INDEX FOR
CONSTRUCTION SPECIFICATION FOR BITUMINOUS PAVEMENT

CONSTRUCTION SPECIFICATION FOR BITUMINOUS PAVEMENT

801. 1 SCOPE

This Specification covers all operations necessary for and pertaining to the construction of a hot mixed Bituminous Pavement.

1.1 Pre-Construction Meeting

The Contractor shall attend a pre-construction meeting with the Contract Administrator, 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 field operations. Topics to be discussed will include, but not limited to, 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, location of the mixing plant and other pertinent topics.

801. 2 DEFINITIONS

Appeals: Request from Contractor for retesting of material property or attribute for the purpose of resolving disagreement on acceptance test results and pay adjustments.

Asphalt Cement Content: The quantity of asphalt cement in the mix expressed as a percentage of total weight of Bituminous Mix.

Bituminous Mix: Plant produced hot mixture of aggregate, asphalt cement and any other approved additives.

Bituminous Mix Design: The laboratory determination of the proportions of the Bituminous Mix components to be blended together to meet the specified mix properties.

Bituminous Pavement: Compacted Bituminous Mix.

Job Mix Formula (JMF): The Bituminous Mix proposed by the Contractor and accepted by the Contract Administrator, establishing the aggregate proportions, combined aggregate gradation and the Asphalt Cement Content to be used for production of Bituminous Mix.

Levelling Course: Bituminous Mix used to improve crossfall and/or level existing pavement surface.

Lift: The compacted thickness of material laid in a single application.

Lot: One (1) day’s scheduled plant Bituminous Mix production of at least 1800 tonnes where no changes have occurred to the accepted Job Mix Formula. If one day plant production of Bituminous Mix is less than 1800 tonnes, it will be combined with the previous or subsequent Lot at the discretion of Contract Administrator.

Lot Mean: The arithmetic average of Sub-Lot test results within a Lot.

Quality Assurance: Testing and inspection performed by the Contract Administrator to monitor the characteristics and properties of the materials delivered to the project and the quality of placement and workmanship.

Quality Control: Testing and inspection performed by the Contractor to monitor the characteristics and properties of the materials produced and incorporated into the Work and the quality of placement and workmanship.

Reclaimed Asphalt Pavement (RAP): Bituminous Pavement that has been removed and processed for the purpose of recycling.

Reject: Unacceptable material for use in the project, unacceptable quality of placement or unacceptable workmanship.

Roadway Segment: Portion of bituminous pavement of approximately 5 km in length where no changes in pavement design layer thickness occurs. If a Roadway Segment is less than 3 km in length, it will be combined with the previous or subsequent Roadway Segment at the discretion of the Contract Administrator. The Contract Administrator may designate short bituminous pavement sections and roadway elements such as intersections, turning lanes, acceleration lanes, deceleration lanes and roundabouts as separate Roadway Segments. Roadway Segments will be used to assess layer thickness for acceptance.

Scheduled Leave: Contractor scheduled days of rest not exceeding four (4) days, unless approved by the Contract Administrator.

Segregation: An area of the pavement where the texture differs visually from the texture of the surrounding pavement. Pavement segregation severity will be classified as slight, moderate, severe, or as paver streak.

Sub-Lot: Each 600 tonne portions of the Lot (in general). Actual size of Sub-Lot may vary based on scaled quantities delivered to the road. The final Sub-Lot of the day's production shall not be less than 300 tonnes.

Surface Smoothness: Longitudinal profile of the pavement surface, measured as International Roughness Index (IRI).

801. 3 MATERIALS

3.1 Aggregate for Bituminous Mixes

The aggregate for Bituminous Mixes shall meet the requirements of the *Material Specification for Aggregate – Bituminous Pavement (No.921)* for mix type specified in the Special Provisions.

Reclaimed Asphalt Pavement from sources outside the Department shall not be incorporated into bituminous mixes.

3.2 Asphalt Cement (Asphalt Binder)

The Contractor shall supply all asphaltic materials and additives to meet the Contract requirements.

All asphaltic materials and additives shall be from pre-approved Suppliers and meet current Manitoba specifications as outlined in the *Grading and Surfacing Approved Products List* at http://www.gov.mb.ca/mit/mateng/product.html.

As the pay adjustment for asphalt cement(s) quality and quantity will be based on the actual purchase price, the Contractor shall submit the purchase price to the Contract Administrator for this purpose, in the form of purchase order or invoice, of the asphalt cement before the start of the paving operation.

3.3 Bituminous Mix Design and Job Mix Formula

The Contractor shall prepare and submit a Bituminous Mix Design for approval by the Contract Administrator.

Mix design work shall be completed by a laboratory with Canadian Council of Independent Laboratories (CCIL) Type "A" certification.

The Bituminous Mix Design shall be prepared and submitted in accordance with *MEB P042 Hot Mixed Bituminous Mix Design*.

The selection of Bituminous Mix type(s), asphalt cement type(s) and design Equivalent Single Axle Load (ESAL) shall be as specified in the Special Provisions.

The design Tensile Strength Ratio (TSR) shall be a minimum of 70%. If the design TSR requirements are not met, an approved anti-stripping additive shall be incorporated into the mix at a rate recommended by the anti-strip manufacturer and approved by the Contract Administrator.

The Contractor shall submit 75kg representative samples of each sizes of virgin aggregate, Reclaimed Asphalt Pavement (RAP), where applicable, and one gallon of asphalt cement for mix design verification purposes to the Contract Administrator. Additional materials may be required for prospective Appeal testing.

The Quality Assurance laboratory will require seven (7) days, from the time of receipt of the Bituminous Mix Design report and corresponding samples, to evaluate the Job Mix Formula (JMF) as per *MEB P048 Verification of Hot Mixed Bituminous Mix Designs*.

If the submitted Bituminous Mix Design is not used on the Contract, the Contractor shall bear all cost of verification testing. Cost per unused bituminous mix design will be $3,000.

The Contractor shall not commence paving operations prior to receiving the Contract Administrators written notice that the mix design has been approved. The approved Bituminous Mix Design shall become the approved JMF.

A new Bituminous Mix Design shall be required if a change to the nature of aggregates, source of the aggregates, supplier of asphalt cement and source of the asphalt cement occurs.

