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SPECIFICATIONS FOR BITUMINOUS PAVEMENT AND RECYCLED BITUMINOUS PAVEMENT

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SPECIFICATIONS FOR BITUMINOUS PAVEMENT AND RECYCLED BITUMINOUS PAVEMENT

## 800. 1 SCOPE

These Specifications govern all operations necessary for and pertaining to the construction of a hot mixed bituminous pavement.

**1.1 Pre-Construction Meeting**

The Contractor and his Superintendent shall attend a pre-construction meeting with the Regional Construction Engineer and Departmental staff, at a mutually agreed upon date, to discuss the project. The meeting shall be initiated by the Contractor and be held in advance of commencing his field operations. Topics to be discussed will include the type and quantity of equipment to be used, sequence of work, traffic control, ~~accessible~~ **accessibility and storage capacity** for train equipped trucks delivering asphalt cement and other pertinent topics.

At the pre-construction meeting the Contractor shall provide the location of the mixing plant.

## 800. 3 MATERIALS

## 3.1 Aggregates

The Contractor shall supply aggregates in accordance with the requirements of the Specifications for Aggregate for Bituminous Pavement.

**3.2 Asphalt Cement**

Asphalt cement detailed in the Special Provisions will be supplied to the Contractor.

When the asphalt cement is transported to the job site storage by means of tank trucks, the Contractor shall perform the following at his own expense and to the satisfaction of the Engineer:

- a) Arrange with the supplying company the points of delivery and the time and quantity to be shipped. When requested, the Contractor shall supply the Engineer with a copy of orders and instructions respecting the shipment.
- b) Provide and maintain a storage area, and upon completion of the work restore the area to a satisfactory condition.
- c) Provide storage facilities of sufficient capacity to store all asphalt cement ordered to the job site.
- d) Calibrate storage tanks and make calibration tables or charts available to the Engineer prior to the start of operations and make convenient provision for asphalt cement samples to be taken from storage tanks by the Engineer.
- e) Provide suitable unloading facilities including a pump and armoured hoses. Unload asphalt cement provided it is delivered at a temperature within the specified **delivery temperature mixing range**.
- f) Pay overtime standby charges for the Supplier's trucks except when the Supplier is responsible for the delay. Overtime standby is defined as the waiting period at the job site unloading point, after a free waiting time allowance of 2½ hours has been exceeded for unloading any delivery of ordered asphalt cement.
- g) Pay transportation charges on asphalt cement returned to the Supplier for all causes, except in the case of the Supplier making a faulty deliver.

The Contractor will be permitted to order a partial load of asphalt cement to complete the work.

Asphalt cement which the Contractor intends to use on projects other than the Contract shall be stored in separate tanks. The Engineer may permit the use of the same tank provided the tank is equipped with an approved meter on the discharge line, or there is some other approved method to determine the quantity of asphalt cement used on other projects.

On projects where the asphalt cement is supplied by the Department and the Contractor arrives on a project with asphalt cement not owned by the Department, the Department will purchase the asphalt cement by Extra Work providing the asphalt is suitable. The price to be paid will be the price which the Department will pay for asphalt cement to be used on the project. Item (vi) of Section 4.5(c) of the General Conditions (15% overhead) will not be paid.

When the Contractor completes a project where the asphalt cement is supplied by the Department, the Contractor shall purchase surplus asphalt cement from the Department at the unit price shown on the Purchase Order, plus tax. The cost of surplus asphalt cement will be deducted from progress payments.

### 3.3 Verification of Asphalt Cement Received

The Contractor shall locate a weigh scale within 300m of the mixing plant. Each ramp shall be constructed straight and to the same elevation as the scale platform for a distance equal to at least the length of the platform.

When the Department's weigh scale operator is on duty, tank trucks delivering asphalt cement will be weighed after unloading in order to verify the quantity of asphalt cement received. Axle loadings will be permitted for the verification of asphalt cement delivered.

When the Department's weigh scale operator is not on duty, the Contractor shall receive and unload all asphalt cement delivered. The Department will use plant checks or tank dips to verify the quantity of asphalt cement received. Shortages will be deducted from progress payments.

