



4130 - SPECIFICATION FOR HOT-MIX BITUMINOUS SAND BASE COURSE

4130 - 1 DESCRIPTION

- 1.01 The work shall consist of screened aggregate and bituminous binder mixed in a central plant and spread and compacted on a prepared surface.
- 1.02 The requirements of this specification shall apply in all respects to Hot-Mix Bituminous Sand Base Course in Urban Areas, when specified in the tender form.
- 1.03 In sections 1, 2, and 3 of this Specification, the following definitions will apply:

Bituminous aggregate - the screened aggregate

Bituminous mix aggregate-the mix after the addition of filler

Bituminous mix - the mix after the addition of bituminous binder

Bituminous base course - the mix in place on the road, during and after spreading and compacting.

4130 - 2 MATERIALS

- 2.01 The Department will supply and pay for the bituminous binder.
- 2.02 Bituminous mix aggregate shall be composed of fragments of durable rock free from undesirable quantities of soft or flaky particles, shale, loam, and organic or other deleterious material.
- 2.03 Bituminous mix aggregate shall meet the gradation requirements listed in the Special Provisions, except that, if necessary to develop the desired mix characteristics the Engineer may require a bituminous mix gradation which falls outside these requirements. If this action is necessary, the new gradation limits will be specified and the Contractor shall be required to adjust the quantity of filler required for the change in gradation.

4130 - 3 CONSTRUCTION

General

- 3.01 Overburden shall be removed from material deposits in accordance with the requirements for removal of Overburden (Specification 2260).
- 3.02 The bituminous aggregate shall be screened over a fifty (50) millimetre screen.
- 3.03 for Stockpiling filler shall be performed in accordance with the requirements for Stockpiling Binder, Filler and Blender Sand (Specification 3400) and sufficient Filler shall be in stockpile for a minimum of twenty-four (24) hours of plant operation. Bituminous aggregate for bituminous mix shall be stockpiled. Stockpiles of bituminous aggregate shall be constructed in accordance with the requirements Stockpiling Aggregates (Specification 3600).
- 3.04 The bituminous mix design will be established by the Engineer. The approximate design quantities of bituminous binder, bituminous aggregate, and filler, will be determined after the start

of the initial bituminous aggregate production. During the course of the work, the bituminous mix design may be adjusted if necessary.

- 3.05 After mixing operations commence, the Contractor shall always have sufficient screened bituminous aggregate in stockpile for at least ten (10) hours of plant operation until screening operations have been completed.
- 3.06 Bituminous binder shall be stored in tanks provided with adequate heating and positive control of temperature.
- 3.07 Storage tanks shall not be partitioned to store more than one (1) bituminous material.
- 3.08 Mixing operations shall be performed in a stationary mixing plant.
- 3.09 Any rejected bituminous mix shall be disposed of as directed by the Engineer.

Plant Requirements

- 3.10 The bituminous aggregate, binder, and filler feeds shall be co-ordinated and the materials fed to the drier at a uniform rate.
- 3.11 A registering pyrometer shall be installed at the discharge end of the drier to indicate the temperature of the dried aggregate.
- 3.12 The drier shall be equipped with a dust collector.
- 3.13 The dried aggregate shall be screened over a twenty-five (25) millimetre screen.
- 3.14 On continuous mix plants, the aggregate storage bin shall be equipped with a belt type feeder to accurately proportion the aggregate. The screen and storage bin unit shall be enclosed such that fines are not lost due to wind.
- 3.15 On continuous mix plants, the aggregate and asphalt feeds shall be positively interlocked.
- 3.16 Batch plants shall be capable of accurately proportioning all materials.
- 3.17 The asphalt pump shall be the position displacement type.
- 3.18 The mixer shall be a twin-shaft pugmill.

Plant Operation

3.19 Temperatures shall be controlled in accordance with the following limits:

Type of Asphalt	DEGREES CELSIUS		
	Maximum Temperature of Dry Aggregate	Asphalt Storage Temperature	Bituminous Mix Temperature at the Pugmill
To be Specified in Special Provisions	175	135 - 160	135 - 150

3.20 The bituminous aggregate, immediately before entering the pugmill, shall contain not more than one (1) percent moisture by weight.

