

**Wharf Construction**  
**Port Bickerton East**  
**Guysborough County, Nova Scotia**  
**Project No. R.082082.001**

## Granular Sub-Base

PART 1 - GENERAL

- 1.1 Related Work .1 Refer to other Specification Sections for related information.
- .2 Refer to Section 01 33 00 for Shop Drawing/Submissions requirements.
- 1.2 Reference Standards .1 ASTM D698-12e2, 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>)).
- 1.3 Measurement For Payment .1 Granular sub-base will be measured in accordance with Section 01 29 00.
- .2 Backfill will be measured in accordance with Section 01 29 00.

PART 2 - PRODUCTS

- 2.1 Materials .1 Granular sub-base material to Section 31 05 17 and following requirements:
- .1 Crushed stone or gravel consisting of hard durable angular particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 Type 2 (previously Class 'C') granular material gradation will be within the following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
56 mm	100
28 mm	60 - 80
5 mm	25 - 45
0.160 mm	0 - 10

- .3 Backfill material can be material removed during demolition and removal operations provided the material is sorted such that it is free of dredge spoils, timber debris or concrete pieces greater than 300 mm diameter and is approved by the *Departmental Representative*. The *Departmental Representative* shall not be liable for the misunderstanding of the suitability of the in-situ material.

**Wharf Construction**  
**Port Bickerton East**  
**Guysborough County, Nova Scotia**  
**Project No. R.082082.001**

## Granular Sub-Base

- .4 The use of additional backfill material other than the material on site is subject to the approval of the *Departmental Representative* and is to be free from rocks larger than 150 mm, cinders, ashes, sods, refuse, or other deleterious materials.

PART 3 - EXECUTION3.1 Inspection of Existing  
Sub-Base Surface

- .1 Do not place new granular sub-base until underlying backfill material is compacted, inspected and approved by the *Departmental Representative*.

3.2 Placing

- .1 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow or ice.
- .2 Place Type 2 (Class 'C') and backfill material to full width in uniform layers not exceeding 100 mm compacted thickness. *Departmental Representative* may authorize thicker lifts (layers) if specified compaction can be achieved.
- .3 Shape each layer to a smooth contour and compact to specified density before the succeeding layer is placed.
- .4 Remove and replace portion of a layer in which material has become segregated during spreading.

3.3 Compacting

- .1 Compact to density of not less than 98% maximum dry density in accordance with ASTM D698.
- .2 Shape and roll alternately to obtain a smooth, even and uniformly compacted sub-base.
- .3 Apply water as necessary during compaction to obtain specified density. If sub-base is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

3.4 Finish Tolerances

- .1 Granular sub-base compacted thicknesses will be as follows: Type 2 (Class 'C'), thickness as indicated on Drawings.

**Wharf Construction**

**Port Bickerton East**

**Guysborough County, Nova Scotia**

**Project No. R.082082.001**

Granular Sub-Base

- .2 Backfill material will be compacted to the thickness as required to attain the grades indicated on the drawings.
- .3 Finish compacted surface to within plus or minus 25 mm of established grade but not uniformly high or low.
- .4 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.5 Maintenance

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by *Departmental Representative*.
- .2 *Departmental Representative* will pay costs for inspection and testing. Refer to Section 01 45 00.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 Work .1 This section describes the work necessary to place Type 1 and Type 2 (as per NSTIR – NSTPW Standard Highway Construction and Maintenance Manual Latest Edition); granulars as shown on the drawings and as indicated in the specifications. It includes all labour, equipment and material necessary to execute the work.
- 1.2 Related Work .1 Refer to other Specification Sections for related information.
- 1.3 Measurement For Payment .1 Granular base will be measured in accordance with Section 01 29 00.
- 1.4 References .1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-07, 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 1557-07, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .6 ASTM D 1883-07, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

PART 2 - PRODUCTS

- 2.1 Materials .1 Granular Base: Material to Section 31 05 17 and following requirements:
- .1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