### 3.4 Asphaltic Materials Supplied By Contractor

**When the asphaltic material is to be supplied by the Contractor it will be identified in the special provision.**

**All asphaltic materials and additives must come from pre-approved suppliers and meet current Manitoba Specifications outlined in the Grading and Surfacing Approved Products List at <http://www.gov.mb.ca/mit/mateng/product.html>.**

## 800. 5 EQUIPMENT

### 5.1 Inspection of Plant and Equipment

Equipment required for this work shall be in satisfactory working condition and so maintained for the duration of the work.

Equipment shall be on the site and available for inspection, testing and approval before paving operations commence.

The Engineer shall have access to all parts of the plant and equipment for purposes pertaining to the work.

### 5.2 Mixing Plants

The plant shall be one of the following types:

- A drum mix plant

- A continuous mix plant
- A batch mix plant

The output of the plant shall be as approved by the Engineer, and within the manufacturer's specifications, with regard to plant size, discharge, temperature and the amount of moisture that must be removed from the aggregate.

## 5.2.1 Drum Mix Plants

### 5.2.1.1 Cold Aggregate Feed

The cold aggregate feed unit shall contain separate bins for each aggregate, supplementary material and V.M.A. additive. Combining of these materials to meet the mix design shall be accomplished by means of adjustable gates and variable speed feed belts on each bin. The Contractor shall provide vibrators or other devices as may be required to ensure a uniform flow of material from each bin.

The Contractor shall provide a vibrating screener on the main feed belt. The maximum size of the screen opening shall be: Virgin mixes 37.5mm, recycled mixes 62.5mm. Field conditions may necessitate a smaller screen.

The total flow of aggregate shall be metered by an electronic weigh belt system which has an indicator that can be monitored by the plant operator, and which is interlocked with a variable speed asphalt cement pump so that the proportions of aggregate and asphalt cement entering the drier-mixer remain constant.

### 5.2.1.2 Plant Operation and Controls

The weighing systems for aggregates and asphalt cement shall have provision to enable convenient calibration without having the material enter the drier-mixer.

The heating, coating and mixing of the bituminous material shall be accomplished in a parallel flow drier-mixer. Heating shall be controlled to prevent fracture of the aggregate or excessive oxidization of the asphalt cement. The system shall be equipped with automatic burner controls and shall provide for continuous temperature sensing of the bituminous material at discharge, with a printing recorder that can be monitored by the plant operator. The printed record of mix temperatures shall, if requested, be delivered to the Engineer at the end of each week.

The mixing period and temperature shall be such as to produce a uniform mixture in which all the particles are thoroughly coated with asphalt cement. The asphalt cement metering system shall be capable of controlling the asphalt cement content of the mix to within plus or minus 0.2%.

For recycled bituminous pavement, the mixing plant shall be capable of causing thorough degradation of the reclaimed material by heating without adversely affecting the quality of the asphalt cement, and of blending the virgin materials and reclaimed materials to create a homogeneous mixture.

The control panel for a drum mix plant shall have the following indicators, recorders and controls:

- Individual variable quantity feed controls which govern the output from each feed bin and a master variable quantity feed control which governs the combined output from the bin feeders.
- A belt scale totalizer showing accumulated weight of aggregate delivered to the drier-mixer.

- Provision for compensating for the moisture content of the material in each or all of the feed bins.
- An indicator showing the computed total weight per hour of aggregate (corrected for moisture content) delivered to the drier-mixer.
- A control for setting the required percentage of asphalt cement based on the weight of dry aggregate and a control to allow for a change in the specific gravity of asphalt cement.
- A counter from which the accumulated volume of asphalt cement delivered to the drier-mixer can be determined, but excluding asphalt cement being circulated in the storage tanks.
- A continuously recording instrument to indicate mix temperature at discharge from the drier-mixer.
- A master switch to start the asphalt cement and aggregate feeds simultaneously and a master switch to stop the asphalt cement and aggregate feeds simultaneously.

#### 5.2.1.3 Storage for Bituminous Material

A metal storage bin covered with either a metal top, insulated tarpaulin or other approved covering which:

- has a capacity equal to at least 20% of the Manufacturer's maximum rated production per hour of the drier-mixer; and
- has material introduced to it through an automatically controlled batching device; and
- is equipped with strain gauges or high and low level lights; and
- is elevated and discharges bituminous material through the base of the silo directly into hauling vehicles.