3.21 Aggregate particles shall not be coated with residue from improper fuel combustion.

3.22 Because of the degradation of the bituminous aggregate during processing, the Contractor may waste all or part of the dust collector material to meet the gradation limits.

3.23 The bituminous mix aggregate shall be dry mixed in the pugmill for a minimum of fifteen (15) seconds. The wet mixing time shall be a minimum of thirty (30) seconds. The wet mixing time shall be increased if the bituminous mix aggregate is not completely coated with the bituminous binder.

3.24 Bituminous mix will not be accepted if the variation in the percentage of bituminous binder varies by more than five-tenths (0.5) of one percent from the design percentage.

Delivering to the Road

3.25 The vehicles used to haul the bituminous mix to the paving machine shall be compatible with the size and capacity of the paving machine.

3.26 The bituminous mix shall be hauled in vehicles previously cleaned of all accumulations of bituminous mix and foreign materials. The inside surface of all vehicles used for hauling bituminous mix shall be sprayed with diesel fuel or soap solution prior to loading, but excess of lubrication will not be permitted. The use of gasoline, kerosene or similar products will not be permitted.

3.27 Prior to unloading into the paving machine, the temperature at a depth of eight (8) centimetres below the surface of the bituminous mix shall be not less than the minimum mix temperature required in the paving machine as specified in Section E, following.

3.28 Loaded or empty trucks shall not be turned around at points where damage may be caused to the surface or slopes of the road.

Spreading

- 3.29 If required, a tack coat shall be applied in accordance with the requirements for Bituminous Prime, Tack and Flush Coat (Specification 4000).
- 3.30 Before the bituminous mix is spread, loose dirt or other objectionable material shall be removed, from the surface to be paved, by brooming and other methods.
- 3.31 Bituminous mix shall be spread on dry surfaces.
- 3.32 Bituminous mix shall be spread by a self-propelled paving machine.
- 3.33 The depth of any compacted lift of bituminous surface course shall be not less than five (5) centimetres and not greater than the total thickness specified on the plans provided all the requirements of the specification are met.
- 3.34 Bituminous mix shall be spread at the following temperatures:

Type of Asphalt	Minimum Mix Temperature in the Paving Machine Degrees Celsius
To be specified in the Special Provisions	125

- 3.35 The contact edges of the mat shall be coated with a thin layer of emulsified asphalt or hot bituminous binder before the bituminous mix is placed against them.
- 3.36 Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with emulsified asphalt or hot bituminous binder before placing the bituminous mix.
- 3.37 When paving is discontinued in any lane, the bituminous base course shall be feathered to a slope of ten (10) to one (1). The taper may be placed on tar paper to facilitate removal when paving is resumed. The transverse joint shall be straight and have a vertical face when the taper is removed.
- 3.38 The surface of the mat behind the paving machine shall be true to cross-section, and have a uniform, close texture.

Compacting

- 3.39 Bituminous mix shall not be spread when the atmospheric temperature is less than two (2) degrees Celsius and secondary rolling of the bituminous base course shall be completed before the temperature of the mat falls below fifty-five degrees Celsius (55°C).
- 3.40 The rolling of each lift of bituminous surface course will be performed in the following manner:
 - (a) Initial or breakdown rolling shall consist of one complete coverage of the bituminous surface course and shall be performed with a steel-tired tandem roller or a 3-wheel steel-tired roller weighing not less than nine (9) tonnes.
 - (b) The initial or breakdown rolling shall be followed by secondary rolling consisting of eight (8) complete coverages with a pneumatic-tired roller weighing not less than eighteen (18) tonnes or twelve (12) complete coverages with a pneumatic-tired roller weighing not less than

fourteen (14) tonnes, both sizes of roller having contact pressure not less than nine kilopascals (9 kPa).