3.3.1 Superpave Mix Design

The Superpave mix design, if specified, shall produce a JMF for hot mixed bituminous using the gyrations as specified in Table 3.1and shall also meet the mix properties as specified in Table 3.2

Table 3.1 Superpave Mix Gyratory Compaction Requirements

Design ESALs (million)	Mix Compaction Parameters		
	$N_{initial}$	N_{design}	N_{max}
<0.3	6	50	75
0.3 to <10	7	75	115
10 to <30	8	100	160
≥30	**9**	**125**	**205**

Table 3.2 Superpave Mix Requirements

Design ESALs (million)	Required Relative Density, Percent of Theoretical Maximum Specific Gravity			Minimum VMA (%)				Voids Filled with Asphalt (%)	Dust to Binder Ratio
	$N_{initial}$	N_{design}	N_{max}	SP19	SP12.5[6]	SP9.5	SP4.75		
<0.3	≤91.5	96.0	≤98.0	13	14	15	16	70-80[1]	0.6-1.2[4]
0.3 to <3	≤90.5	96.0	≤98.0	13	14	15	16	65-78[2]	0.6-1.2[4]
3 to <30	≤89.0	96.0	≤98.0	13	14	15	16	65-75[2,3]	0.6-1.2[5]
≥30	**≤89.0**	**96.0**	**≤98.0**	**13**	**14**	**15**	**16**	**65-75[2,3]**	**0.6-1.2[5]**

[1] SP4.75 shall have VFA of 67 to 79 percent
[2] SP4.75 shall have VFA of 66 to 77 percent
[3] SP9.5 shall have VFA of 73 to 76 percent
[4] SP4.75 shall have dust to binder ratio of 1.0 to 2.0
[5] SP4.75 shall have dust to binder ratio of 1.5 to 2.0
[6] **SP12.5 shall have minimum effective asphalt content of 4.5 percent.**

3.3.2 Marshall Mix Design

The Marshall mix design, if specified, shall produce a JMF for hot mixed bituminous that meet the mix properties as specified in Table 3.3 .

The Marshall mix shall be designed using 75 blows per side of the test specimen with manual compaction hammer or a mechanical hammer equivalent to 75 blows per side of the test specimen with manual compaction.

Table 3.3 Marshall Mix Requirements

Mix Properties	Bituminous Pavement Class B (Bit B)
Voids in Mineral Aggregate (%), minimum	14.0
Voids Filled with Asphalt (%)	67-75
Air Voids (%)	4
Effective Asphalt (%), minimum	4.5
Marshall Flow, 0.25 mm	8-14
Marshall Stability (kN), minimum	8

3.4 Revisions to the Approved Job Mix Formula (JMF)

The Contractor will be permitted to revise the approved JMF to more closely reflect the Bituminous Mix produced at the hot mixing plant but the revised mix design shall still meet the requirements of the specification, including Asphalt Cement Content and percent passing each sieves.

The number of field adjustments to the JMF shall be limited to four (4) for each approved mix design. If the delivered quantities of bituminous for a mix design exceed 60,000 tonnes in a particular Contract, an additional JMF revision will be permitted for each successive 20,000 tonnes.

The revised JMF shall not exceed any one of the limits specified in. If the proposed changes exceed any of the limits specified in, a new mix design shall be submitted. The maximum field adjustment shall apply against the original JMF submitted with the mix design report.

Table 3.4 Maximum Field Adjustments for JMF

JMF Properties	Maximum Field Adjustment, %
AC content (by total weight of the Bituminous Mix)	± 0.3
Percent RAP	± 5.0 (Note 1)
Passing 25.0 mm, 19.0 mm, and 16.0 mm sieves	± 5.0
Passing 12.5 mm, and 9.5 mm sieves	± 4.0
Passing 4.75mm, 2.36 mm, 2.0 mm and 1.18 mm sieves	± 3.0
Passing 600, 425, 300, 180 and 150 µm sieves	± 2.0
Passing 75 µm	± 1.0

Note 1: Percentages of RAP shall not exceed the maximum allowable limit specified in the Contract.

The proposed revisions to the approved JMF shall be submitted in writing on a form provided by the Contract Administrator and identify the Lot where the revision is to commence and the revision number. On request from the Contractor and approval by the Contract Administrator, revisions to the last completed Lot will be permitted.

Any field adjustment, even if returning to a previous JMF, will constitute as a revision.

801 4 CONSTRUCTION

4.1 Plant Requirements and Operation

The Contract Administrator or designate shall have access to all parts of the plant and equipment pertaining to the project Work.

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

Where blending of materials from one or more sources and/or sizes is required to meet the Specification, each materials shall be placed in separate stockpiles.

The plant shall be capable of producing a uniform mixture in which all particles are thoroughly coated.

If RAP is added, the following shall apply:

a) The plant shall contain equipment that will prevent the RAP from coming into direct contact with the flame.

b) The Contractor shall undertake all the necessary adjustments to ensure proper heat transfer and breakdown of the RAP to form a homogeneous asphalt mix.

c) The plant shall be capable of heating the RAP particles and blending them with virgin aggregate and virgin asphalt cement to create a homogeneous mix at the plant discharge.

The Contractor shall dispose of any rejected Bituminous Mix or Bituminous Pavement in a manner acceptable to the Contract Administrator, as outlined in the Quality Management Plan.

The Contractor shall hold a valid development license issued in accordance with the Manitoba Environment Act for the operation of the Bituminous Mix plant. The plant shall be located and operated in accordance with the terms and conditions of the license.

The Contractor shall control dust at the plant site in accordance with health, safety and environmental requirements.

4.2 Asphalt Cement Working Temperatures

The asphalt cement shall be heated in a storage tank to a temperature that falls within the mixing temperature range recommended by the asphalt cement manufacturer.

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

The mixing temperature of any bituminous mix shall not exceed 165°C, unless approved in advance by the Contract Administrator.

Provision shall be made by the Contractor for determining the temperature of the asphalt cement at or near the discharge end of the feed line.

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 Contract Administrator. Excess lubricants shall be removed before trucks are loaded with bituminous material. Release agents that adversely affect the quality or performance of the Bituminous Mix shall not be used.

4.4 Prime/Tack Coat

A prime/tack coat shall be applied in accordance with *Specification for Applying Prime Coat and Tack Coat (No.806),* unless otherwise approved by the Contract Administrator, before placing bituminous material.

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 until the surface is prepared as per the Contract and in condition satisfactory to the Contract Administrator.

4.5 Levelling Course

A levelling course of Bituminous Pavement shall be placed over areas of uneven surface. The levelling course shall be constructed at locations and to the depth as shown on the Detailed Design Drawings or approved by the Contract Administrator. A paver shall be used to place levelling course unless otherwise permitted by the Contract Administrator.

The levelling course shall be laid in Lifts with thickness not exceeding 75mm, and each Lift shall be compacted to the required minimum density. The levelling course shall have cooled to 50ºC or lower before placing any further material thereon.

4.6 Bituminous Lift Thickness

The minimum and maximum thickness of a compacted Lift of bituminous shall meet the requirements in Table 4.1.

