



4150 - SPECIFICATION FOR COLD-MIX BITUMINOUS SURFACE COURSE

4150 - 1 DESCRIPTION

- 1.01 The work shall consist of crushed aggregate and bituminous binder mixed and placed on a prepared surface at the locations and in conformity with the lines, grades, and dimensions shown on the plans or as designated by the Engineer.
- 1.02 For the purpose of this specification, the following definitions will apply:

- Bituminous aggregate** - The crushed aggregate.
- Bituminous mix aggregate** - The mix after the addition of filler or blender sand.
- Bituminous mix** - The mix after the addition of bituminous binder.
- Bituminous surface course** - The mix in place on the road during and after spreading and rolling.

4150 - 2 MATERIALS

- 2.01 The Department will select and pay for the bituminous binder.
- 2.02 Where the Contractor elects to road mix, the bituminous binder shall generally be an MC-250 MC-800, SC-250 or SC-800 type of liquid asphalt or HF-500M type emulsified asphalt.
- 2.03 Where the Contractor elects to plant mix using a drier and haul the bituminous mix directly to the road, the bituminous binder shall generally be an MC-800, SC-800 type of liquid asphalt or HF-1000M type emulsified asphalt.
- 2.04 Where the Contractor elects to plant mix and stockpile the bituminous mix prior to spreading, only an MC-250 or SC-250 type of liquid asphalt or HF-500M type emulsified asphalt shall be used.
- 2.05 When the aggregate is provided from Department stockpiles, as shown on the plans or as indicated in the special provisions, it will not require further crushing; however, it may be necessary to add filler and/or blender sand in order to meet the desired mix characteristics.
- 2.06 When the Contractor produces the aggregate it shall meet the specification for Cold-Mix Bituminous Surface Course Aggregate (Specification 4140).
- 2.07 When the bituminous mix is provided from Department stockpiles, as shown on the plans or as indicated in the special provisions, it will not require further plant processing; however, the bituminous mix may require additional bituminous binder and/or additional bituminous aggregate to meet the desired mix characteristics.

4150 - 3 CONSTRUCTION

General

- 3.01 The cold-mix bituminous surface course may be constructed with any machine, combination of machines or equipment that will produce results meeting the requirements for bituminous binder application, mixing, spreading, compaction, and finishing as controlled by the specifications.
- 3.02 Materials shall be handled in a manner such that segregation of the coarser and finer fractions will not occur.
- 3.03 Stockpiling filler or blender sand shall be done in accordance with the requirements for Stockpiling Binder, Filler, and Blender Sand (Specification 3400).
- 3.04 When storage tanks are used, the bituminous binder shall be stored in tanks provided with adequate heating and positive temperature control. Storage tanks shall not be partitioned to store more than one type of bituminous material.
- 3.05 The bituminous mix design will be established by the Engineer to determine the exact proportions of bituminous binder, bituminous aggregate, filler and/or blender sand required.
- 3.06 During the course of the work, the bituminous mix design may be adjusted if necessary.
- 3.07 Where the Contractor elects to mix the bituminous aggregate and bituminous binder on the road, any filler and/or blender sand required will be mixed with the bituminous aggregate during the crushing operation.
- 3.08 If bituminous mix is stockpiled, the operation shall conform to the following requirements:
 - (a) Bituminous mix shall be stockpiled in such a manner that it will not be compacted by equipment on the stockpile.
 - (b) If a conveyor belt is used, the free fall distance from the conveyor belt to the stockpile shall not be more than two metres.
 - (c) The height of the stockpile shall be not less than four metres.
 - (d) If stockpiled bituminous mix must be carried over from one construction season to the next, the surface of the stockpile(s) shall be uniformly sprayed with an MC-30 type of cut-back asphalt.
- 3.09 The bituminous mix shall be hauled in vehicles 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.
- 3.10 Loaded or empty trucks shall not be turned around at points where damage may be caused to the surface or slopes of the road.

- 3.11 A mechanical spreader capable of spreading bituminous aggregate, bituminous mix aggregate or bituminous mix in uniform windrows at the specified quantities shall be used when dumping material on the roadway.

