INDEX FOR
SPECIFICATIONS FOR BITUMINOUS PAVEMENT AND RECYCLED BITUMINOUS PAVEMENT

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## 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, 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. 2 MATERIALS

### 2.1 Aggregates

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

### 2.2 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:

- 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.
- Provide and maintain a storage area, and upon completion of the work restore the area to a satisfactory condition.
- Provide storage facilities of sufficient capacity to store all asphalt cement ordered to the job site.
- 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.
- 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.
- 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.
- 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.

2.3 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.

2.4 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. 3 EQUIPMENT

3.1 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.

3.2 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.

3.2.1 Drum Mix Plants

3.2.1.1 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.

3.2.1.2 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.

3.2.1.3 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.

3.2.2 Continuous Mix and Batch Mix Plant

3.2.2.1 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.

3.2.2.2 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 15ºC.

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. 4 CONSTRUCTION METHODS

### 4.1 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.

Unless otherwise permitted by the Engineer, the Contractor shall locate a certified weigh scale within 300m of the bituminous mixing plant. 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 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.

4.2 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 | |
|---|---|
| PG 58-34 | 145 - 160 |
| PG 58-34 P | 150 - 165 |
| PG 58-37 P | 150 - 165 |
| PG 58-40 P | 150 - 165 |
| 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.

4.3 Hauling Bituminous Material

Truck boxes shall be clean and free from foreign material. 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.

4.4 Location of Mixing Plant

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

- 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.
- 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.

4.5 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.

4.6 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 50ºC or lower before placing any further material thereon.

4.7 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:

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

- 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.

4.8 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.

4.9 Weather Limitations

The top lift of bituminous pavement shall be placed only when the surface is dry. The atmospheric temperature shall be a minimum 6ºC and rising for projects with a dead haul of 40km or less and not less than 10ºC and rising for projects with dead hauls exceeding 40km. If the wind velocity exceeds 10km/hour the atmospheric temperature shall be at least 10ºC 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 0ºC and rising.

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

4.10 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.

4.11 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:

- 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.
- 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 10ºC.

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.

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.

4.12 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.

4.13 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 device approved for use by the Department.

Laser Profiler readings to determine smoothness on intermediate 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.

4.13.1 Surface Smoothness

Smoothness will be expressed in terms of the International Roughness Index (IRI) which is the accumulated suspension motion of a car divided by the distance travelled. The IRI is calculated by applying a standardized computer algorithm to the profile data collected by an inertial profiler. The distance per section is 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 IRI 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 corrective actions shall be limited to localized roughness and 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.

Exclusions include the following:

- Portions of turn lanes that are not parallel to the main alignment
- Median crossovers
- Interchange ramps in a loop configuration
- Paved shoulders, side street connections less than 300m in length

The Department will measure the final pavement profiles for inner and outer wheel path in each lane.

IRI calculations shall be based on the average of both wheel paths. A partial section less than 100m but more than 50m in length resulting from an interruption of the continuous pavement surface is subject to the same evaluation as a whole section and pro-rated for 100m. A partial section up to and including 50m will be combined with the adjacent 100m section to produce one continuous IRI result.

4.13.1.1 Definitions

International Roughness Index (IRI): Roughness measure in (mm/m)

Localized Roughness: An IRI value over a specified limit within a section length of 7.6m.

Outer Wheel Path: a longitudinal line parallel to the centerline of pavement located approximately 0.9m to 1.1m from all lane edges.

Inner Wheel Path: a longitudinal line parallel to the centerline of pavement located approximately 1.5m to 1.8m from outer wheel path.

Section: a continuous 100m length of pavement.

4.13.1.2 Specification Limits and Pay Adjustment

Payments for pavement smoothness shall be paid out of Contingency that is added to the Contract at the time of Award. The Contractor will be paid or deducted based on this Riding Quality Specification.

Each 100m section of the final lift will qualify for a payment if the section has an IRI less than 0.746 mm/m per 100m, and no localized roughness greater than 1.96 mm/m per 7.6m.

Repairs within any 100m section will disqualify that section from receiving any payments.

Deductions for IRI (Table 1) will be waived for the following conditions, however deductions for localized roughness (Table 2) will be enforced:

- 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.
- Anytime the posted speed limit is less than 80km/hr;
- Acceleration/deceleration lanes that are at least 3.5m wide and at least 300m in length. The profile measurement will terminate at the beginning or end of the turning radius;
- 300m on either side of an intersection where traffic must come to a stop; and,
- 10m on either side of an intersection when matching cross fall elevations.

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

Table 1: Pay Adjustments for Bituminous Pavement

| Pay Adjustment Calculations for Bituminous Pavement Smoothness | | |
|---|---|---|
| Floating Pay Adjustment Formula | IRI (mm/m) | Pay Adjustment per $/100m |
| 809-(1081xIRI) | 0.471-1.026 | $300 - $-300 |
| Maximum Pay Adjustment | <0.470 | $400.00 |
| Maximum Deduction | >1.026 | -$500.00 |

Localized Roughness

The Department shall determine the localized roughness profiles for the inner and outer wheel path in each lane. Localized roughness will be identified by calculating the IRI of the pavement in 7.6m intervals. IRI calculations shall be based on the worst of both wheel paths according to Table 2.