Table 4.1 Minimum and Maximum Lift Thickness of Bituminous Pavement

Mix Type	Min Thickness (mm)	Max Thickness (mm)
Bit B	40	60
SP19	50	70
SP12.5	35	55
SP9.5	25	40
SP4.75	15	20

4.7 Spreading Bituminous Mix

The temperature of the Bituminous Mix at the paver while spreading shall be controlled to ensure compaction can be achieved. The temperature shall not be less than 120°C or the mix will be rejected. The Contract Administrator may authorize an exception where the Contractor uses an approved warm mix additive.

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

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

a) On Lifts 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 centreline and the length of centreline drop-off is kept to a minimum.

c) Deviations to a) and b) may be permitted on 4 lane highways.

Each Lift of bituminous material shall be spread and compacted to the width as indicated on the Detailed Design Drawings or as specified in the Special Provisions.

Each layer of bituminous material shall be placed to the crown or slope and thickness as indicated on the Detailed Design Drawings or as specified in the Special Provisions.

When paving is suspended on the roadway, the Bituminous Pavement shall be temporarily feathered to a slope of 10 horizontal to 1 vertical. When paving is resumed, the taper shall be removed and a vertical transverse joint shall be constructed.

All longitudinal joint and transverse joints shall be constructed with a vertical face and to provide a smooth surface when finished.

Longitudinal joints will not be permitted in the lane, unless otherwise authorized by the Contract Administrator, or the Contractor shall remove and replace the associated Bituminous Pavement at no cost to the Contract Administrator.

Where Bituminous Pavement is to be constructed against a vertical surface of any kind, including joints, curbs or underground utility accesses, the vertical surface shall be painted with asphalt cement or undiluted emulsified asphalt cement.

The moisture content of Bituminous Mix shall not exceed one (1) percent by weight of Bituminous Mix sample taken from the road immediately behind the paver.

4.8 Bituminous Layer Thickness

The layer thickness (total of all Lifts) of a Bituminous Mix type shall meet the design requirements as specified in the Special Provisions and Detailed Design Drawings.

A deviation in a Lift thickness for a particular Bituminous Mix type can be compensated by adjusting thickness of the overlaying Lift(s) of the same Bituminous Mix type. However, the minimum and maximum Lift thickness requirements as specified in Table 4.1 shall apply.

4.9 Weather Limitations

Paving will only be permitted under the following weather conditions:

Top Lift Paving

- The atmospheric temperature shall be at least 6ºC and rising.
- The atmospheric temperature shall be at least 10ºC and rising when the wind speed is greater than 10km/h.
- When using warm mix:
    - The atmospheric temperature shall be at least 0ºC and rising.
    - The atmospheric temperature shall be at least 4ºC and rising when the wind speed is greater than 10km/h.

Other than Top Lift Paving

- The atmospheric temperature shall be at least 0ºC and rising.
- When using warm mix, the atmospheric temperature shall be at least -4ºC and rising.

Notwithstanding the above, when weather conditions are unfavourable, or are likely to become unfavourable, paving operations may be suspended by the Contract Administrator without liability or cost to the Contract Administrator.

4.10 Compacting Bituminous Material

All Bituminous Pavement shall be thoroughly compacted, and after final rolling, the finished surface of the mat shall be free from Segregation, waves, hairline cracks, pavement edge damage and any other defects.

Asphalt compaction equipment shall be clean, free from accumulations of asphalt mix and foreign material. Equipment shall be lightly coated with a uniform application of non-petroleum based asphalt release agent.

No construction traffic shall be allowed to travel on the finished surface until the surface has cooled to a temperature of 60ºC or less.

Each Lift of Bituminous Pavement shall be compacted to a minimum of 93% of the Maximum Theoretical Density (MTD) established for the Lot.

Spreading and compacting operations shall be restricted to the hours between official sunrise and official sunset as per Environment Canada.

4.11 Crossings and Intersecting Roads

Work required on crossings and intersecting roads shall be completed in accordance with the Special Provisions or Detailed Design Drawings.

Any Handwork is considered incidental to Bituminous Mix or Recycled Bituminous Pavement.

4.12 Opening to General Traffic

Unless otherwise specified, general (public) traffic shall not be permitted on any newly paved surface until the surface temperature is below 60ºC.

4.13 Restricted Paving

Construction of Bituminous Pavement shall not be permitted unless frost-free ground conditions exist in the upper 750mm of the embankment and approved by the Contract Administrator.

After October 15, each lift of the Bituminous Pavement shall be matched daily with respect to adjacent lanes and paved shoulders, unless otherwise approved in advance by the Contract Administrator.

4.14 Optional Trial Lot

When the tendered quantity for a Bituminous Mix is 5,000 tonnes or more, an optional Trial Lot, not exceeding 500 tonnes, will be permitted. The Contractor shall only be permitted to construct the Trial Lot Bituminous Material on bottom lifts, F.O.B. or temporary construction, if available. The Contract Administrator will approve the location of the placement of the Trial Lot Bituminous Material in advance and in no case shall the material be placed at an intersection or on a bridge deck.

If the Contractor elects to place the optional Trial Lot, the Contract Administrator shall be advised in writing 48 hours prior to the placement.

The optional Trial Lot is not subject to pay adjustment unless it is in reject. Corrective action will apply.

The Contract Administrator will endeavour to provide the Contractor with a copy of the test results for the Trial Lot within 24 hours.

4.15 Laboratory Correlations

On request, the Contract Administrator will allow the Contractor to conduct correlation tests for mix properties and/or compaction of the Bituminous Mix between the Quality Assurance and Quality Control laboratories prior to the placement of the bituminous mix. The correlation tests may occur once for each mix type.

The Contractor shall provide the samples to the Contract Administrator for the purpose of conducting requested correlation tests.

The Contract Administrator will provide the Contractor with a copy of the results upon completion of the correlation testing.

801. 5 QUALITY CONTROL

The Contractor shall meet the requirements of the Specification for Quality Control (No.110).

If the Contractor wishes to take cores for Quality Control testing, the number of cores shall be limited to one core per Sub-Lot, except for the calibration of nuclear density gauge for which up to ten (10) cores can be taken from the first Lot of each Lift.

801. 6 QUALITY ASSURANCE

6.1 General

The Contract Administrator will conduct Quality Assurance testing and inspection for asphalt cement quality, mix properties, compaction, layer thickness, surface smoothness, segregation and surface defects.

The Contract Administrator may test for any property outlined in the Contract. The Contractor will be provided with results from the completed tests.

Quality Assurance testing and inspection will be performed at no cost to the Contractor.

All bags and containers required for sampling shall be supplied by the Contractor. The Contract Administrator will provide all required tags and labels as described in the applicable MEB Standard.