Mixing

- 3.12 Regardless of the method of mixing elected by the Contractor, the bituminous mix shall conform to the following requirements:

- (a) The bituminous aggregate, immediately prior to the addition of the bituminous binder, shall contain not more than two percent moisture by weight.
- (b) The percentage of bituminous binder added shall not vary by more than 0.5 of one percent from the design percentage.
- (c) The temperature of the bituminous binder when added to the aggregate shall conform to the following limits:

Type of Bituminous Binder	Temperature Degrees Celsius
MC - 250	60 - 100
MC - 800	80 - 120
SC - 250	60 - 100
SC - 800	80 - 120
HF - 500M	50 - 90
HF - 100M	50 - 95

- 3.13 When the Contractor elects to mix the materials in a central plant, the bituminous mix and the operation shall conform to the following requirements:

- (a) A heat sensing device shall be installed to indicate the temperature of the dried aggregate at the discharge end of a drier, and to indicate the temperature of the bituminous mix at the discharge end of a drum mixer. The maximum temperature of the dry aggregate leaving a drier shall be 120 degrees Celsius.
- (b) For a drum mixer the maximum temperature of the bituminous mix at the discharge end shall be 100 degrees Celsius.
- (c) The drier or drum mixer shall be equipped with a dust collector.
- (d) All plants shall be capable of accurately proportioning all materials.
- (e) The asphalt pump shall be the positive displacement type.
- (f) Aggregate particles shall not be coated with residue from improper fuel combustion.
- (g) 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.

- (h) If a drum type mixer is used, the aggregate shall enter the drum at the burner end and travel parallel to the flame and exhaust gas stream. The asphalt shall enter the drum by way of a nozzle which may be moved along the length of the drum. Heating shall be controlled to prevent excessive oxydization of the asphalt.
 - (i) Regardless of the method of mixing, a uniform mixture shall be produced in which all particles are thoroughly coated. The mixing time will be increased if the bituminous mix aggregate is not completely coated with the bituminous binder.
- 3.14 When the Contractor elects to use motor graders, pulvi-mixers and similar equipment to mix the materials on the road, the bituminous mix and the operation shall conform to the following requirements:
- (a) The prepared surface shall be primed prior to the dumping of the bituminous aggregate. The mixing operation shall be carried out in a manner which will prevent damage to the prime coat.
 - (b) The bituminous aggregate shall be bladed into an even windrow prior to adding the bituminous binder.
 - (c) The bituminous binder shall be applied with a distributor equipped with the appliances and devices and meeting the adjustments and requirements contained in the Specification for Prime, Tack and Flush Coat (Specification 4000).
 - (d) Mixing shall be carried out only when the surface on which the mixing is being done is dry.
 - (e) The asphalt binder shall be added to such portions of the windrow of aggregate as will permit satisfactory and uniform application of the bituminous binder and satisfactory mixing of the bituminous binder and aggregate. Each portion of the windrow shall be thoroughly and satisfactorily mixed before commencing the mixing of the next portion. The portions so mixed shall then be combined into one windrow and the resultant windrow thoroughly mixed prior to commencing spreading.
 - (f) At the completion of mixing, the bituminous mix shall contain no more than two percent moisture by dry weight.
 - (g) If a partially mixed windrow or portion of a windrow becomes water soaked due to rain, the mixture shall be spread, rolled over frequently and allowed to dry until it contains not more than two percent moisture by dry weight. More bituminous binder may then be added.
 - (h) Water trapped in pools alongside a windrow of mix shall be drained immediately by making trenches across the windrow.
 - (i) Mixing shall not be carried on when the atmospheric temperature is less than two degrees Celsius.

Spreading

- 3.15 When required, a tack coat shall be applied in accordance with the requirements for Bituminous Prime, Tack and Flush Coat (Specification 4000).
- 3.16 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.
- 3.17 Bituminous mix shall be spread on a primed, dry surface.
- 3.18 The bituminous mix shall not be spread when the prepared surface is frozen and/or when the atmospheric temperature is less than two degrees Celsius.
- 3.19 Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with bituminous binder before placing the bituminous mix.
- 3.20 Where the Contractor elects to road mix, or use a central plant mix with no drier, the bituminous mix shall be allowed to cure for a minimum of 24 hours prior to commencing spreading. The bituminous mix shall be spread not later than 72 hours after the completion of mixing unless prevented by rain.
- 3.21 When the Contractor elects to mix the materials in a central plant using a drier or a drum mixer, the length of bituminous mix placed on the road, including the section being spread, shall be not greater than three kilometres.
- 3.22 When the Contractor elects to use a motor grader to spread the mix, generally the edge of the surfacing shall be laid first. The surface shall be laid so the outside edge is in line with the stakes or string line placed to mark the edge of the surfacing. Sufficient blading shall be done until the surface is smooth.
- 3.23 The bituminous mix, at the time of spreading, shall contain not more than two percent moisture by weight.
- 3.24 The thickness of the bituminous surface course shall be uniform.
- 3.25 When the Contractor elects to spread the bituminous mix with a self-propelled paving machine(s), the paving machine(s) shall be equipped with automatic screed controls for the control of longitudinal and transverse slope and joint matching, as recommended or supplied by the manufacturer of the paving machine. The first pass of bituminous surface course shall be controlled as to grade by reference to a ski having a minimum length of nine metres, or a floating beam or travelling string line.
- 3.26 The transverse slope control shall be set for the cross-section specified by the Engineer. The automatic control device shall be capable of being operated from either side of the paving machine and shall be equipped with indicator lights to show when the automatic controls are adjusting the screed.
- 3.27 The thickness of the compacted lift of bituminous surface course will be as indicated on the plans, the special provisions, or as designated by the Engineer.