- (c) The final rolling of the final lift shall be performed with a steel-tired tandem roller or a 3-wheel tired roller weighing not less than seven (7) tonnes. Such rollers shall work as required to remove waves, hairline cracks, roller marks, and other unevenness from the finished surface of the mat.
 - (d) The final rolling of lower lifts shall be performed until the lift is sufficiently smooth to ensure that no irregularities will be duplicated in the final lift.
 - (e) The final minimum density as determined by test 9215 shall not be less than ninety-five (95) percent of the standard density. Should this minimum density not be obtained with the amount of rolling described above the Engineer may designate that additional rolling be done.
 - (f) Should this additional rolling result in densities less than ninety-five (95) percent of the standard density then the Contractor shall make available a pneumatic-tired roller that is capable of varying the tire pressures up to twelve kilopascals (12 kPa).
 - (g) Payment for the above mentioned additional rolling that is requested by the Engineer will be on an extra work basis.
- 3.41 Steel rollers shall be kept slightly moistened by water. Steel rollers shall be equipped with scrapers. Excessive use of water will not be permitted.
- 3.42 The speed of steel tire rollers shall not exceed five kilometres per hour (5 km/h). The speed of pneumatic-tire rollers shall not exceed eight kilometres per hour (8 km/h).
- 3.43 Rollers shall be operated with the drive roll or wheels nearest the paving machine.
- 3.44 Longitudinal joints shall be rolled directly behind the paving operation.
- 3.45 After the longitudinal joints and edges have been compacted, rolling shall start longitudinally at the edge and gradually progress toward the centre of the mat, except that on superelevated curves, rolling shall progress from the lower to the upper edge.
- 3.46 The line of rolling shall not be suddenly changed or the direction of rolling suddenly reversed. Any pronounced change of direction shall be made on stable material.
- 3.47 The roller shall not be driven onto or off the mat over the longitudinal edge of the mat.
- 3.48 Rollers shall not be permitted to stand on the mat unless the mat has thoroughly cooled.
- 3.49 The finished surface of the mat shall be free from waves, hairline cracks, roller marks, depressions and other unevenness.
- 3.50 If the finished surface of the mat does not comply with the aforementioned riding quality requirements the Contractor shall either remove and replace or recap the deficient section(s) at his own expense. The replacement of the mat and/or placement of a recap shall be performed with a paving machine and shall comply with the specified riding quality requirements.

- 3.51 If designated by the Engineer, a flush coat shall be applied in accordance with the requirements for Bituminous Prime, Tack, and Flush Coat (Specification 4000).

4130 - 4 MEASUREMENT

- 4.01 Hot-Mix Bituminous Sand Base Course will be measured in tonnes.

4130 - 5 PAYMENT

- 5.01 Payment for HOT-MIX BITUMINOUS SAND BASE COURSE will be at the contract unit price per tonne.
- 5.02 The unit price will be full compensation for removing overburden; excavating, screening, stockpiling, drying the aggregate; heating and storing the bituminous binder; and mixing, loading, dumping, spreading, compacting, and finishing the bituminous base course. The unit price will also be full compensation for adding binder, filler, and blender sand at the central mixing plant.
- 5.03 Payment for HAULING HOT-MIX BITUMINOUS SAND BASE COURSE will be at the contract unit price per tonne kilometre in accordance with the requirements for Haul (Specification 2405).
- 5.04 Payment for HOT-MIX BITUMINOUS SAND BASE COURSE IN PLACE will be at the contract unit price per tonne. The unit price will be full compensation for removing overburden; excavating, screening, stockpiling and drying the aggregate; heating and storing the bituminous binder; and mixing, loading, hauling, dumping, spreading, compacting, and finishing the bituminous base course. The unit price will also be full compensation for adding binder, filler, and blender sand at the central mixing plant.
- 5.05 Payment for hauling binder, filler, and blender sand will be in accordance with the requirements for Haul (Specification 2405).
- 5.06 Payment for tack coat and flush coat will be in accordance with the requirements for Bituminous Prime, Tack, and Flush Coat (Specification 4000).
- 5.07 Payment for HOT-MIX BITUMINOUS SAND BASE COURSE IN URBAN AREAS will be at the contract unit price per tonne. The unit price will be full compensation for those items indicated under Payment for Hot-Mix Bituminous Base Course.
- 5.08 Payment for hauling hot-mix bituminous sand base course in urban areas will be at the contract unit price for Hauling Hot-Mix Bituminous Surface Course.
- 5.09 Payment for HOT-MIX BITUMINOUS SAND BASE COURSE IN PLACE IN URBAN AREAS will be at the contract unit price per tonne. The unit price will be full compensation for those items indicated under Payment for Hot-Mix Bituminous Sand Base Course in Place.