The inability of the Contract Administrator to provide Quality Assurance test results within the time provided in this Specification shall not relieve the Contractor of their obligation to remedy any defect.

6.2 Quality Assurance Testing and Inspection

Sampling and Quality Assurance testing will be in accordance with the following:

6.2.1 Asphalt Cement Quality

The Contractor shall be responsible for sampling the asphalt cement in accordance with *MEB P031 Sampling and Testing Asphalt Binder Materials* and providing all samples to the Contract Administrator for Quality Assurance testing.

Samples shall be taken from each truckload of asphalt cement delivered to the Contractor's storage tanks. The Contract Administrator will be present during the sampling process unless otherwise authorized by the Contract Administrator in writing.

6.2.2 Specific Gravity of Aggregates

The Contractor shall obtain samples of RAP and aggregates identified in the mix design from stockpiles, in the presence of the Contract Administrator, in accordance with MEB P047 Sampling Aggregate Materials for Laboratory Testing.

Two (2) samples shall be taken from each stockpile creating two sets of samples; one sample from each pile making one set, no later than seven (7) days prior to the start of bituminous construction. One set of samples will be used for Quality Assurance testing and the other set of samples will be reserved for the prospective Appeal testing.

Quality Assurance testing for the Specific Gravity (SG) of aggregates will be conducted in accordance with *MEB P055 Specific Gravity and Absorption of Bituminous Aggregates*.

The Contract Administrator will use the average results from Bituminous Mix design verification and Quality Assurance testing to calculate Bituminous Mix properties during construction.

If the combined SG of aggregates for mix design verification and Quality Assurance testing differs by more than **0.025**, the Contractor shall obtain another two sets of samples from the stockpiles, in the presence of the Contract Administrator. One set of samples will be used for Quality Assurance testing and the other set will be reserved for the prospective Appeal testing. The average of two SG values from the Quality Assurance stockpile samples will be used to calculate Bituminous Mix properties during construction.

6.2.3 Bituminous Mix Properties

The Contract Administrator will locate one test site in each Sub-Lot as per MEB P044 Random Sampling for Acceptance Testing – Method B.

The Contractor shall obtain two (2) samples of the Bituminous Mix, in the presence of the Contract Administrator, in accordance with *MEB P039 Sampling and Testing of Hot Mix Bituminous*. One sample will be used for Quality Assurance and other one will be reserved for prospective Appeal testing.

Quality Assurance testing for the Bituminous Mix properties will be in accordance with *MEB P039 Sampling and Testing of Hot Mix Bituminous*.

Asphalt Cement Content will be determined as *per ASTM D6307 Asphalt Content of Hot Mix Asphalt by Ignition Method* for pay adjustment purpose.

The Contract Administrator may rescind the Bituminous Mix Design approval if it cannot be demonstrated that the material is compliant with the Specification requirements and the JMF.

6.2.4 Compaction

The Contract Administrator will locate one test site in each Sub-Lot as per *MEB P044 Random Sampling for Acceptance Testing – Method A*.

The Contractor shall obtain two (2) core samples from each test site, in the presence of the Contract Administrator, as per *MEB P043 Sampling Compacted Bituminous Mixtures for Laboratory Testing*. One sample will be used for Quality Assurance testing and other one will be reserved for prospective Appeal testing.

Core samples of a completed Lot shall be taken by the Contractor within 48 hours or on the first day of return from Scheduled Leave and prior to placement of the next Lift of Bituminous Pavement. Compaction test specimen shall be prepared to represent material from the Lift of Bituminous Pavement being assessed.

Each core will be used for determination of compaction as per *ASTM D2726 Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures*.

No compaction tests will be done on Bituminous Pavement used for shimming and levelling where the thickness is 30mm or less. However, compaction equipment and procedures are subject to the approval of the Contract Administrator.

6.2.5 Bituminous Layer Thickness

Despite payment for Bituminous Mix based on quantity (tonnes) of bituminous that is supplied to the project, the Contract Administrator will determine the net thickness of each bituminous layer, which is the total thickness of all Lifts of same Bituminous Mix type after any required correction.

No pay adjustment for bituminous thickness will apply to shimming and levelling Lift(s).

Single Lift bituminous placed over a non-milled and milled bituminous, concrete, granular, pulverized asphalt or chip sealed (AST) surface, where a separate levelling Lift is not required, will be excluded from pay adjustment for layer thickness.

The bottom Lift of multi-Lift bituminous, where a separate levelling Lift is not required, will be considered a separate layer. It will be excluded from pay adjustment for layer thickness. To determine the remaining layer thickness requirement, the Contract Administrator will calculate the average thickness of the bottom lift using material application rates, the paved width and the average density of the Bituminous Pavement. Pay adjustment for thickness deviation will apply to the subsequent layers.

The Contract Administrator will locate two test sites in each lane-km or part thereof within a Roadway Segment, with a minimum of two cores for short Roadway Segments, as per *MEB P044 Random Sampling for Acceptance Testing – Method A* using start and end station of a given lane-km, after completion of each bituminous layer and any corrective actions.

Each lane of the Roadway Segment will be assessed independently.

The Contractor shall obtain one (1) 100 mm diameter full depth core sample from each test site, in the presence of the Contract Administrator.

The Contract Administrator will take three (3) measurements around the circumference of each core sample to determine the average layer thickness on each core sample.

The Roadway Segment mean thickness per layer of in-place Bituminous Pavement will be determined from all thickness core samples taken from that Roadway Segment.

6.2.6 Surface Smoothness

The final surface will be profiled as per *MEB P045 Surface Smoothness Measurement Using High Speed Inertial Profiler for Highway Construction Projects*.

If a Section, as defined in *MEB P045 Surface Smoothness Measurement Using High Speed Inertial Profiler for Highway Construction Projects*, is located within a rejected Lot or Roadway Segment, the surface of that Section will not be profiled until the Lot has been corrected.

The Contract Administrator will provide the Contractor with a copy of the results for Surface Smoothness.

6.2.7 Segregation and Paver Streak

Each lane-km, including shoulders will be inspected for areas of Segregation and paver streak as per *MEB P053 Rating Segregated Bituminous Pavement for Highway Construction Projects*.

The Contract Administrator will endeavour to provide the Contractor with the locations of the visually identified Segregation and paver streak within two (2) days of spreading the Bituminous Mix.

6.2.8 Surface Defects

Each lane-km, including the shoulder, shall be inspected for surface defects.

The Contract Administrator will endeavour to provide the Contractor with the locations of the visually identified surface defects within two (2) days of spreading the Bituminous Mix.

6.2.9 Discretionary Lots

The Contract Administrator can designate any portion of the completed Work as a discretionary Lot if operational issues, workmanship or quality indicate deficient material or Work.