### 5.2.2 Continuous Mix and Batch Mix Plant

#### 5.2.2.1 Cold Aggregate Feed

Separate aggregate feeds capable of delivering a uniform flow of material to the drier shall be provided for each separate stockpile of aggregate, supplementary material and V.M.A. additive being used to produce the final mix.

Where blending of materials from one or more sources is required to meet the Specifications, materials shall be placed in separate stockpiles.

#### 5.2.2.2 Plant Operation and Controls

The plant shall be equipped with interlocking automatic controls to ensure that;

- The operation of the plant is independent of any operator; and
- The correct proportioning of the aggregates and the asphalt cement is achieved.

Continuous mix plants shall contain an asphalt cement metering system to accurately indicate the accumulated quantity of asphalt delivered to the pugmill and a pressure gauge located between the meter and the pugmill spray bar.

Batch plants shall be equipped with a batch counter.

The aggregate shall be fed through the drier where it shall be heated without burning. The plant shall provide for continuous temperature sensing of the dried aggregate at discharge.

The drier shall be equipped with a dust collector arranged so that any part or all of the dust may be returned to the hot stone elevator.

After drying, the aggregate shall be passed over vibrating screens to separate the aggregate by size into two or more hot bins. The screens shall be kept clean and in good repair at all times. The amount of undersize material in the coarse bin and the amount of oversize material in the fine bin shall remain reasonably constant and shall not be more than ten percent by weight of the total aggregate in any sample taken from any bin.

Aggregate shall be mixed dry in the pugmill for not less than 10 seconds. The asphalt cement shall then be added and mixing continued until all aggregate particles are uniformly coated and the asphalt cement is uniformly distributed throughout the mixed material. The wet mix time shall be not less than 30 seconds.

The temperatures of the asphalt cement and aggregate entering the pugmill at any time shall not differ from each other by more than 15°C.

The automatic controls shall be such that the mixing operation is automatically shut down when;

- in the case of batch mix plants, there is insufficient material in any one hot bin to make up the batch.
- in the case of continuous mix plants, the level of the aggregate in any one hot bin drops below one-third full.

## 800. 7 CONSTRUCTION METHODS

### 7.1 Mixing Bituminous Pavement

Prior to commencing mixing operations the plant shall be calibrated by the Engineer. The Contractor shall notify the Engineer at least three days in advance of when the plant will be completely ready for calibration. The Contractor shall supply necessary men and equipment to assist in the calibration. Calibration may commence during the mix design period but mixing operations shall not commence until the mix design is completed.

**The Contractor shall locate a certified weigh scale at all times within 300m of the mixing plant for calibration, silo scale verification (random checks), taring trucks, and to use as a backup in case of silo scale malfunction. Each ramp shall be constructed straight and to the same elevation as the scale platform for a distance equal to at least the length of the platform. This scale is to remain on site for the duration of the bituminous paving operations.**

The plant settings for asphalt cement, aggregate, supplementary material and V.M.A. additive for the bituminous material shall be established by the Engineer in accordance with the mix design, and adjusted as required by the Engineer during paving operations.

The bituminous material shall be controlled to maintain the mix design gradation and asphalt cement content which yields the required air voids.

When **normal start and stop** mixing operations result in reject mix exceeding an average of 10t/day, the Contractor will be **charged** assessed the cost of the asphalt cement in the excess reject mix. The average reject will be calculated on a five day operation **and prorated for blocks less than 5 days at seasonal shutdown or completion of the project. All other reject will be assessed as a direct charge back to the contractor at the discretion of the engineer. Reject mix will be kept separate from the RAP pile being used on the project.**

During mixing operations, plant checks are required to determine the asphalt cement content and plant output shall be carried out as directed by the Engineer.

When producing the bituminous material, sufficient aggregate quantities shall be maintained in stockpile at the plant site for at least four days operation of the mixing plant at its rated capacity.

All aggregate, supplementary material and V.M.A. additive required for the final lift shall be produced prior to commencing the production of the final lift of bituminous material.

