SPECIFICATIONS FOR ASPHALT PAVING ON BRIDGES

1052. 1. DESCRIPTION

The work will consist of the supply of labour, equipment, tools and materials necessary for the application of the tack coat and the placing and compaction of the asphaltic hot mix on the bridge deck and approach slabs. The thickness of the pavement shall be as specified on the plans or in the Special Provisions.

1052. 3. MATERIALS TO BE SUPPLIED BY THE CONTRACTOR

3.1 Tack Coat

The tack coat shall consist of RS-1 emulsion or RC-0 liquid asphalt.

3.2 Asphalt Cement

The asphalt cement shall be of 150/200 penetration, homogeneous, free from water and shall not foam when heated to 150^0 C. This material shall meet the Province of Manitoba Specification for Asphalt Cement (latest edition).

3.3 Aggregate

The aggregates shall be combined in such proportions as to produce a mixture conforming to the gradation limits by mass shown in the following table:

Sieve	% Passing
16.0 mm	100
9.5 mm	70 - 85
4.75 mm	50 - 65
2.00 mm	35 - 50
425 um	15 - 30
75 um	2 - 6

Mixes laid to a compacted thickness of less than 25 mm shall not contain aggregate particles retained on the 9.5 mm sieve.

The aggregate retained on the 4.75 mm sieve shall:

(i) consist of clean, hard, tough, durable, angular particles with a rough surface texture,

(ii) be free from organic material, adherent coatings of clay, clay balls, an excess of thin particles or any other extraneous material,

(iii) contain not less than 40% percent by mass of crushed particles, and

(iv) have not less than 40% of the particles with at least two fractured faces.

When tested for abrasion in accordance with the Los Angeles Rattler Test ASTM designation C 131 (latest edition), the aggregate shall not have a mass loss of more than 25%. In addition, no 15% by mass portion of the prepared test sample, composed of particles selected by hand, shall show a loss exceeding 50%m by mass. Aggregates with objectionable polishing characteristics will not be accepted.

1052. 3. MATERIAL TO BE SUPPLIED BY THE CONTRACTOR (Cont'd)

3.3 Aggregate (Cont'd)

The aggregate passing the 2.36 mm sieve shall be angular, natural sand or a combination of natural sand and crushed stone screenings. It shall comply with ASTM designation D 3515 (latest edition).

The aggregate passing the 75 um sieve shall be free from organic matter and clay particles and shall have a plasticity index not greater than 4 when tested by:

(i) the ASTM designation D 423 (latest edition) method for the liquid limit of soils, and

(ii) the ASTM Designation D 424 (latest edition) method for the plastic limit and plasticity index of soils.

The aggregate shall not contain more than 5% by mass of shale.

3.4 Caulking Compound and Miscellaneous Joint Materials

Caulking compound and miscellaneous joint materials shall be as shown on the plans.

3.5 Cement

Normal Portland cement shall be used for dusting the rubberized asphalt waterproofing.

1052. 5. EQUIPMENT

5.1 Plant for Asphalt Pavement

The plant used to manufacture the asphalt pavement shall be subject to the approval of the Engineer and shall have the following features:

(a) Capacity shall be at least 36.0 t per h of finished products.

(b) The dryer shall be a rotating type drum capable of heating the aggregates to the temperatures as set forth in these Specifications.

(c) The plant shall contain an accurate means for mixing the asphalt and the aggregates in the proper proportions.

(d) Asphalt shall be heated to the specified temperature in approved tanks and shall be delivered to the plant by means of insulated pipes so that no loss of heat occurs.

5.2 Distributor

The distributor used in applying the liquid bituminous tack coat shall be of a type and size approved by the Engineer, and so constructed and equipped as to meet the following requirements:

(a) It shall be capable of applying bituminous material on the deck and approach slabs in accurately measured quantities.

1052. 5. EQUIPMENT (Cont'd)

5.2 Distributor (Cont'd)

(b) It shall be equipped with:

(i) A heating unit capable of maintaining the asphalt in the tank at the specified temperature.

(ii) A thermometer so placed as to accurately measure the temperature of the material in the tank.

(iii) A tachometer operated by an independent wheel, or a similar suitable device, which will allow the operator to determine the correct travel speed for applying the specified quantity of asphaltic material.

(iv) A pressure gauge to indicate to the operator that the required nozzle pressure is being maintained.