At the discretion of the Contract Administrator, additional samples may be collected.

Quality Assurance of discretionary Lots for compaction, asphalt content, aggregate gradation, VMA and air voids will be done by the Contract Administrator in accordance with the following:

a) The Contract Administrator will locate up to five (5) test sites in each discretionary Lot as per MEB P044 Random Sampling for Acceptance Testing – Method A.

b) The Contractor shall obtain core sample(s) from each test site, in the presence of the Contract Administrator, as per MEB P043 Sampling Compacted Bituminous Mixtures for Laboratory Testing.

c) Samples shall be taken prior to the placement of the next Lift of Bituminous Pavement and compaction test specimen shall be prepared to represent material from the Lift of Bituminous Pavement being assessed.

d) Core samples will be used for determination of compaction, air voids, asphalt content and aggregate gradation.

801. 7 APPEALS

7.1 General

Appeals will be considered by the Contract Administrator if the Contractor can demonstrate that Quality Assurance test results are different from the Quality Control test results.

Quality Control test results for a Lot which are provided to the Contract Administrator subsequent to the Contractor`s receipt of the Quality Assurance test results for that Lot will not be considered for an Appeal.

The Contractor shall serve notice of Appeal to the Contract Administrator, in writing, within five (5) days of receipt of the applicable Quality Assurance test results. Samples collected and retained for Appeal testing will be discarded if notice of Appeal is not requested within the allotted time period.

The Contractor shall bear all costs of Appeal testing unless the new test results indicate an improvement to the pay adjusted unit price of 2.5% or more, unless otherwise specified in the contract. The cost for Appeal testing will be based on the price that Manitoba pays its Service Provider for the Appeal test in question (including tax) plus 10% for administration. The Appeal testing Service Provider will be selected on the basis of competitively tendered lowest qualified price that is not in a conflict of interest with the Contractor or Manitoba.

Appeal testing will be done by a 3rd party laboratory retained by the Contract Administrator.

The Appeal test results shall replace the appealed Quality Assurance test result and be used to calculate the pay adjustment.

The Contract Administrator will not be responsible for any delays including but not limited to Contractor’s downtime, or other costs as a result of the Appeal.

7.2 Asphalt Cement Quality

Notwithstanding *MEB P026 Pay adjustment for Performance Grade Asphalt Cement*, the Contractor may Appeal the results of Quality Assurance testing for the asphalt cement quality of any sample.

7.3 Specific Gravity of Aggregates

The Contractor may Appeal the specific gravity of aggregate results prior to start of bituminous construction.

7.4 Bituminous Mix Properties and Compaction

The Contractor may Appeal the results of Quality Assurance testing for mix properties or compaction for any Lot.

7.5 Layer Thickness

The Contractor may Appeal the Quality Assurance results of layer thickness for any Roadway Segment. Additional cores will be taken at the same locations of the original cores for layer thickness Appeal testing.

7.6 Surface Smoothness

The Contractor may Appeal the measurements on any Section within pay deduction or correction.

The appealed Sections will be profiled as per *MEB P045 Surface Smoothness Measurement Using High Speed Inertial Profiler for Highway Construction Projects*.

If the Appeal test produces results in the Contractor's favour and the IRI value differs by more than 5% of the original value, the Appeal test will be no expense to the Contractor. However, if the Appeal test confirms the original assessment within the 5% threshold, the Appeal test shall be at the Contractor's expense. Costs for Appeal testing for Surface Smoothness will be $2,000 per day.

7.7 Segregation

The Contractor may Appeal moderate and severe pavement Segregation for identified area.

The Contract Administrator will locate a representative area for the type of severity under Appeal.

The Contractor shall obtain one (1) core sample of the area, in the presence of the Contract Administrator, as per *MEB P043 Sampling Compacted Bituminous Mixtures for Laboratory Testing*.

The Contract Administrator will deliver the core(s) to the Appeal laboratory to determine the gradation.

The test area will be considered to be in slight segregation category if the gradation test results indicate no price adjustment as per Table 8.4.

The test area will be considered to be in moderate segregation category if the gradation test results indicate a price adjustment as per Table 8.4.

The test area will be considered to be severe segregation category if the gradation test results indicate rejection as per Table 8.4.

801. 8 ACCEPTANCE CRITERIA

8.1 General

The acceptance of the asphalt cement, Bituminous Mixes and the finished product with unit payment or Pay Adjustment shall be based on the following criteria from the Quality Assurance test results:

a) Asphalt Cement Quality
b) Bituminous Mix Properties – Asphalt Content, Air voids, Voids in Mineral Aggregate, Gradation
c) Compaction
d) Layer thickness
e) Smoothness
f) Segregation
g) Surface Defects

If the acceptance test results on a Lot fall in rejection, refer to Table 9.1 (Section 801.9) for the required repair.

8.1.1 Bituminous Mix Unit Price Adjustment

The adjusted Unit Price per tonne of each mix will be used to determine the Lot payment and the applicable pay adjustments.

The Contract Administrator will adjust the Unit Price (per tonne) of each Bituminous Mix based on the actual percentage of Asphalt Cement Content in the supplied bituminous mixes. The Unit Price of Bituminous Mixes may increase or decrease from that specified in the contract, depending on the actual percentage of Asphalt Cement Content. The adjusted (increased or decreased) price per tonne of Bituminous Mixes per Lot will be calculated using the following formula:

$$PRTBmix = PRTcont + [(ACmean - ACcont)/100]\, x\, PRACt$$

Where:

PRTBmix = Adjusted price per tonne of Bituminous Mix based on the actual percentage of asphalt cement in the supplied bituminous mix, $

PRTcont = Price per tonne of Bituminous Mix based on the percentage of Asphalt Cement Content specified in the Contract, $

ACmean = Lot Mean Asphalt Cement, %

ACcont = Asphalt Cement Content specified in the contract, %

PRACt = Price of virgin asphalt cement per tonne (includes PST, excludes GST and additives), $

8.2 Asphalt Cement Quality

Unless otherwise specified, the asphalt cement shall conform to the latest Specifications for asphalt cements on the APL.

The Contract Administrator will notify the Contractor of out-of-specification test results.

8.2.1 Pay Adjustment for Asphalt Cement Quality

The pay adjustment will be calculated using the asphalt cement price in the supplied invoice and deducted from payments to the Contractor.

- *MEB P026 Pay Adjustment for Performance Graded Asphalt Cement*
- *MEB P027 Pay Adjustment for Penetration Graded Asphalt Cement*

8.3 Bituminous Mix Properties

The Lot Mean of Asphalt Cement Content, aggregate gradation, voids in mineral aggregate (VMA) and air voids (AV) will be determined by the Contract Administrator for acceptance.