- .2 Type 1 (previously Class "A") granular fill gradation will be within following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
20 mm	100
14 mm	50 - 85
5 mm	20 - 50
0.16 mm	0 - 10
0.080 mm	0 - 7

PART 3 - EXECUTION

- 3.1 Inspection of Underlying Sub-Base
- .1 Do not place granular base until finished sub-base surface is inspected and approved by Departmental Representative.
- 3.2 Placing
- .1 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.
- .2 Place using methods which do not lead to segregation or degradation of aggregates.
- .3 Place material to full width in a uniform layer to mm compacted thickness.
- .4 Shape each layer to a smooth contour and compact to specified density before succeeding layer is placed.
- 3.3 Compacting
- .1 Compact to density not less than 98% maximum dry density in accordance with ASTM D698.
- .2 Shape and roll alternately to obtain a smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

- .4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.
- 3.4 Finish Tolerances
  - .1 Finished base surface shall be within plus or minus 10 mm of established grade but not uniformly high or low.
  - .2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.5 Maintenance
  - .1 Maintain finished base in a condition conforming to this section until succeeding material is applied or until acceptance.

**END OF SECTION**

**Wharf Construction**  
**Port Bickerton East**  
**Guysborough County, Nova Scotia**  
**Project No. R.082082.001**

Nominal Clear Stone

Page 1

PART 1 - GENERAL

- 1.1 Related Work
- .1 Refer to other Specification Sections for related information.
  - .2 Refer to Section 01 33 00 for Shop Drawing/Submissions requirements.
- 1.2 Reference Standards
- .1 ASTM C127-15, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
  - .2 AASHTO T85-14, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate.
- 1.3 Submissions
- .1 Product Data/Samples:
    - .1 Provide samples of materials proposed for the work.
  - .2 Methodology:
    - .1 Provide methodology for carrying out the work.
  - .3 Provide submissions in accordance with Section 01 33 00.
- 1.4 Measurement For Payment
- .1 Nominal Clear Stone will be measured in accordance with Section 01 29 00.

PART 2 – PRODUCTS

- 2.1 Materials
- .1 Nominal Clear Stone
    - .1 Material to Section 31 05 17 and to be a stone consisting of hard, durable particles, free from clay lumps, silt, cementation, organic material, frozen material and other deleterious foreign materials. Clear stone to be free from splits, seams or defects likely to impair its soundness during handling or under action of water.
    - .2 Specific gravity of not less than 2.65 when tested to ASTM C127 (AASHTO T85).

**Wharf Construction****Port Bickerton East****Guysborough County, Nova Scotia****Project No. R.082082.001**

## Nominal Clear Stone

- .3 200 mm Clear Stone (type C3) gradation will be within the following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
200 mm	50 - 100
125 mm	0 - 5

- .4 50 mm Clear Stone (type C2) gradation will be within the following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
50 mm	100
25 mm	35 - 45
12.5 mm	0 - 5

- .5 25 mm Clear Stone gradation will be within the following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
38 mm	100
25 mm	90 - 100
12.5 mm	0 - 10

**PART 3 - EXECUTION****3.1 Placement**

- .1 Clear stone can be end dumped provided that no breakage of stone occurs. Any broken rock shall be removed at the contractor's expense.
- .2 Place clear stone at maximum density.

**3.2 Protection**

- .1 Take into account anticipated weather conditions and degree of exposure of site in setting requirements for protection.
- .2 Schedule and carry out construction so that each phase of work is not left exposed longer than necessary.

**Wharf Construction**

**Port Bickerton East**

**Guysborough County, Nova Scotia**

**Project No. R.082082.001**

Nominal Clear Stone

- .3 The Contractor should note that the work site is subject to water level variations due to tidal action.
- .4 The Contractor will be responsible to replace any mattress lost due to storms, tidal erosion or by his own activities.

**END OF SECTION**

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