

**GRANULAR BASE PREP**

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**1.0 GRANULAR BASE AND SUB-BASE**

**1.1 DESCRIPTION**

- .1 This section specifies requirements for supplying, producing, hauling placing and compacting processed gravel or quarried stone as a granular base or sub-base to lines, grades and typical cross sections or as otherwise directed.
- .2 Granular sub-base is defined as the initial layer of granular material placed upon prepared subgrade to form an integral part of the total pavement structure.
- .3 Granular base is defined as the layer of granular material placed upon the compacted granular sub-base or prepared subgrade to form an integral part of the total pavement structure.

**1.2 RELATED WORK**

- .1 Asphalt Prime - Section 05120
- .2 Hot Mix Asphalt Concrete Paving - Section 05140

**1.3 SAMPLES**

- .1 At least two (2) weeks prior to commencing work, inform the Engineer of proposed source of aggregates and provide access for sampling.

**1.4 MATERIALS CERTIFICATION**

- .1 Aggregates: At least two (2) weeks prior to commencing work provide:
  - .1 Test data reports representing granular base and/or granular sub-base processed into stockpile. Submit one complete aggregate gradation analysis report for every 1000 tonnes of each material required for the project, or one complete analysis for each production day when production rate is less than 1000 tonnes. Include percentage of crushed coarse aggregate particles in granular base reports.
  - .2 Certification that the physical properties of the aggregates meet the requirements of this section.
  - .2 Reports and certification shall be provided by an independent testing consultant under the signature and professional seal of a qualified materials engineer.

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- .3 At least two (2) weeks prior to contemplated change in source of aggregates, provide written notification to the Engineer and provide new materials certification in accordance with the requirements of this section.

**1.5 DELIVERY AND STORAGE**

- .1 Deliver and stockpile aggregates in accordance with the requirements of this section.
- .2 Stockpile minimum of 50 (50%) percent of each type of base material required before commencing to haul products to the project site.
- .3 Handle and transport products to avoid segregation, contamination and degradation.
- .4 Stockpile products in sufficient quantities to meet project schedules. When adding new products to the stockpile after removal to the project site has commenced, do not deposit material against working face of stockpile.
- .5 Separate product stockpiles by substantial dividers or stockpile far enough apart to prevent intermixing.
- .6 Reject intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Engineer within 48 hours of rejection.
- .7 Construct stockpiles in uniform lifts using trucks or rubber-tired loading equipment, being careful to avoid spillage of materials over the ends of previously placed lifts. Do not use conveyors or tracked equipment in stockpile construction.
- .8 Provide a previously stabilized stockpile base or provide a compacted sand base not less than 300 mm in depth to prevent contamination. Alternatively, stockpile aggregates on the ground but do not incorporate bottom 300 mm of pile into the work.

**2.0. PRODUCTS**

**2.1 GRANULAR BASE**

- .1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

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.2 Physical properties of Aggregates:

% Fracture, by weight (2 faces)	- 60 min.
Los Angeles Abrasion, loss, %	- 45 max.
Liquid Limit, %	- 25 max.
Plasticity Index, %	- 6 max.
Lightweight particles, %	- 5 max.
California Bearing Ratio, when Compacted to 100% of ASTM D698	- 80 min.

.3 Gradation to be within the following limits when tested to ASTM C-117 with sieve sizes to CAN/CGSBD 8-GP-2M rather than ASTM E11, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
25 000	100
16 000	73 - 94
10 000	56 - 80
5 000	40 - 66
1 250	24 - 45
315	13 - 27
160	9 - 19
80	4 - 10

**2.2 GRANULAR SUB-BASE**

.1 Crushed stone or gravel consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious material.

.2 Physical properties of aggregates:

Los Angeles Abrasion, Loss, %	- 50 max.
Liquid Limit, %	- 25 max.
Plasticity Index, %	- 6 max.
Lightweight particles, %	- 5 max.
California Bearing Ratio when Compacted to 100% of ASTM D698	- 20 min.
Crushed Particles ( 1 face, plus 5 000 sieve fraction),%	- 25 min.