At the completion of the project there may be surplus final lift material in stockpiles. If requested by the Contractor, the Department will purchase up to 10% of the quantity of each material used in the final lift of bituminous pavement, except for V.M.A. additive material. When coarse and fines are produced from the same source no compensation for over crushing will be considered unless both products are remaining. An equal percentage of each products proportion of the final lift mix will be purchased. The quantity of surplus material purchased will be determined by weight or volume measurement. Each material purchased will be paid for at the applicable rate set out in the Provisions for Interim Payments.

Stockpile site agreements, if required, will be obtained by the Department. When requested by the Engineer, surplus material purchased shall be loaded and hauled by the Contractor on the basis of Extra Work.

**7.2 Asphalt Cement Working Temperatures**

The asphalt cement shall be heated in a storage tank to a working temperature within the range as specified herein or as directed by the Engineer. Provision shall be made for determining the temperature of the asphalt cement at or near the discharge end of the feed line.

Specified mixing temperature ranges, in degrees Celsius, shall apply as follows;

Asphalt Cement

<b>PG 58/34</b>	<b>145 - 160</b>
<b>PG 58/34 P</b>	<b>150 - 165</b>
<b>PG 58/37 P</b>	<b>150 - 165</b>
<b>PG 58/40 P</b>	<b>150 - 165</b>
120/150 Type "A"	140 - 160
150/200 Type "A"	130 - 155
200/300 Type "A"	120 - 145
300/400 Type "A"	110 - 135
SC 3000	110 - 120

**The actual mixing temperature shall be sufficient to produce a uniform homogeneous mixture in which all particles of the aggregate are thoroughly and uniformly coated.**

~~The actual mixing temperature within the specified range shall be as directed by the Engineer, based upon temperature-viscosity curves.~~

**7.3 Hauling Bituminous Material**

Truck boxes shall be clean **and** free from foreign material ~~and lubricated~~. **Truck boxes shall be lightly coated with a uniform application of a non-petroleum based asphalt release agent approved by the Engineer.** Truck boxes shall be raised to drain excess lubricant before being loaded with bituminous material. **MI reserves the right to reject any asphalt release agents not meeting performance standards.**

Waterproof tarpaulins shall be installed on trucks at all times and shall be spread to cover the truck box completely whenever the Engineer considers the moisture, temperature, wind, length of haul or other conditions will require protection over the bituminous material.

Bituminous material loaded in excess of the allowable load limits shall be unloaded and, if possible, salvaged by the Contractor. Where material is wasted, the cost of the asphalt cement in the wasted material shall be paid for by the Contractor.

#### 7.4 Location of Mixing Plant

When the quantity of bituminous pavement to be constructed on any Section on the project;

- a) Is 10 000 tonnes or greater, the plant shall be located so that the maximum dead haul from the plant to the point where the bituminous material enters the project does not exceed 40km.
- b) Is less than 10 000 tonnes, the plant shall be located so that the maximum dead haul from the plant to the point where the bituminous material enters the project does not exceed 160km.

Asphalt plant(s) shall hold a valid development license issued in accordance with the Manitoba Environment Act and shall be located and operated in accordance with the terms and conditions of the license.

In addition, the Contractor shall apply dust suppressants at the plant site to the satisfaction of the Department.

#### 7.5 Moisture Content of Bituminous Material

The moisture content of bituminous paving material shall be one percent or less in mix samples taken from the road immediately behind the spreader.

#### 7.6 Levelling Course

A levelling course of bituminous pavement shall be placed over areas of uneven pavement. The levelling course shall be constructed at locations and to the depth as directed by the Engineer. A paver shall be used unless otherwise permitted.

A levelling course shall be laid in lifts not exceeding 75mm in depth, and each lift shall be compacted to 97% of Marshall Density. The levelling course shall be properly compacted and shall have cooled to 50°C or lower before placing any further material thereon.

#### 7.7 Spreading Bituminous Material

**All top lifts of bituminous pavement will be a minimum of 45mm.**

The Contractor shall maintain the primed base course free from surface breaks and potholes until the pavement has been constructed. Bituminous material shall not be deposited on the highway until the surface is properly prepared and in satisfactory condition.

**Temperature of the mix at the paver while spreading shall not be less than 120 °C unless a Warm Mix Additive is being used.**

Where surface maintenance involves bituminous patching the Contractor shall, at his own expense:

- a) When the asphalt plant is on site and in operation; supply all equipment, labour and materials except asphalt cement to restore the surface.