(v) Spray nozzles, with quick acting positive shutoff, of a design which will ensure a uniform fan-shaped spray.

(vi) A strainer on the discharge line to prevent clogging.

(vii) A spray bar of adjustable length that can be raised or lowered.

(viii) A spray bar having a heating device, asphalt circulation system, or other device which will provide a uniform viscosity of material in all portions of the spray bar.

(ix) A hose and nozzle attachment to be used for spraying, by hand, areas inaccessible to the distributor spray bar.

(c) On smaller bridge decks, the use of manual spraying equipment suitable for applying the liquid bituminous material uniformly at the desired rate will be allowed.

5.3 Spreader

The Contractor shall spread the bituminous paving material by means of a self-propelled mechanical paver complete with screed. The paver shall be equipped with both automatic and manual controls capable of adjusting the screed to produce the required profile, cross section and longitudinal joint matching. Unless otherwise permitted, the paver shall be operated using automatic controls. The automatic control of profile shall be accomplished by reference to a floating beam or skid. The beam or skid shall have a minimum length of 9 m. A floating beam shall be supported by wheels or skis in a floating tandem arrangement. The number and arrangement of wheels or skis and the nature of the beam or skid shall be subject to the Engineer's approval whose decision will be final. When paving adjacent to a newly laid lane on final lift or adjacent to a curb, control of profile may be accomplished by reference to a shoe on the adjacent final lift or curb.

The speed of the paver shall be maintained at a uniform rate that is in balance with the actual plant production.

1052. 5. EQUIPMENT (Cont'd)

5.3 Spreader (Cont'd)

The paver shall produce a uniformly textured surface free from tearing, tracking or other objectionable surface irregularities. If the surface condition is not acceptable, spreading operations shall cease until equipment adjustments, repairs or replacement are made. Spreading operations shall not recommence without the approval of the Engineer. Delays and expense entailed in adjustments, repairs or replacement of equipment shall be the responsibility of the Contractor.

The sequence of spreading operations in respect to lanes and lifts shall be as directed by the Engineer.

5.4 Compaction Equipment

The Contractor shall supply:

(a) One self-propelled steel wheeled roller, either tandem or three-wheeled, weighing at least 9.0 t.

(b) One self-propelled pneumatic tired roller weighing at least 1 350 kg per wheel. Tire inflation pressures shall be form 480 to 620 kPa.

(c) Hot iron tampers and mechanical vibratory tampers.

NOTE: The use of the self-propelled pneumatic tired roller shall be mandatory.

1052. 7. CONSTRUCTION METHODS

7.1 Application of Tack Coat

The bridge deck and approach slabs, unless covered with rubberized asphalt waterproofing, shall be thoroughly cleaned by means of a power broom and compressed air. All surfaces to which the tack coat is to be applied shall be dry and free from scale, dirt, grime, grease, oil or other contaminants.

A tack coat of RS-1 emulsion or RC-0 liquid asphalt, shall be applied to the entire surface of the deck and approach slabs. The quantity used shall not exceed 550 mL/m^2. Curbs, medians, manholes and all other like appurtenances having a vertical face shall receive a brushed-on application of tack coat to the height of the compacted asphalt mat. All puddles or other excess of the tack coat, shall be thoroughly spread out by brushing the material over the surrounding surface.

The vertical surfaces of the existing curbs, medians, manholes, and all other like appurtenances and the bridge deck areas within one foot of such abutting surfaces, shall receive a further coating of paving grade (150/200 penetration) asphalt cement.

The treated surface shall be allowed to cure until it becomes tacky before applying the asphalt mix. A tack coat will not be required on surfaces covered by rubberized asphalt waterproofing.

1052. 7. CONSTRUCTION METHODS (Cont'd)

7.2 Testing

All materials supplied by the Contractor to be permanently incorporated in the finished product are subject to the inspection and approval of the Engineer prior to and during their use in construction.

Coarse and fine aggregate samples shall be submitted by the Contractor to the Department's Testing Laboratory for testing and mix design purposes at least 14 d prior to their use in the work. Each sample shall contain not less than 25 kg, and the Contractor shall assume all costs incurred in obtaining and shipping the samples. In conjunction with the submission of the test samples, the Contractor shall notify the Engineer as to the source of supply of the aggregates to be used in this work.

