

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001**

Granular Base

PART 1 - GENERAL

- 1.1 Work .1 This section describes the work necessary to place granular base "Class A" (as per PEI DOTIE Specifications (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 Section 31 23 10 Excavating, Trenching and Backfilling.
.2 Refer to Section 32 12 16 Hot Mix Asphalt Concrete Paving.
- 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 117-13, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
.2 ASTM C 131-14 (No. 200), 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 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³ (600kN-m/m³)).
.5 ASTM D 1557-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³ (2,700kN-m/m³)).
.6 ASTM D 1883-14, Standard Test Method for California Bearing Ratio of Laboratory Compacted Soils.
.7 ASTM D 4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
.8 PEI Department of Transportation, Infrastructure and Energy General Provisions and Contract Specifications for Highway Construction (latest edition).

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PART 2 - PRODUCTS2.1 Materials

.1 Granular Base: Material to meet the 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 Class "A" granular fill gradation will be within following limits:

ASTM SIEVE SIZE	% PASSING BY MASS
31.5 mm	100
25.0 mm	95 – 100
12.5 mm	50 – 83
4.75 mm	30 – 60
1.18 mm	15 – 40
0.600 mm	1 – 32
0.300 mm	5 – 22
0.075 mm	3 - 9

PART 3 - EXECUTION3.1 Inspection of Underlying Fill

.1 Do not place granular base until finished sub-grade surface is inspected and approved by Departmental Representative.

3.2 Placing

- .1 Before and after placing granular base, provide a table of cross section elevations at 15 metre intervals showing the design and as constructed elevations, demonstrating that the surfaces are not uniformly high or low and within grading tolerance.
- .2 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.
- .3 Place using methods which do not lead to segregation or degradation of aggregates.

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| | .4 | Place material to full width in uniform layers not exceeding 150mm compacted thickness. | |
| | .5 | Shape each layer to a smooth contour and compact to specified density before succeeding layer is placed. | |
| 3.3 | <u>Compacting</u> | .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 | <u>Finish Tolerances</u> | .1 | Finished 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 | <u>Maintenance</u> | .1 | Maintain finished base in a condition conforming to this section until succeeding material is applied or until acceptance. |
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Hot Mix Asphalt Concrete Paving

PART 1 - GENERAL

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|-----|--|----|--|
| 1.1 | <u>Description</u> | .1 | This section specifies requirements for supplying, hauling, placing, shaping and compacting of hot-mix asphalt concrete. |
| 1.2 | <u>Reference Standards</u> | .1 | ASTM C136-96a, Sieve Analysis of Fine and Coarse Aggregates. |
| | | .2 | ASTM D995-95b, Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures. |
| | | .3 | ASTM D1559-89, Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus. |
| | | .4 | ASTM D3203-94, Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures. |
| | | .5 | PEI Department of Transportation, Infrastructure and Energy General Provisions and Contract Specifications for Highway Construction (Latest Edition). |
| 1.3 | Related Work
<u>Specified Elsewhere</u> | .1 | Refer to Section 32 11 23 Granular Base. |
| 1.4 | <u>Source Sampling</u> | .1 | Inform Departmental Representative of proposed source of asphaltic concrete, and provide access for sampling at least two weeks prior to commencing hauling this material to plant site. |
| 1.5 | <u>Production Sampling</u> | .1 | Use only material approved by Departmental Representative. |
| | | .2 | One or more samples per day to be taken of mix, or components thereof, being produced to determine compliance with general and special requirements. |
| 1.6 | Measurement
<u>For Payment</u> | .1 | Hot mix asphalt paving will be measured in accordance with Section 01 29 00. |
| | | .2 | Regrading of base material prior to placement of new asphalt will be considered incidental to the work. |
| | | .3 | Supply and application of tack coat will be included in the cost of asphalt. |

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PART 2 - PRODUCTS

- 2.1 Materials
- .1 Hot-mix Asphaltic Concrete design mix formula to be provided to Departmental Representative two weeks prior to commencing paving operations. Submit design mix for review providing at least the following information:
 - .1 Nominal aggregate size
 - .2 Marshall strength at 60°C
 - .3 Marshall stability at 60°C
 - .4 Flow Index
 - .5 Percent Air Voids in Mixture
 - .6 Min. % Voids in Mineral Aggregate
 - .7 Retained Stability
 - .2 Hot mix asphalt paving shall meet the requirements of PEI Transportation, Infrastructure and Energy standard specifications and shall be:
 - .1 Base, Type A.
 - .2 Seal, Type B.
 - .3 Do not change job mix without prior approval of Departmental Representative. Should a change in a material source be contemplated, a new job mix formula to be provided to Departmental Representative and approved prior to installation.
 - .4 Asphalt tack coat meeting the requirement of PEI Transportation, Infrastructure and Energy standard specifications.

PART 3 - EXECUTION

- 3.1 Equipment
- .1 Pavers: Provide mechanical grade controlled self powered pavers capable of spreading mix, within specified tolerances, true to line, grade, and crown indicated on plans.
 - .2 Rollers: Provide sufficient number of rollers of type and weight to obtain specified density of compacted mix.
 - .3 Haul Trucks: Provide trucks of such size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.