- The deviation of voids (AV and VMA) will be calculated from the Lot Mean and specified mix design properties.
- The deviation of asphalt cement will be calculated from the Lot Mean and the corresponding JMF and the Asphalt Cement Content specified in the Contract.
- The deviation of the gradation will be calculated from the Lot Mean and the corresponding JMF.

8.3.1 Pay Adjustment for Mix Properties

8.3.1.1 Air Voids

The pay adjustment for air voids will be calculated using

Table 8.1 . The mean deviation of air voids (absolute value) will be calculated using the following formula:

$$Deviation\ of\ AV, Dav = |AVdesign - AVmean|$$

Where:

AVdesign = Air voids specified in the specified mix properties, %

AVmean = Lot Mean air voids, %

Table 8.1 Pay Adjustment for Air Voids

Mean of Deviations of Air Voids from the Mix Design (*Dav*)	Unit Price Adjustment, $ per Tonne of Bituminous Mix
0.00 to 0.7	0.00
0.71 to 1.50	= [7.00 – (10xDav)]
> 1.50	Reject

Where:

Dav = Lot Mean deviation of air voids (absolute value)

8.3.1.2 Voids in Mineral Aggregate

The pay adjustment for voids in mineral aggregate (VMA) will be calculated using Table 8.2.

The deviation of VMA will be calculated using the following formula:

$$Deviation\ of\ VMA, Dvma = VMAmean - VMAmin$$

Where:

VMAmin = Minimum VMA in the specified mix properties, %

VMAmean = Lot Mean VMA, %

Table 8.2 Pay Adjustment for Voids in Mineral Aggregate (VMA)

Deviation of VMA from the Minimum Requirements (*Dvma*)	Unit Price Adjustment, $ per Tonne of Bituminous Mix
> 3.0	Reject
2.1 to 3.0	= [12.0 – (6xDvma)]
0.0 to 2.0	0.00
-0.1 to -1.0	= 6xDvma
< -1.0	Reject

Where:

Dvma = Lot Mean deviation of VMA

8.3.2 Asphalt Cement Content

The pay adjustment for Asphalt Cement Content will be calculated using Table 8.3 . The deviation of Asphalt Cement Content from the JMF will be calculated using the following formula:

$$Deviation\ of\ AC, Dac = |ACmean - ACjmf|$$

Where:

ACjmf = AC specified in corresponding approved Job Mix Formula, %

ACmean = Lot Mean Asphalt Cement Content, %

Table 8.3 Pay Adjustment for Asphalt Cement Content

Mean of Deviations of Asphalt Cement Content from the JMF (Dac)	Unit Price Adjustment, $ per Tonne of Bituminous Mix
0.00 to 0.30	0.00
0.31 to 0.50 (above JMF)	= - [300 x (Dac - 0.30)^2]
0.31 to 0.50 (below JMF)	= - [500 x (Dac - 0.30)^2]
> 0.50	Reject

Where:

Dac = Lot Mean deviation of Asphalt Cement Content (absolute value)

8.3.3 Gradation

The pay adjustment for gradation will be calculated using Table 8.4. The deviation of gradation (absolute value) will be calculated using the following formula:

$$Deviation\ of\ Percent\ Passing\ (Dpp) = |PPjmf - PPmean|$$

Where:

PPjmf = Percent passing specified in corresponding approved Job Mix Formula

PPmean = Lot Mean percent passing

The pay adjustment for each Lot will be the sum of the pay adjustment for each sieve listed in Table 8.4.

Table 8.4 Pay Adjustment for Gradation

Sieve Size	Mean of Deviations of the Gradation from the JMF (Dpp)	Unit Price Adjustment, $ per Tonne of Bituminous Mix
12.5 mm for SP19.0 and Bit. B Mixes; 9.5mm for SP12.5 Mix	0.0 to 5.0	0.00
	5.1 to 10.0	= [10 – (2xDpp)]
	> 10.0	Reject
4.75 mm	0.0 to 5.0	0.00
	5.1 to 10.0	= [10 – (2xDpp)]
	> 10.0	Reject
2.00 mm for Bit. B Mix and 2.36 mm for Superpave Mixes	0.0 to 4.0	0.00
	4.1 to 8.0	= [10 – (2.5xDpp)]
	> 8.0	Reject
0.075 mm	0.0 to 0.5	0.00
	0.6 to 1.5	= [-7.5 x (Dpp - 0.5)^1.3]
	> 1.5	Reject

Where:

Dpp = Lot Mean deviation of percentage passing (absolute value)

A pay reduction of $45.00 per tonne will be applied on Lift 98 and lower if the Lot Mean percent by mass retained on the maximum size sieve exceeds 3.0% but does not exceed 5.0%

There will be no payment made on top Lift (Lift 99) if the Lot Mean percent by mass retained on the maximum size sieve exceeds 3.0%

There will be no payment made on other Lifts (Lifts 98 and lower) if the Lot Mean percent by mass retained on the maximum size sieve exceeds 5.0%

A Lot will be rejected if the sum of the Pay Adjustment for Table 8.4 in the Lot exceeds $15.00 per tonne.

8.3.4 Compaction

Compaction in percentage will be calculated based on the Lot Mean bulk relative density determined from the Bituminous Pavement core samples and the Maximum Theoretical Density (MTD) determined from the loose Bituminous Mix samples collected from the corresponding Lot.

If the compaction in any specific Sub-Lot is lower than 92%, the Contractor may collect one additional core as per Section 6.2.4 (Compaction) in the presence of Contract Administrator within 48 hours of receiving the Quality Assurance test results. The result from the additional core and original core will be averaged to determine the new bulk relative density for the Sub-Lot.

If the compaction of a Sub-Lot is lower than 88%, it will not be included in the Lot mean and the Sub-Lot will be rejected.

Where the compaction of all Sub-Lots within a Lot is less than 92%, no additional core will be allowed in any Sub-Lot within that Lot. In that case, the original test results from all cores within the Lot will be used to determine the Lot Mean Compaction.

8.3.4.1 Pay Adjustment for Compaction

The pay adjustment for each Lot will be determined from Table 8.5 Table 8.5.

Table 8.5 Pay Adjustment for Compaction per Lift

Lot Mean Compaction (% of MTD)	Unit Price Adjustment, $ per Tonne of Bituminous Mix
>98.0	Reject
96.1 to 98.0	= [388.0 - (4xPCmean)]
94.1 to 96.0	= [(2xPCmean) - 188.0]
93.0 to 94.0	0.00
90.0 to 92.9	= [(4xPCmean) – 372.0]
<90.0	Reject

Where:

PCmean = Lot Mean compaction in percentage of MTD

Notes:

(1) Preliminary levelling is not considered as a Lift;
(2) Unit price increase will not apply if core samples are not collected within 48 hours of Lot completion or on the first day of return from Scheduled Leave.