Preliminary approval of the quality and nature of the aggregates submitted in the samples will not constitute general acceptance of all the aggregates at the source of supply. If any aggregate sample is of a quality or nature not suitable for use in the asphalt mix, additional samples shall be supplied until an aggregate is approved as being suitable.

The Engineer will take random field samples and conduct quality control tests on the materials, including the asphalt hot mix. If any material or the asphalt hot mix is proven to be of inferior quality, the Engineer will reject such material and no payment will be made for the rejected material. In cases where asphaltic materials have already been laid and are proven in later tests to be inferior, the Contractor shall remove such material and replace it with proper material at his own expense.

7.3 Composition of Asphalt Mixture

The asphalt mix shall consist of asphalt cement and coarse and fine aggregates. The mix design will be determined from actual trial mixes prepared at the Department's Testing Laboratory. This mix design will be supplied to the Contractor within 14 d of the date of submission of aggregate samples that are subsequently approved by the Testing Laboratory. It is the Contractor's responsibility to ensure that the asphalt hot mix is supplied according to the design mix.

The in-place asphalt shall meet the following requirements when tested by the 50 blow Marshall design method:

Stability	1,000 minimum
Flow	8-16
Air Voids	2 - 5%
V.M.A.	15% minimum
Density	98% of Lab. density

Asphalt mixes not meeting these requirements will be rejected.

7.4 Preparation of Asphalt Mixture

The dry mixing time of the aggregates shall not be less than 10 s.

The asphalt cement shall be heated and brought to a temperature of not less than 120^0 C nor more than 150^0 C at the time of mixing. After the introduction of the asphalt cement into the pugmill, mixing shall be continued for 30 to 40 s as required to fully coat the aggregate.

1052. 7. CONSTRUCTION METHODS (Cont'd)

7.4 Preparation of Asphalt Mixture (Cont'd)

Aggregate temperature shall be within $\pm 15^0$ C of the asphalt cement temperature, but in no case less than 120^0 C.

Temperature of the mix leaving the pugmill shall not exceed 140^0 C.

Temperature of the mix at the time of spreading and breakdown rolling shall not be less than 115^0 C.

7.5 Transportation of Asphalt Mixture

The mixture shall be transported from the mixing plant to the work in vehicles with tight boxes having metal bottoms previously cleaned of all foreign materials. When directed by the Engineer, the vehicles shall be suitably insulated. Each vehicle shall be equipped with a closely fitting tarpaulin of canvas or other suitable material of sufficient size to overhang the truck box on all sides when the vehicle is loaded. Tarpaulins shall be used to completely cover the mixture at all times, even during the placing of the load into the spreader.

All loads not properly covered will be rejected.

7.6 Placing Asphalt Mixture

Asphalt shall be placed by means of a mechanical self-propelled spreader capable of placing the mixture uniformly without distortion or tearing.

The spreader shall be capable of spreading the mixture true to the elevations, grades and crown as given on the plans. Particular attention shall be paid to the setting of the spreader when laying the mixture in the areas adjacent to protruding joints in order to avoid bumps in the areas of such joints. The allowable variation in the surface across a protruding joint shall not exceed 6 mm when measured using a 3 m straight edge centred on the joint. In correcting the areas adjacent to a joint or when removing excess mixture, the material shall be picked up and not cast on the surface of the freshly spread asphalt.

Immediately after the course is screeded, and before roller compaction is started, the remainder of the surface shall be checked, all inequalities adjusted, and all fat spots removed and replaced with satisfactory material. Irregularities in alignment and grade along the curb shall be corrected by the addition or removal of mixture before the edge is rolled.

The speed of the spreader shall be maintained at a uniform rate that is in balance with the amount of asphalt being delivered to the bridge site.

The Contractor shall apply a tack coat between successive lifts as directed by the Engineer.

7.7 Precautions When Paving Over Rubberized Asphalt Waterproofing

The Contractor shall undertake the following precautionary measures when paving on or in the vicinity of surfaces covered with rubberized asphalt waterproofing.