- b) When the asphalt plant is not on site; supply all equipment, labour and materials including asphalt cement to restore the surface.

The Contractor shall provide sufficient trucks to ensure a continuous supply of bituminous material to the paver.

Bituminous material shall be spread on the prepared base by means of a self-propelled mechanical paver complete with screed and augers. 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 9m. A floating beam shall be supported by wheels or skis in a floating tandem arrangement.

**A string line shall be used on the lead lane for all lifts to help keep the seam of the mat straight, and on the proper alignment.**

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 paver shall be equipped with a Layton hitch or equivalent. The speed of the paver shall be maintained at a uniform rate that is in balance with the actual plant production, but in no case shall the paver exceed a speed of 25 metres per minute.

The paver shall produce a uniformly textured surface free from tearing, tracking or other unacceptable 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 re-commence 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.

The length of pavement constructed on a lane, shall be controlled so that;

- a) On other than top lift, the length of pavement in the adjacent lane is not exceeded by more than one day's normal production.
- b) On top lift, the pavement marking tape is applied continuously on the same side of centerline and the length of centerline drop-off is kept to a minimum.
- c) Deviations to a) and b) may be permitted on 4 lane highways.

The bituminous material shall be spread to the width as staked on the ground or **the thickness** as specified by the Engineer. A lift shall consist of not more than 570 tonnes per kilometre for a lane 3.7m wide.

Where adjacent lanes of bituminous pavement are constructed the Contractor shall paint longitudinal seams with emulsified asphalt cement.

Where bituminous pavement is to be constructed against a vertical concrete surface, the joint shall be painted with asphalt cement or undiluted emulsified asphalt cement.

Painting will not be paid for directly but will be considered as incidental to the unit price for "Bituminous Pavement."

When the bituminous material is produced in two plants for the same project, separate spreading operations will be required for material from each plant unless a common storage silo is used by the Contractor.

Spreading and compacting operations shall be restricted to the hours between official sunrise and official sunset.

#### 7.8 Crossings and Intersecting Roads

Work required on crossings and intersecting roads for which a unit price is provided in the contract will be paid for at the applicable unit price. Work for which no unit prices are provided will be done by the Contractor on the basis of Extra Work. The time at which work shall be done will be as permitted or directed by the Engineer.

#### 7.9 Weather Limitations

The top lift of bituminous pavement shall be placed only when the surface is dry. The atmospheric temperature shall be a minimum 6°C and rising for projects with a dead haul of 40km or less and not less than 10°C and rising for projects with dead hauls exceeding 40km. If the wind velocity exceeds 10km/hour the atmospheric temperature shall be at least 10°C and rising.

Lifts other than the top lift may be placed when the surface is dry and the atmospheric temperature 150mm above the surface to be paved is not less than 0°C and rising.

Notwithstanding the above, when weather conditions are unfavourable, or are likely to become unfavourable, paving operations may be suspended.

#### 7.10 Restricted Paving

Construction of bituminous pavement will not be permitted until frost-free ground conditions exist in the upper 750mm of the embankment.

Construction of the top lift of bituminous pavement may be permitted after October 15 providing the specifications are met and the pavement is matched daily on adjacent lanes and paved shoulders.

#### 7.11 Compacting Bituminous Material

The Contractor shall supply rollers in sufficient quantities, to produce a uniform, tight knit pavement surface having a minimum of 97% Marshall Density.

The Contractor's compaction equipment shall include at least one self-propelled rubber tired roller, or a combination roller having a vibratory steel drum on one end and at least four pneumatic tires on the other end **and one steel vibratory roller for bottom lifts.**

**The contractor shall provide a minimum of three pieces of compaction equipment for all top lift paving. This equipment shall include one double steel vibratory roller for initial rolling, one pneumatic tired roller or combination roller for intermediate rolling, and one double steel roller for finishing.**

**The rollers and drums shall be kept moist with water or non-petroleum based asphalt release agent to prevent adhesion of HMA.**

When compaction tests indicate that the density of the pavement is less than 97%, the Engineer will require adjustments to production and compaction procedures in order to raise the density to the specified level.