8.3.5 Bituminous Layer Thickness

Deviation of layer thickness will be calculated based on the Roadway Segment Mean thickness determined from core samples and the design layer thickness. The deviation of thickness will be calculated using the following formula:

$$Deviation\ of\ Layer\ Thickness, Dlt = Tm - Tdg$$

Where:

Tdg = Design layer thickness as specified in the Special Provision or as adjusted after the bottom Lift paving, mm

Tm = Roadway Segment Mean net layer thickness (after any required corrective measure), mm

If the deviation in any specific lane-km exceeds 10 mm from the design layer thickness, that lane-km will be considered as a discretionary Lot for the purpose of pay adjustment for layer thickness.

8.3.5.1 Pay Adjustment for Bituminous Layer Thickness

The pay adjustment for deviation of bituminous layer thickness will be determined from Table 8.6 .

Table 8.6 Pay Adjustment for Layer Thickness

Deviation of Layer Thickness from the Design (Dlt), mm	Unit Price Adjustment, $ per Tonne of Bituminous Mix
>10	= - 1.5 x (Dlt - 9)
>5 to 10	= - 0.5 x (Dlt – 5)
0 to 5	0.0
-5 to -1	= Dlt
-20 to -6	= 2xDlt
< -20	Reject

Where:

Dlt = Roadway Segment Mean deviation of layer thickness from the design.

8.3.5.2 Conversion of Roadway Segment to Tonne

For the purpose of pay adjustment, the Contract Administrator will determine the theoretical quantity of Bituminous Pavement or Recycled Bituminous Pavement in Tonnes as follows:

$$BitQuantity_{rs} = Length\ x\ Width\ x\ \frac{Tm}{1000} x\ BRD_{avg}$$

Where

*$BitQuantity_{rs}$ = **Mean** Quantity of bituminous pavement **per Lift** in the Roadway Segment, t*
Length = Length of the Roadway Segment, m
Width = Width of the Roadway Segment, m
BRD_{avg} = Average Bulk Relative Density of compaction cores for the particular Bituminous Mix
*Tm = Roadway Segment Mean **Lift** thickness (after any required corrective measure), mm*

Calculation of Tm,

$$\boldsymbol{Tm = \frac{Total\ Layer\ Thickness}{\#\ of\ Lifts\ Paved}}$$

8.3.6 Surface Smoothness

Any length of completed pavement which is 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 and turning lanes.

The smoothness profile measurements 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 smoothness assessment will be subject to a review by the Contract Administrator. 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.

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 and side street connections less than 300m in length

8.3.6.1 Pay Adjustment for Section Smoothness

Section smoothness will be calculated in international roughness index (IRI) and based on the average of the inner and outer wheel paths. A partial Section less than 100m in length is subject to the same evaluation as a whole Section.

Repairs within any 100m Section will disqualify that Section from receiving any incentives for Section smoothness.

The pay adjustment for Section smoothness will be determined from Table 8.7 .

Table 8.7 Pay Adjustment for Section Smoothness

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

Deduction for Section smoothness will not be applied 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;
- Location where 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.

8.3.7 Pay Adjustment for Localized Roughness

Localized Roughness will be calculated in international roughness index (IRI) and based on the worst of both wheel paths. Localized Roughness will be identified by calculating the IRI of the pavement in 7.6m intervals.

The pay adjustment for Localized Roughness will be determined from Table 8.8 .

Table 8.8 Pay Adjustments for Localized Roughness

Pay Adjustment for Localized Roughness	
IRI (mm/m) per 7.6m	Pay Adjustments per Occurrence
< 1.97	Nil
1.97-2.36	- $125
2.36-3.94	- $250
> 3.94	Reject or Apply $500 Deduction (Note 1)

Note 1: Reject if the posted speed limit is 80km/hr or higher. Deduction of $500 if the posted speed limit is less than 80km/hr.

8.3.8 Pay Adjustment for Percent Improvement

Pay adjustment for percent improvement will be applied on projects with one Lift overlay over a non-milled surface, unless otherwise specified. Table 8.7 and 8.8 will not apply to these projects.

Percent improvement will be calculated in international roughness index (IRI) and based on the difference of the pre-construction Section smoothness measurements and final Section smoothness measurements. A partial Section less than 100m in length is subject to the same evaluation as a whole Section.

Contractor shall request pre-construction Section smoothness within ten (10) business days prior to the Work. The pre-construction Section smoothness shall not be taken until frost-free ground conditions exist in the upper 750mm of the work area.

The pay adjustment for percent improvement will be determined from Table 8.9 .

Table 8.9 Pay Adjustments for Percent Improvement

Pay Adjustment for Percent Improvement		
Floating Pay Adjustment Formula	Percent Improvement	Pay Adjustment (per 100m)
= - 236 + 6.500 x (%Improvement)	15% to 64%	$173.50 to -$138.50
Maximum Pay Adjustment	>64%	$180.00
Maximum Deduction	<15%	Reject (Note 1)

Note 1: Corrective Work will be at the discretion of the Contract Administrator based on pavement structure and the severity of roughness. If the Contract Administrator decides not to take corrective action, there will be a $300 penalty per rejected Section in lieu of diamond grinding.

If the pre-construction Section smoothness is less than 0.950mm/m and the percent improvement is greater than zero, no corrective action and no pay deduction will be applied for that Section.

If the pre-construction Section smoothness is less than 0.950mm/m and the percent improvement is less than zero, a $300 deduction will be applied for that Section.

8.3.9 Segregation

Pay adjustment for Segregation will be calculated for each Lift of completed Bituminous Pavement.

Acceleration and deceleration lanes and interchange ramps will be considered separate lanes.

Pay adjustment will be based on the severity and the frequency of Segregation and in accordance with the following:

- Segregated areas, paver streak, and any repaired segregated areas identified by the Contract Administrator either during construction, or during the inspection conducted after the completion of paving Work, will be used to determine payment adjustments. Payment adjustments will not apply to segregated areas equal to or less than 0.1 m2 and on paver streaks equal to or less than one (1) metre long;
- Segregated areas (excluding paver streaks) separated by less than three (3) metres will be considered a single area for the determination of payment adjustments. For paver streaks, each area will be measured separately for payment adjustments;
- Shoulder paved with the adjacent travel lane will be considered as the part of that travel lane. Shoulder paved separately from the adjacent travel lane will be considered a separate lane.