Table 2. Pay Adjustments for Localized Roughness

| Deductions for Localized Roughness | |
|---|---|
| IRI (mm/m) per /7.6m | Pay Adjustments |
| < 1.97 | Acceptable |
| 1.97-2.36 | $125 deduction |
| 2.36-3.94 | $250 deduction |
| > 3.94 | Correct or Apply $500 Deduction* |

*A correction is required when the speed limit is 80km/hr or higher. A deduction of $500 will be applied when the speed limit is less than 80km/hr.

Percent Improvement Projects

The percent improvement table (Table 3) will be used on one lift overlay projects over a non-milled surface unless otherwise specified. For pay adjustments to be computed, the initial pavement must be measured with the same baseline that will be used for the duration of that contract. Both the initial IRI and final IRI shall be measured with the same profiler.

No corrective action will be required and no negative pay adjustments will be assessed in a section if the initial IRI values for that section are less than 0.950 mm/m and the percent improvement is greater than zero. If the percent improvement is less than zero with an initial IRI of 0.950 mm/m there will be a $300 deduction for that section.

Table 3: Pay Adjustments for Percent Improvement Projects

| Pay Adjustment Calculations for Percent Improvement Projects | | |
|---|---|---|
| Floating Pay Adjustment Formula | Floating Percent Range | Pay Adjustment - $/100m |
| -236 + 6.500 x (%Improvement) | 15% to 64% | $173.50 to -$138.50 |
| Maximum Pay Adjustment | > 64% | $180.00 |
| Maximum Deduction | < 15% | -$300 or Correct* |

*Corrective work will be of the discretion of the department engineer based on severity and structure. If the department decides not to take corrective action there will be a $300 penalty per correction assessed in lieu of a diamond grinder coming to the site.

4.13.1.3 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 IRI 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.

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

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

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 IRI 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.

After one unsuccessful repair attempt, the Contractor may, at the discretion of the Engineer, be offered a $2,000.00 deduction applicable to the deficient section in lieu of further correction.

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.

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 minimum grind length will be 20m regardless of the severity of the correction area to allow for a smooth transition in and out of the grind to match with the existing profile. Any corrected area which produces roughness at the beginning or end of the grind must be corrected or penalized accordingly based on the engineers' discretion.

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

4.13.2.3 Appeals

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

If the pay adjustment increases and the IRI value differs by more than 5% of the original value, the retesting will be at the Department's expense. However, if the retest confirms the original assessment within the 5% threshold, the retest shall be at the Contractor's expense at a rate of $2,000 per day.

4.14 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 65ºC.

800. 5 METHOD OF MEASUREMENT

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

800. 6 BASIS OF PAYMENT

6.1 Bituminous Pavement or Recycled Bituminous Pavement

The unit price per tonne for "Bituminous Pavement" Class "A", "B" and "C" 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."

6.2 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.

**6.3 Asphalt Cement Cost Adjustment for Market Price**

**If asphalt cement is supplied by the Contractor, Manitoba will adjust payment to the Contractor for the market price variation based on the Department's Asphalt Cement price index. The price index will be used to calculate the cost adjustment per tonne of new asphalt cement incorporated into the Work for both the penetration and performance grade asphalt cements.**

**The price index is based on the price per tonne, excluding taxes, of asphalt cement grade PG 58-28. The price index will be established for each month and used to calculate the payment adjustment for all grades in each respective month. The price index for each month reflects the average of PG 58-28 asphalt binder prices within that month and will be circulated on the last day of the month. The price index established for a month will apply to quantities of bituminous pavement constructed in the same month.**

**The asphalt cement cost adjustment for each month will be calculated using the following formula:**

$$AC\ Cost\ Adjustment = (Index_m - Index_{tc})x\ ACQuantity_m$$

***Where,***

***$Index_m$= Manitoba Index for the month in which paving occurs, $***
***$Index_{tc}$= Manitoba Index for the month prior to tender closing, $***
***$ACQuantity_m$= Quantity of new asphalt cement for the month, tonne***

**The quantity of new asphalt cement for the month will be calculated using the following formula:**

$$ACQuantity_m = \left(\frac{AC_{new}}{100}\right) * BitQuantity_m$$

***Where,***

***$AC_{new}$ = Percentage of new asphalt cement in the mix as required by job mix formula, %***
***$BitQuantity_m$ = Monthly quantity of bituminous pavement accepted in the work, tonne***

**For bituminous mixes containing reclaimed asphalt pavement, the percentage of new asphalt cement will be determined using the following formula:**

$$AC_{new} = (ACcontent - ACrap)$$

***Where,***

***ACrap = Contribution of RAP asphalt cement content as determined through ASTM D2172 Quantitative Extraction of Bitumen from Bituminous Paving mixtures, %***
***ACcontent = Asphalt cement content required for the bituminous mix, %***

**AC cost adjustments will be paid on a lump sum basis separately from the Unit Price on progress payments.**