

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 05 16 - Aggregate Materials

1.2 MEASUREMENT AND PAYMENT

- .1 Measure granular base in tonnes of material incorporated into Work and accepted in writing by Departmental Representative. The granular base price shall include all cost related to supplying, charging, transportation, placement, grading and compaction of the materials. Weighing must be conducted in accordance of OPSS 102, General Specifications for Weighing Materials.

1.3 REFERENCES

- .1 ASTM C117-13, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136-14, 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 D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
- .6 ASTM D1557-12e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
- .7 ASTM D1883-14, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .8 ASTM D4318-10e1, 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 Ontario Provincial Standard Specification (OPSS)
 - .1 OPSS 102, General Specifications for Weighing Materials
 - .2 OPSS 1010, Material Specification for Aggregates – Base, Subbase, Select Subgrade and Backfill Material.
- .4 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Products

2.1 MATERIALS

- .1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

- .1 Crushed stone or gravel.
- .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to OPSS 1010 for granular A aggregate.

- .1 Gradation for Granular A:

Sieve Designation	% Passing
150 mm	-
106 mm	-
37.5 mm	-
26.5 mm	100
19.0 mm	85-100
13.2 mm	65-90
9.5 mm	50-73
4.75 mm	35-55
1.18 mm	15-40
0.300 mm	5-22
0.150 mm	-
0.075 mm	2-8

- .2 Los Angeles degradation: to ASTM C131. Max. % loss by weight: 45
- .3 Crushed particles: at least 60% of particles by mass within each of following sieve designation range to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C136.

Passing		Retained on
26.5 mm	to	19.0 mm
19.0 mm	to	13.2 mm
13.2 mm	to	9.5 mm
9.5 mm	to	4.75 mm

- .4 Soaked CBR: to ASTM D1883, minimum 100, when compacted to 100% of ASTM D1557.

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 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 PLACEMENT AND INSTALLATION

- .1 Place granular base after sub-base surface is inspected and approved in writing by Departmental Representative.
- .2 Placing:
 - .1 Construct granular base to depth and grade in areas indicated.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow and ice.
 - .4 Begin spreading base material on crown line or on high side of one-way slope.
 - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
 - .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
 - .7 Ensure proper scarification of existing base course for proper blending with new aggregates. Equipment shall be capable of scarifying and blending the full width of the roadway to a minimum depth of 100 mm. All teeth on the scarifier shall be in place and adequate to break up the existing roadbed into a uniform, compactable material.
 - .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - .1 Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
 - .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .10 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
 - .1 Ensure compaction equipment is capable of obtaining required material densities.
 - .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.
 - .3 Equipped with device that records hours of actual work, not motor running hours.
- .4 Compacting:
 - .1 Compact to density not less than 100% maximum dry density to ASTM D698.

- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Proof rolling:
 - .1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.
 - .2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.
 - .3 Proof roll at level in granular base as indicated.
 - .1 If use of non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.
 - .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
 - .5 Where proof rolling reveals areas of defective subgrade or sub-base:
 - .1 Remove base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.
 - .2 Backfill excavated subgrade with base material and compact in accordance with this Section.
 - .6 Where proof rolling reveals defective base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with this Section, at no extra cost.

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 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.

3.5 PROTECTION

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

3.6 EXCESS MATERIALS

- .1 Transport excess aggregates at location indicated by Departmental Representative.

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