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- .2 Covers of sufficient size and mass 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 box.
 - .4 Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.
- .4 Hand Tools:
 - .1 Provide lutes or rakes with covered teeth during spreading operation when finishing by hand.
 - .2 Provide straight edges, 2.4 m in length to test finished surface.
 - .3 Provide tamping irons having weight not less than 12 kg and a bearing area not exceeding 310 sq. cm for consolidating material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, approved by Departmental Representative, may be used instead of tamping irons.
- 3.2 Preparation
- .1 When paving over existing asphalt surface, clean pavement surface to remove dust, contaminants, loose and foreign materials, oil and grease and apply asphalt tack coat.
 - .2 Prior to laying mix, clean surfaces of loose and foreign material.
- 3.3 Transportation of Mix
- .1 Transport mix to job site in vehicles cleaned of foreign material which may affect mix.
 - .2 Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as often as required. After this operation, elevate truck bed and thoroughly drain; no excess solution is permitted.
- 3.4 Placing
- .1 General
 - .1 Place asphalt mixtures only when base of lower course is dry and air temperature is above 5°C.
 - .2 When surface temperature on which material is to be placed falls below 10°C, provide extra rollers to compact mix before it cools too much to obtain required density.
 - .3 Do not mix and place hot-mix asphalt when moisture of aggregate in stockpile or from dryer interferes with quality
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of mix production or with normal plant operations, or when pools of water are observed on surface to be paved.

- .2 Construct asphalt concrete to design depth, width, and grade.
 - .3 Place asphalt concrete mix at temperature not less than 120°C at time of placing.
 - .4 Place asphalt concrete mix in layers with minimum thickness of 25 mm.
 - .5 Commence spreading at high side of pavement or at crown.
 - .6 Employ experienced rakers to correct irregularities prior to rolling.
 - .7 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges to true line markings.
 - .2 When paving against a compacted mixture that has cooled, paint edge of previously laid lane with a thin coating of asphaltic material or heat joint with an Infra Red-type joint heater mounted on side of paving machine.
 - .3 When segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .4 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .5 Correct irregularities in surface of pavement course directly behind paver.
 - .8 When hand spreading is used:
 - .1 Distribute material uniformly. Broadcasting of material will not be permitted.
 - .2 Provide heating equipment used for keeping hand tools free from asphalt. Prevent high heating temperatures which may burn material. Temperature of tools when used shall not be greater than temperature of mix being placed.
- 3.5 Compacting
- .1 Start rolling operations as soon as placed mixture can bear mass of roller without undue displacement of material or cracking of surface.

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- .2 Operate roller slowly initially to avoid displacement of material. Subsequent rolling not to exceed 5 km/h for steel-wheeled rollers and 8 km/h for pneumatic-tired rollers.
 - .3 Overlap successive trips of roller by at least one half width of roller and alternate trip lengths.
 - .4 Keep wheels of roller slightly moistened with water to prevent pick-up of material, but do not over water.
 - .5 Roll material continuously to a density not less than 98% of density obtained with marshall specimen prepared from plant mix.
 - .6 General:
 - .1 Provide minimum two rollers paver and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be a pneumatic-tired type.
 - .2 Operate rollers at a slow but uniform speed with drive roll or wheel nearest paver.
 - .3 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling. Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .7 Breakdown Rolling:
 - .1 Commence breakdown rolling immediately following rolling of longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
 - .4 Use only experienced roller operators for this work.
 - .8 Second Rolling:
 - .1 Use pneumatic-tired, tandem or vibratory rollers and follow breakdown rolling as closely as possible and while
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paving mix is still of a temperature that will result in maximum density from this operation.

- .2 Rolling shall be continuous after initial rolling until mix placed has been thoroughly compacted.

- .9 Finish Rolling:

- .1 Accomplish finish rolling with two-axle tandems or three-axle tandems while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, Departmental Representative shall specify use of pneumatic-tired rollers.
- .2 Conduct rolling operations in close sequence.

3.6 Joints

- .1 General:

- .1 Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
- .2 Paint joint face with thin coat of hot asphalt cement or cut back asphalt or preheat joint face with approved heater, prior to placing of fresh mixture.
- .3 Overlap previously laid strip with spreader by 100 mm.
- .4 Rake fresh mixture against joint and thoroughly tamp and roll.
- .5 Remove any material from surface of previously laid strip.
- .6 Do not throw surplus material on freshly screened mat surface.

- .2 Longitudinal Joints:

- .1 Roll longitudinal joints directly behind paving operation.
- .2 Before rolling, carefully remove with a lute or rake, and discard coarse aggregate in material overlapping joint.
- .3 Ensure joints are offset at least 150 to 200 mm from those in lower layers.

3.7 Finish Tolerances

- .1 Finish pavement surfaces smooth and true to design line, crown, and grade.
 - .2 Remove irregularities exceeding 5 mm when checked with a 2.4 m long straight edge placed in any direction and replace with new material and compact.
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.3 Use straight edge at transverse joints and along pavement to check for surface irregularities.

3.8 Defective Work

.1 Repair areas showing checking or hairline cracking to the approval of the Departmental Representative.