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- .3 Gradation to be within the following limits when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSBD 8-GP-2M rather than ASTM E11, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
75 000	100
25 000	65 - 100
10 000	40 - 100
5 000	30 - 90
2 500	25 - 65
630	15 - 35
160	5 - 15
80	3 - 10

**2.3 SCREENED GRANULAR SUB-BASE**

- .1 Screened stone or gravel consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious material.
- .2 Physical properties of aggregates:
 

Los Angeles Abrasion, Loss, %	- 50 max.
Liquid Limit, %	- 25 max.
Plasticity Index, %	- 6 max.
Lightweight particles, %	- 5 max.
California Bearing Ratio when Compacted to 100% of ASTM D698	- 20 min.
- .3 Gradation to be within the following limits when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSBD 8-GP-2M rather than ASTM E11, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

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<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
75 000	100
25 000	60 - 100
10 000	40 - 80
5 000	25 - 65
630	10 - 35
160	5 - 15
80	3 - 10

**3.0 EXECUTION**

**3.1 PREPARATION**

- .1 The subgrade shall be prepared according to the requirements of Section 05010.2., Excavation and Preparation of Subgrade and to cross-sections shown on drawings. The Contractor shall maintain the subgrade to the specified section, free from ruts, waves and undulations until granular sub-base material is placed. The subgrade shall be in a firm dry condition and must be approved by the Engineer before gravel is placed. The depositing of granular base or sub-base on a soft, muddy or rutted subgrade will not be permitted.

**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 Aggregate. Use approved methods to create uniform windrow of material along a crown line or high side of a one-way slope.
- .3 Place material to full width in layers not exceeding 150 mm in compacted thickness.
- .4 Shape each layer to a smooth contour and compact to the specified density before a succeeding layer is placed.
- .5 Remove and replace any portion of a layer in which material becomes segregated during compaction.

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**3.3 COMPACTING:**

- .1 Moisture condition of granular sub-base and base coarse materials to be within plus or minus 3 percent of the optimum moisture content of the material.
- .2 Compact to density not less than 98% of maximum dry density in accordance with ASTM D698 (Method C or D).
- .3 Shape and compact alternately to obtain a smooth, even and uniformly compacted base.
- .4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

**3.4 FINISH TOLERANCES**

- .1 Finished sub-base and base surfaces 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 materials until surface is within the specified tolerances.

**3.5 MAINTENANCE**

- .1 Maintain finished base in a condition conforming to this section until succeeding material is applied or until acceptance.

**3.6 TESTING**

- .1 The City of Lethbridge shall appoint an independent testing consultant to perform all tests for acceptance in accordance with the requirements of this section. Test data provided by this testing agency shall be final and binding on both the City and the Contractor.

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**4.0 METHOD OF MEASUREMENT AND PAYMENT**

**4.1 FINISHING AND COMPACTING BASE GRAVELS**

- .1 Compaction and finishing of granular sub-base and base shall be paid for at the bid price per unit of finishing and compacting which price and payment shall be full compensation for ploughing and compacting granular base gravels, drying or adding water, fine grading, draining water, repairing base damaged by rain or excessive machinery traffic and any other work incidental to complying with the requirements of this section.

**4.2 METHOD OF MEASUREMENT AND PAYMENT**

- .1 Granular base and granular sub-base shall be measured in tonnes of material delivered to the site, as determined by scales at the Contractor's supply source.
- .2 Material is to be scaled and recorded by the Contractor on duplicate weigh slips. Weigh slips must be signed by both parties at the time of delivery and a copy supplied to the City of Lethbridge.
- .3 The granular material shall be paid for at the contract unit prices, bid per tonne, as listed on the Tender Form, notwithstanding the conditions under which they are an included portion of another unit price item. The payment shall include the furnishing of all material, production, handling, hauling and placing, spreading mixing and compacting the materials on the site.