When compaction tests indicate that the density of the pavement is less than 96% Marshall Density, the Contractor shall immediately provide and use the following minimum quantity of compaction equipment until the pavement has been constructed:

- a) For mixing plants with Manufacturers rated capacity of less than 320 tonnes per hour;
  - 2 steel vibratory breakdown rollers,
  - 1 self propelled pneumatic tired or combination intermediate roller,
  - 1 steel roller for final rolling.
- b) For mixing plants with Manufacturers rated capacity of greater than 320 tonnes per hour;
  - 2 steel vibratory breakdown rollers,
  - 2 self propelled pneumatic tired or combination intermediate rollers,
  - 1 steel roller for final rolling.

The distance between the two steel vibratory breakdown rollers shall not exceed 200m.

The Contractor shall use at least one steel vibratory roller, one pneumatic-tired or combination roller and one steel roller, when paving during the fall of the year at temperatures consistently below 10°C.

Rollers shall be in good condition and capable of reversing without backlash. They shall be operated in such a manner that all parts of the pavement receive equal compaction. The speed of the rollers shall not exceed 5km per hour and shall at all times be slow enough to avoid displacement of the material.

~~If the material tends to adhere to the rollers, they shall be kept moistened, but excess water or oil will not be permitted.~~

Rollers will not be permitted to park on the pavement during the rolling operation. They shall be parked off the newly constructed pavement when not in use or when being serviced. Rollers shall be moved to and from the pavement in such a way that the pavement edge is not damaged.

The rolling pattern established by the Contractor may vary depending on the gradation of the aggregate, the type of asphalt supplied and the type of rollers used.

## 7.12 Joints

Where transverse butt joints are required, the Contractor shall cut back the previously constructed lift to a vertical face.

Longitudinal seams and transverse joints shall be constructed so as to provide a smooth surface.

### 7.13.1 Approval of Finished Surface

The finished surface of each lift of bituminous pavement shall be smooth, free from segregation and roller marks, uniform and true to line and cross-section as shown on the plans or as specified by the Engineer.

After final rolling, the surface profile will be measured with a **Laser Profiler** ~~profile measuring~~ device approved for use by the Department.

**Laser Profiler** readings to determine smoothness on intermediate ~~or bottom~~ lifts of pavements can be provided at the Engineer's or Contractor's request and will be dependent upon availability of the equipment. The Engineer shall inform the Contractor of all readings.

**The department will endeavor to accommodate requests from the contractor for Laser Profiler readings.**

~~Profiler readings will, if requested by the Contractor, be taken every second day during paving operations.~~

#### 7.13.1.1 Surface Tolerances

Smoothness will be expressed in terms of a Profile Index which is the sum of the vertical deviations of the profile outside a 0mm blanking band, over a unit distance of 100m.

The profile readings will be terminated 10m from the beginning and end of each bridge or railway crossing, 10m from an existing pavement which was placed under another contract, and 10m on either side of manhole covers/water valves.

All bituminous pavements that are excluded from the profile index assessment will be subject to a review by the Engineer. The review will be subjective and will be based on field conditions and workmanship. All mitigating measures shall be limited to correcting bumps or dips. Corrective actions shall be the responsibility of the Contractor.

Any length of pavement at least 300m long and having a width of at least 3.5m will be considered a lane for the purpose of smoothness testing. This will include any passing, acceleration, deceleration, turning lanes that meet the above criteria.

The Department shall determine the final pavement profiles for inner and outer wheel path in each lane. PI calculations shall be based on the wheel path with the roughest values. A partial section resulting from an interruption of the continuous pavement surface is subject to the same evaluation as a whole section and pro-rated for 100m.

#### 7.13.1.2 Definitions

- 1) Profile Index (PI<sub>0</sub>): Roughness (mm/0.1km) above or below a 0mm blanking band.
- 2) Bumps: Any deviations greater than 8mm or 12mm over a distance of 7.6m depending on the specification table being used for the contract. Any 100m section containing a bump(s) based on the table used is automatically disqualified from a PI bonus and will be subjected to a penalty per bump.
- 3) Null Band: also known as the blanking band. It is a tolerance band projected on to the profile that represents a deviation from the best-fit line through the profile. This specification is based on a 0mm null band, and all roughness is included in the smoothness determination.
- 4) Outer Wheel Path: a longitudinal line parallel to the centerline of pavement located approximately 0.9m to 1.1m from all lane edges.
- 5) Inner Wheel Path: a longitudinal line parallel to the centerline of pavement located approximately 1.5m to 1.8m from outer wheel path.
- 6) Section: a continuous 100m length of pavement.