8.3.9.1 Pay Adjustment for Segregation Severity

Payment adjustments for Segregation severity will be calculated in accordance to Table 8.10 .

Table 8.10 Pay Adjustment for Severity of Segregation

Severity of Segregation	Pay Adjustment
Slight	– $5.00 per square metre
Moderate	– $10.00 per square metre (Lower Lifts) Reject (Top Lift)
Severe	Reject
Paver Streak	– $5.00 per lineal metre

Notes:

(1) A segregated area will be categorized by the severity prevalent for 50% or more of the segregated area.

(2) For the purpose of segregated area calculations, except for paver streak, the Segregation severity will be measured across the half lane width unless the Segregation is more than one half the lane width or is across the centre of the lane, in which case the full width will be used.

8.3.9.2 Pay Adjustment for Segregation Frequency

Pay adjustment for Segregation frequency will be determined for each lane in accordance with the following:

1) The total number of slight segregated areas;
2) The total number of moderate and severe segregated areas; and
3) The total number of paver streaks

The sum of these values will be the Segregation frequency for the lane-km. The Segregation frequency for partial lane-kms will be calculated by dividing the Segregation frequency by actual length expressed in kms.

Payment adjustments for Segregation frequency will be determined in accordance to Table 8.11.

Table 8.11 Pay Adjustment for Segregation Frequency

Segregation Frequency per Lane Kilometre	Pay Adjustment ($ per lane kilometre)
0 – 5	$0
6 – 15	– $250
>15	– $500

8.3.10 Surface Defects

Surface defects include but are not limited to: gouges, slippage, cracking, tearing, pocketing, blistering, shoving, wash boarding, surface depressions or surface bumps.

All surface defects shall be repaired to the satisfaction of the Contract Administrator prior to final payment.

801. 9 CORRECTIVE ACTIONS

9.1 Unacceptable Bituminous Pavement and Repair Requirements

Each unacceptable (rejected) Bituminous Pavement will be subjected to corrective actions.

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

The nature of the deficiencies shall be taken into consideration when selecting corrective action. The corrective action selected by the Contractor will be subject to approval by the Contract Administrator prior to undertaking the corrective action.

The Contractor shall not undertake any correction on any defective work prior to notifying the Contract Administrator.

The corrective actions selected by the Contractor and approved by the Contract Administrator 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 being perpendicular to centreline of the paved lane.

The corrected area shall have a smooth transition to the surrounding pavement without negatively affecting any adjacent sections, impairing the functionality and the service life of the area.

Corrective actions shall be in accordance to Table 9.1 unless otherwise approved by the Contract Administrator.

Table 9.1 Unacceptable Bituminous Pavement and Corrective Actions

Deficiency/Distress	Severity	Corrective Actions
Mix Properties	Rejection	Remove and replace with acceptable Bituminous Mix
Compaction	Rejection	Remove and replace with acceptable Bituminous Mix
Layer Thickness	Rejection	1) Remove and replace with acceptable Bituminous Mix 2) Place an additional Lift of structurally equivalent thickness
Smoothness	Rejection	1) Remove and replace with acceptable Bituminous Mix 2) Diamond Grinding
Segregation	Moderate	<u>Top Lift Only</u> 1) Remove and Replace with acceptable Bituminous Mix
	Severe	<u>All Lifts</u> 1) Remove and Replace with acceptable Bituminous Mix 2) Overlay (additional Lift) with acceptable Bituminous Mix
Surface Defects	Rejection	1) Remove and Replace with acceptable Bituminous Mix 2) Overlay

9.1.1 Removal and Replacement

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

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 (same mix type as the removed mix) shall be placed and compacted meeting Specification.

9.1.2 Overlays

Should an overlay be proposed by the Contractor, the following will apply:

i. Tack coat shall be applied to the surface;

ii. New bituminous material shall be placed and compacted meeting Specification.

9.1.3 Diamond Grinding

Diamond grinding of the pavement surface shall be parallel to centerline and shall provide smooth transitions in and out of grinds, to adjacent lanes and maintain proper drainage to edge(s) of pavement.

The slurry produced from diamond grinding shall be disposed of in accordance with existing environmental regulations.

The corrections shall be re-profiled in accordance to *MEB P045 Surface Smoothness Measurement Using High Speed Inertial Profiler for Highway Construction Projects*.

The corrections shall not produce localized roughness or percent improvement values that result in a reduction in payment.

801. 10 COST OF QUALITY ASSURANCE RE-TEST OR RE-INSPECTION

The Contract Administrator shall charge the Contractor the cost of re-test or re-inspection for each unacceptable Lot or lane-km subjected to corrective measures identified through Quality Assurance.

The cost of re-testing will be based on:

1. In the event that the re-test was conducted by a laboratory service provider during the contract, the price that Manitoba pays its laboratory service provider (including tax) plus 10% for administration.
2. In the event that the testing is conducted by Manitoba, the cost to Manitoba to conduct the re-test.

The cost of re-inspection for segregation, paver streak and surface defects is $200 per lane-km or part thereof.

Manitoba will charge the Contractor for additional staff costs during construction of overlay or remove and replace corrective measures at the rate of the daily liquidated damages.

801. 11 METHOD OF MEASUREMENT

Bituminous Pavement or Recycled Bituminous Pavement will be measured by weight in tonnes supplied and placed on the road in accordance with this Specification.

801. 12 BASIS OF PAYMENT

12.1 Bituminous Pavement

The unit price per tonne for Bituminous Pavement will be payment in full for supplying all materials, constructing the Bituminous Pavement and performing all associated activities necessary to complete the Work in accordance to this specification.

Where pay adjustments are made, deductions or additional payment will be made as a lump sum separately from the Unit Price.

12.2 Bituminous Mix F.O.B.

The unit price per tonne for Bituminous Mix F.O.B. will be payment in full for supplying all materials, mixing and loading the material into trucks supplied by Others and any other associated activities necessary to complete the Work in accordance to this specification.

Acceptance will be based on Quality Assurance test results from the Lot being placed at time of supply.

Pay adjustment for aggregate properties, asphalt cement quality and bituminous mix properties will apply. If the acceptance test results for the material fall in rejection, no payment will be made and no corrective action is required.

If the actual Asphalt Cement content used in the mix is not determined, the Unit Price of the Bituminous Pavement will be adjusted based on the accepted JMF.

Where pay adjustments are made, deductions or additional payment from the Unit Price will be made separately as a lump sum.

12.3 Asphalt Cement Cost Adjustment for Market Price

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:

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

Where,

ACrap = Contribution of RAP to the design asphalt cement content as determined through ASTM D2172 Quantitative Extraction of Bitumen from Bituminous Paving mixtures, %
ACdesign = Design asphalt cement content as per the accepted mix design, %

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