(a) The rubberized asphalt waterproofed surfaces shall be dusted uniformly with cement in such a way that the surface is completely covered by a thin layer of cement;

1052. 7. CONSTRUCTION METHODS (Cont'd)

7.7 Precautions When Paving Over Rubberized Asphalt Waterproofing (Cont'd)

(b) As a spreader proceeds onto the rubberized asphalt waterproofed surface, the tracks of the spreader shall be cleaned of stones and other foreign objects and continuously dusted with cement;

(c) In the event that the spreader has to cross a rubberized asphalt waterproofed surface other than during asphalt spreading operations, the Contractor shall place plywood continuously underneath the tracks of the spreader to protect the surfaces from damage. The rubberized asphalt waterproofed surfaces under the plywood shall be dusted with cement;

(d) The Contractor shall not allow the spreader to twist or turn on the rubberized asphalt waterproofed surface, whether travelling directly upon it or on the protective plywood. Any maneuvers required to return the spreader to its starting point, or for any other reason, shall be done outside areas covered by the rubberized asphalt waterproofing;

(e) If deemed necessary by the Engineer, the Contractor shall do additional cement dusting along the wheel lines of any trucks delivering the asphalt mixture or of any other equipment crossing the rubberized asphalt waterproofed surfaces;

(f) Equipment including asphalt trucks shall not park on top of rubberized asphalt waterproofed surfaces;

(g) The Contractor shall not allow the cement used for dusting to accumulate. Any surplus cement dust shall be removed prior to paving over the rubberized asphalt waterproofing.

If any damage occurs to the rubberized asphalt waterproofing as a result of the Contractor's operations, the damage shall be repaired by the Contractor at his own expense and to the satisfaction of the Engineer.

7.8 Compaction of Asphalt Mixture

The breakdown and finishing operations shall be carried out by a steel three-wheeled or tandem roller. The intermediate rolling shall be done by a self-propelled pneumatic-type roller. Delays in rolling freshly-spread mixture will not be tolerated. All areas next to vertical curb and median faces and protruding deck joints shall be worked with hot iron tampers, mechanical vibratory tampers or by other means satisfactory to the Engineer.

7.9 Construction Joints in Asphalt

Longitudinal and transverse joints shall be made in a careful manner in order to assure a well-bonded, sealed and level joint. A transverse joint shall be cut back to its full depth perpendicular to the mat at the end of the run. On resuming laying of the paving mixture, the exposed edges shall be painted with a thin coat of hot asphalt cement.

Before placing the paving mixture against them, all contact surfaces of longitudinal joints, curbs, leaders, etc., shall be painted with a thin coat of hot asphalt cement, as well as heated with a propane joint heater.

The allowable variation in the surface across a transverse joint shall not exceed 6 mm when measured using a 3 m straight edge centred on the joint.

1052. 7. CONSTRUCTION METHODS (Cont'd)

7.9 Construction Joints in Asphalt (Cont'd)

In raking joints, excess mix material shall be picked up and removed from the surface of the freshly spread asphalt.

7.10 Joints in Asphalt at Ends of Precast Deck Units

When called for on the plans, the Contractor shall, after the completion of the asphalt paving, saw-cut the asphalt in the transverse direction for the full roadway width at every pier and abutment to the dimensions as shown on the plans. The joints shall then be constructed in accordance with the plans.

7.11 Weather

Paving of asphalt to be laid to a compacted thickness of less than 40 mm shall not be started unless the air temperature is at least 10^0 C and rising and, furthermore, not until all frost or moisture has evaporated to leave a dry surface. For greater thicknesses of asphalt pavement, the temperature requirement may be reduced to 5^0 C, providing the temperature is rising.

7.12 Protection of Exposed Bridge Surfaces

Utmost care shall be taken to prevent the surfaces of the curbs and medians above the compacted asphalt mat, as well as the newel posts and the guardrailing, from being disfigured by materials such as the tack coating, caulking compound, cement and asphalt mixture. If the exposed surfaces are marred as a result of the Contractor's operations, restoration shall be made by the Contractor at his expense and to the satisfaction of the Engineer.

1052. 9. METHOD OF MEASUREMENT

Asphalt paving will be measured on a mass basis. The quantity to be paid for will be the total number of tonnes of asphaltic hot mix used to pave the area specified on the plans.

The supplying and placing of the tack coat and cement, the supplying and placing of the caulking compound and miscellaneous joint materials, as well as the saw cutting of the joints, will be considered incidental to the Unit Price for "Asphalt Paving" and no separate measurements or payments will be made for these items.

1052. 11. BASIS OF PAYMENT

Asphalt paving will be paid for at the contract Unit Price per tonne for "Asphalt Paving", measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the work included in these Specifications.