely as possible behind the placing and spreading operation. At the end of each business day, all materials placed shall have been compacted to the specified density.

.3.5 Each layer of material shall be graded and compacted as specified before the next layer is placed.

.4.6 Material must be handled and compacted without segregating or adversely breaking down (such that its gradation falls outside the specified grading limits, as determine by sieve analysis on random samples of the compacted in place material). ~~Frozen material shall not be incorporated into the work and material shall not be placed on a frozen roadbed.~~

.7 Water shall be applied as necessary to facilitate compaction in order to achieve the degree of compaction required. However, it shall not be added in such quantities that it seeps into the underlying subgrade or exceeds the optimum moisture content (as determine by ASTM D698 and ASTM D4718, as applicable) by 1.0 %.

.5 Where necessary to obtain the required compaction, the Contractor shall apply sufficient water by means of an approved distributor.

.8 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Owner.

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

.6.10

4.5 SITE TOLERANCES

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

4.54.6 MAINTENANCE PROTECTION

.1 Maintain finished base in a condition conforming to this section until succeeding material is applied or until granular subbase is accepted by the Owner.

PART 5 PAYMENT

5.1 MEASUREMENT FOR PAYMENT

- .1 Measurement for Payment will only be made for those materials accepted for use under this specification and then only when incorporated into the work at the required locations and thicknesses as indicated on the plans. The contractor shall not be paid more than 110 % of the calculated quantities based on theoretical limits and approved tickets. This additional quantity is included in the MERX Schedule of Quantities and Prices.
- .2 Selected Granular Base and Sub-~~b~~Base Materials will be measured in cubic metres (m<sup>3</sup>) of compacted material incorporated into the work within the areas and to the thicknesses indicated on the Contract Drawings unless otherwise specified. Owner shall indicate in the 01000 Project Specific Specifications if tickets are required.
- .3 Weigh Scales shall be provided by the Contractor and in accordance with Section 01155. The Contractor will supply scale tickets, and the Owner will issue tickets. Only loads certified by the Owner as being placed in the works at the required locations shall be included in measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.
- .4 Excavation of base, sub-base and sub-grade materials to correct deficiencies in sub-grade discovered during placing of base or sub-base will be measured for payment as common excavation in accordance with Section 02224. ~~Imported b~~Backfill borrow of sub-grade with suitable materials will be measured for payment as ~~imported~~ backfill borrow in accordance with Section 02224. Replacement of base and sub-base material will be measured for payment under this section.
- .5 The theoretical quantities will be based on 2.1 tonne/m<sup>3</sup> for Class "A", Class "B", and Maintenance Grade No. 3 regardless of the actual density.

5.2 BASIS OF PAYMENT

- .1 All costs associated with the work outlined in this specification shall be deemed to be included in the appropriate unit and lump sum prices quoted as outlined in the Measurement for Payment subsection of this section and as included in the MERX Schedule of Quantities and Prices.
- .2 Payment at the appropriate contract price for the particular categorytype of Selected Granular Base Course shall be full compensation for all labour, materials, equipment use and any other expenses. This may include expenses to provide a pit or quarry, obtain all required permits and approval, provide and transport pit or quarry samples to the Owner, clear,

grub and strip the pit or quarry, process pit or quarry materials to the gradation and physical requirements for the required type-category of material, provide and maintain a field laboratory, provide scales if required and construct and maintain access road to the source of the material

- .3 Reconditioning of the surface on which the selected granular base course is to be applied and which is required in accordance with Section 2231, but which is not a pay item under that section is incidental to the work.
- .4 Incidental to the work is all haulage of the material from the source to where the material is to be placed, placing, spreading, grading, and compacting the material.
- .5 Also incidental to the work is the cost of any royalties for the material, cleaning up and providing such other restoration to the pit or quarry and the stockpile site as may be required, and any other work necessary to complete the contract item.