- 3.28 Longitudinal points will not be allowed between the centreline and the outside edge of the driving lane in the final lift of bituminous surface course, unless permitted by the Engineer.
- 3.29 The minimum mix temperature in the paving machine shall be 65 degrees Celsius.
- 3.30 If required, the contact edges of the mat shall be coated with a thin layer of hot bituminous binder before the bituminous mix is placed against them.
- 3.31 When paving is discontinued in any lane, the bituminous surface course shall be feathered to a slope of ten centimetres horizontal to one centimetre vertical. 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.
- 3.32 The surface of the mat behind the paving machine shall be true to cross-section, and have a uniform, tight texture.
- 3.33 Bituminous material shall not be placed or allowed to fall on the previously laid mat or the existing pavement when it is not to be overlaid.

Rolling

- 3.34 The mat shall be rolled with a straight axle, pneumatic-tired roller(s), having a rolling pressure of 35 kilograms per centimetre width of tire.
- 3.35 Before the Contractor starts work he shall provide the Engineer with the empty and ballasted weights of all rollers to be used on the contract. The weights may be actual scale weights or as per the manufacturer's specification sheets.
- 3.36 Rolling shall commence at the outer edges of the mat and progress towards the centre, except that on superelevated curves rolling shall progress from the lower to the upper edge. Rolling shall continue until the surface of the mat is smooth and all loose material is tied down.
- 3.37 If the mat bleeds or ravels because of improper procedures by the Contractor, the mixture shall be reworked and aggregate added, if required, at no direct expense to the Department.
- 3.38 When designated by the Engineer, a flush coat shall be applied in accordance with the requirements for Bituminous Prime, Tack and Flush Coat (Specification 4000).

4150 - 4 MEASUREMENT

- 4.01 Cold-mix bituminous surface course will be measured in tonnes of bituminous mix delivered to the road if the Contractor elects to use a plant mix method.
- 4.02 Cold-mix bituminous surface course will be measured in tonnes of bituminous mix aggregate delivered to the road if the Contractor elects to use a road mix method.
- 4.03 Cold-mix bituminous surface course from stockpile will be measured in tonnes or cubic metres of bituminous mix delivered to the road.

4150 - 5 PAYMENT

- 5.01 Payment for COLD-MIX BITUMINOUS SURFACE COURSE will be made at the unit price per tonne. The unit price will be full compensation for removal of overburden; excavating, crushing, screening, stockpiling (when the aggregate is not available in stockpiles), drying the aggregate; heating and storing the bituminous binder; and mixing, loading, dumping, spreading, and rolling the bituminous surface course and placing salvaged or imported gravel on the shoulders, if applicable. The unit price will also be full compensation for the addition of the filler and/ or blender sand at the crushing or mixing plant.
- 5.02 Payment for HAULING COLD-MIX BITUMINOUS SURFACE COURSE will be made at the unit price per tonne kilometre in accordance with the requirements for Haul (Specification 2405).
- 5.03 Payment for COLD-MIX BITUMINOUS SURFACE COURSE IN PLACE will be made at the unit price per tonne. The unit price will be full compensation for removal of overburden, excavating, crushing, screening, stockpiling (when the aggregate is not available in stockpiles), drying, heating and storing the bituminous binder, mixing, loading, hauling, dumping, spreading, and compacting and finishing the bituminous surface course and placing salvaged or imported gravel on the shoulders, if applicable. The unit price will also include the addition of filler and/or blender sand at the crushing or mixing plant.
- 5.04 Payment for COLD-MIX BITUMINOUS SURFACE COURSE FROM STOCKPILE will be made at the unit price per tonne or per cubic metre as indicated in the tender form. The unit price will be full compensation for loading, dumping, spreading, and compacting and finishing the bituminous surface course. Payment for the addition of bituminous binder and/or bituminous mix aggregate at the road, if required, will be on an Extra Work basis.
- 5.05 Payment for COLD-MIX BITUMINOUS SURFACE COURSE IN PLACE FROM STOCKPILE will also be full compensation for hauling to the road.
- 5.06 Payment for HAULING COLD-MIX BITUMINOUS SURFACE COURSE FROM STOCKPILE will be made at the unit price per tonne kilometre or cubic metre kilometre as indicated in the tender form, in accordance with the requirements for Haul (Specification 2405).
- 5.07 Payment for hauling filler or blender sand to the crushing or mixing plant will be made in accordance with the requirements for Haul (Specification 2405).
- 5.08 Payment for prime, tack and flush coats will be made in accordance with the requirements for Bituminous Prime, Tack and Flush Coat (Specification 4000).