#### 7.13.2 Riding Quality Measurements for Bituminous Pavement

##### 7.13.2.1 Specification Limits and Pay Adjustment

Riding Bonus for Bituminous Pavement shall be paid out of Contingency that is added to the Contract at the time of Award. This figure is based upon historical data regarding payment of riding bonuses and is only an estimate. The Contractor will be paid or deducted based on the "Bituminous Pavement Smoothness Specification".

Each 100m section of the final lift will qualify for a bonus if the section has a Profile Index less than 35mm per 100m, and no bumps or dips having deviations greater than 8mm or 12mm per 7.6m depending on the specification table being used for the contract.

Repairs within any 100m section will disqualify the section from bonus assessment.

Corrections will be enforced but negative pay adjustments will be waived for the following conditions:

- screed width change greater than 0.3m to accommodate design widths;
- curves with less than 600m radius;
- concrete barrier walls;
- Existing curb or curb and gutter;
- Matching new pavement to an existing adjacent surface that is not being re-surfaced.

Table 3 will be used for the following conditions:

- Anytime the posted speed limit is less than 70km/hr;
- 300m on either side of the intersection, where traffic must come to a stop;
- Acceleration/deceleration lanes or turning lanes that are at least 3.5m wide and at least 300m in length;
- 10m on either side of intersections when matching cross fall elevations.

After one unsuccessful repair attempt, the Contractor may, at the discretion of the Engineer, be offered penalty in lieu of correction in the amount of \$6,000.00 for the 100m section containing the unsuccessful repair.

All pay adjustments are based on the contract as a whole. Lanes are not independent of each other for payment purposes.

Pay Adjustments and corrections will be made according to the schedules on the following page:

TABLE 1: Smoothness Specification and Pay Adjustment for Bituminous Pavement with a speed limit of 70km/hr and greater

Single Lift Pavement over Milled Surface

PROPOSED SPECIFICATION & PAY ADJUSTMENT Thin Pavement		
PROFILE INDEX (0 NULL BAND)		
SPEC RANGE (mm/100m)		Pay Adjustment (\$)
	<18	400
18	22	180
23	27	120
28	34	60
35	40	UNIT
41	46	-45
47	52	-90
53	62	-150
>62		CORRECT
BUMPS		

TABLE 2: Smoothness Specification and Pay Adjustment for Bituminous Pavement with a speed limit of 70km/hr and greater

Multiple Lift Pavement

PROPOSED SPECIFICATION & PAY ADJUSTMENT Thick Pavement		
PROFILE INDEX (0 NULL BAND)		
SPEC RANGE (mm/100 m)		Pay Adjustment (\$)
	<18	400
18	22	180
23	27	120
28	34	60
35	40	UNIT
41	46	-90
47	52	-180
53	62	-300
>62		CORRECT
BUMPS		

SPEC RANGE	Pay Adjustment (\$)
>8mm -   12mm	-150
>12mm	CORRECT

SPEC RANGE	Pay Adjustment (\$)
>8mm -   12mm	-300
>12mm	CORRECT

Note: Penalties on single lift pavement over a non-milled surface will be applied in accordance with Table 1 to Net Zero but corrections will be enforced.

TABLE 3: Smoothness Specification and Pay Adjustment for Bituminous Pavement with a speed limit less than 70km/hr

Single or Multiple Lift Pavement

PROPOSED SPECIFICATION & PAY ADJUSTMENT Reduced Speed Pavement <70km/hr		
PROFILE INDEX (0 NULL BAND)		
SPEC RANGE (mm/100m)		Pay Adjustment (\$)
	<18	400
18	22	180
23	27	120
28	34	60
35	56	UNIT
57	62	-45
63	72	-90
73	80	-150
>80		CORRECT
BUMPS		
SPEC RANGE		Pay Adjustment (\$)
>12mm -   18mm		-150
>18mm		CORRECT

7.13.2.2 Corrective Actions

All corrections must be completed within 1 calendar year of receiving notice of the final smoothness adjustment assessment, unless otherwise permitted by the Engineer.

Finished top lift pavement on which PI or bump values exceed the specified limits shall be corrected at the expense of the Contractor if so directed by the Engineer. The corrections shall produce smoothness values no less than the unit price specification range for both bump and PI values.

The corrective methods used by the Contractor shall be applied to the full lane width. When completed, the corrected area shall have uniform texture and appearance, with the beginning and ending of the corrected area perpendicular to centerline of the paved surface.

Any corrective methods proposed by the Contractor shall be subject to approval of the Engineer. The Contractor shall not undertake any repair on any defective work prior to notifying the Engineer. Any areas repaired prior to obtaining the Engineer’s approval will not be considered for penalty adjustment.

The area repaired shall have a smooth transition to the surrounding pavement without negatively affecting any adjacent sections, impairing the functionality and/or structural characteristics or the service life of the area. The nature of the deficiencies shall be taken into account in the consideration of the method of repair.

All corrective actions shall be performed at the Contractor's expense.

The Department will retest any section where corrections were made to verify that the corrections have produced a PI or bump value meeting or exceeding the value required to qualify for unit price. The Department will provide the profiler report and evaluation to the Contractor within 3 work days after any corrections are made.

Asphalt cement required for corrective repairs will be supplied by the Contractor.

Corrective actions may include: replacement of the lift, construction of a bituminous overlay, diamond grinding or other approved method.

#### 7.13.2.3 Removal and Replacement

Should removal and replacement be proposed by the Contractor, following method shall be employed:

- i. A saw shall be used to produce a vertical face along the boundary of the defective area or joint;
- ii. Material within the sawn boundaries shall be removed to the full depth of the lift in such a manner that the vertical faces are not damaged;
- iii. Tack coat shall be applied to both the horizontal and vertical faces;
- iv. New bituminous material shall be placed and compacted to specification.

#### 7.13.2.4 Diamond Grinding

Diamond grinding shall not reduce design pavement thickness by more than 7mm without approval of the Engineer. Grinding shall be accomplished in a manner to provide smooth transitions to adjacent lanes and drainage to edge of pavement.

Grinding of the pavement surface shall be parallel to centerline. The beginning and end of the diamond ground area shall be squared perpendicular to centerline. Feathered transitions shall be made between ground and un-ground areas.

The total amount of grinding is limited to no more than 5% of the lane-kms eligible for pay adjustment.

The slurry produced from diamond grinding shall be removed from the site by the Contractor and disposed of in accordance with existing environmental regulations.

#### 7.13.2.5 Appeals

The Contractor may appeal the measurements on any 100m section only once. The Contractor shall request the retest within 3 work days of receiving notice of the original pay adjustment assessment.

If the retest increases the pay adjustment payment, the retesting will be at the Department's expense. However, if the retest confirms the original assessment, the retest shall be at the Contractor's expense.

### 7.14 Opening to Traffic

Unless otherwise specified, traffic will not be permitted on any newly paved surface until such time as the surface temperature has cooled to below 65°C.

Bituminous Pavement or Recycled Bituminous Pavement will be measured by weight in tonnes of pavement actually spread on the road.

**800. 11 BASIS OF PAYMENT**

**11.1 Bituminous Pavement or Recycled Bituminous Pavement**

The unit price per tonne for "Bituminous Pavement" Class "A", "B" and "C" and "~~D~~", or Recycled Bituminous Pavement Class "A", "B" and "C" will be payment in full for supplying materials (except asphalt cement) and for constructing a hot mixed bituminous pavement and for performing all work necessary or incidental thereto.

Bituminous material placed as a levelling course will be paid for at the unit price for "Bituminous Pavement."

**11.2 Bituminous Pavement Class "" or Recycled Bituminous Pavement, Class "", F.O.B. Contractor's Plant Site**

The unit price per tonne for "Bituminous Pavement Class " ", or Recycled Bituminous Pavement Class " ", F.O.B. Contractor's Plant Site" will be payment in full for supplying materials (except asphalt cement), mixing the materials and loading the material into trucks supplied by Others, and for performing all work necessary or incidental thereto.