

INDEX FOR
SPECIFICATIONS FOR MICRO SURFACING TREATMENT

827.	1	SCOPE.....	2
	1.1	Pre-Construction Meeting	2
827.	2	DEFINITIONS	2
827.	3	MATERIALS.....	3
	3.1	Aggregates.....	3
	3.2	Water.....	4
	3.3	Additives.....	4
	3.4	Mineral Filler.....	4
	3.5	Emulsified Asphalt Materials.....	4
827.	4	EQUIPMENT	6
	4.1	General	6
	4.2	Paving Equipment.....	6
	4.3	Water Truck.....	7
	4.4	Sweeper	7
	4.5	Equipment Calibration.....	7
827.	5	CONSTRUCTION	8
	5.1	Construction Limits.....	8
	5.2	Surface Preparation	8
	5.3	Spreading.....	9
	5.4	Curing Period	10
	5.5	Joints	10
	5.6	Clean Up	10
	5.7	Weather Limitations	10
	5.8	Opening to General Traffic.....	11
	5.9	Road Surface Condition at Seasonal Shutdown	11
827.	6	QUALITY CONTROL	11
827.	7	QUALITY ASSURANCE	12
	7.1	General	12
	7.3	Aggregate Gradation.....	12
	7.4	Mix Properties	13
	7.5	Segregation and Surface Defects	13
827.	8	APPEALS.....	13
827.	9	ACCEPTANCE CRITERIA.....	14
	9.1	General	14
	9.2	Emulsified Asphalt Quality	14
	9.3	Aggregate Properties	14
	9.4	Mix Properties	15
	9.5	Segregation and Surface Defects	15
827.	10	CORRECTIVE ACTIONS.....	15
827.	11	WARRANTY.....	16
	11.1	Warranty Period	16
	11.1	Warranty Repairs	16
827.	12	METHOD OF MEASUREMENT	16
827.	13	BASIS OF PAYMENT	16

SPECIFICATIONS FOR MICRO SURFACING TREATMENT

827. 1 SCOPE

These Specifications cover all operations necessary for and pertaining to the application of Micro Surfacing treatment.

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 a minimum of 15 business days in advance of commencing field operations. Topics to be discussed will include the type and quantity of equipment, sequence of Work and detailed Work schedule, traffic control, quality management plan, calibration of equipment, sampling procedures, aggregate and mix acceptance and other pertinent topics.

827. 2 DEFINITIONS

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

Deleterious Material: Material that can affect the performance of the structure and/or cause degradation of the product.

Delaminating: A physical separation of the Micro Surfacing from the surface.

Flushing: Excess asphalt binder occurring on the roadway surface making a shiny reflective condition that becomes tacky to the touch at higher temperatures.

Lot: Portion of Work that is being considered for acceptance and for the determination of pay adjustments for aggregate.

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

Lot Size: Micro Surfacing placement based on approximately 150 tonnes of emulsified asphalt. The Contract Administrator shall establish the Lot size at the start of each contract section. Smaller contract sections will be considered one Lot for the purpose of acceptance unless otherwise agreed upon.

Micro Surfacing: Pavement surfacing composed of polymer modified asphalt emulsion, high quality aggregate, mineral filler, and water.

Quality Assurance: Testing and inspection performed by the Contract Administrator for materials and placement quality acceptance.

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

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

Segment: 200 m, or part thereof, portion of the Work.

Straking: Longitudinal streak in Micro Surfacing caused by dragging oversize aggregate, broken or segregated mix during the placement of Micro Surfacing treatment.

Ravelling/Aggregate Loss: Dislodging of aggregate from the Micro Surfacing caused by bonding

failure between aggregate and binder.

827. 3 MATERIALS

3.1 Aggregates

Aggregates shall meet the requirements specified in the Contract.

Aggregate and supplementary granular materials shall consist of sound and durable particles of crushed rock, gravel, stone, sand and fines free from injurious quantities of sod, roots, clay lumps and friable particles, organics or other Deleterious Material.

3.1.2 Aggregate Requirements

Table 3.1 Combined Aggregate Gradation Requirements

Sieve Size		Percent Passing (%)	
Metric, mm	Imperial	Lower Limit	Upper Limit
9.50	3/8"	100	100
4.75	#4	70	90
2.36	#8	45	70
1.18	#16	26	50
0.600	#30	18	34
0.300	#50	12	25
0.150	#100	7	18
0.075	#200	5	15

Note: A maximum of two percent (3%) oversize particles will be allowed provided that the maximum dimension of the oversize particles does not exceed 3mm from the specified maximum size.

Table 3.2 Physical Properties Requirements

Physical Properties	Limit
Fractured Faces Content, Min. %	100
Total Lightweight Particles Content, Max. %	1.0
Ironstone Content, Max. % (Note 1)	1.5
Sand Equivalent, Min. %	60
L.A. Abrasion Loss, Max. % (Note 2)	30

Table 3.3. Aggregate Properties Test Methods

Test	Standard
Gradation	ASTM C136 ASTM C117
Fractured Faces Content (Note 1)	ASTM D5821
Lightweight Particles Content (Note 2)	ASTM C123
Ironstone Content (Note 3)	MEB C221
Sand Equivalent	ASTM D2419
Los Angeles Abrasion (Note 4)	ASTM C131

Note 1: The fractured face content will be determined based on two or more fractured faces.

Note 2: The heavy liquid used in the test method shall consist of a solution of zinc chloride in water.

Note 3: The ironstone content is the percentage of ironstone particles by weight of all particles retained on 4.75mm sieve.

Note 4: The LA Abrasion test shall be conducted on the parent aggregate

3.2 Water

The water shall be clean and free from injurious amounts of oil, alkalis, salts, organic matter or other Deleterious Materials.

3.3 Additives

Additives may be used to accelerate or retard the break/set of the Micro Surfacing. **Appropriate additives, and application rate ranges, shall be approved by the mix design laboratory as part of the mix design process.**

3.4 Mineral Filler

The mineral filler shall be Portland Cement, Type GU.

3.5 Emulsified Asphalt Materials

The Contractor shall supply emulsified asphalt cement Type CQS-1HP for the Micro Surfacing mix.

All asphaltic materials 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>.

The Contractor shall provide certified weigh scale tickets for all tank trucks of emulsified asphalt cement supplied.

3.6 Mix Design

The Contractor shall prepare and submit a Micro Surfacing mix design meeting specified requirements **seven (7) days prior to Construction.**

Mix design shall be completed by a laboratory equipped and staffed to carry out Micro Surfacing mix designs.

The Contractor shall provide 70kg of representative aggregate, **1gal of emulsified asphalt cement and 1kg of Portland Cement to the Contract Administrator for mix design verification and aggregate acceptance purposes.** An additional 50kg of the parent aggregate will be required for LA abrasion testing. Based on the maximum nominal size of the parent aggregate additional material may be required. The Quality Assurance laboratory will require ten (10) days, from the time of receipt, **to evaluate the mix time and test aggregate properties.**

The Contract Administrator will endeavor to verify and accept aggregate properties and proposed mix design within 48 hours of receiving quality assurance test results.

The Contractor shall not commence operations prior to receiving the Contract Administrators written notice that the mix design and aggregates have been accepted.

A new mix design shall be required if there is a change to the nature or source of the aggregate or to the supplier or source of asphalt cement.

3.6.1 Submission Requirements

The Micro Surfacing mix design submission shall include the following:

- Type of emulsified asphalt including the supplier name and location
- Type and source of individual aggregate (including legal description)
- Mix design proportions of the representative materials
- Mix properties at each trial mixtures (minimum three points) and for the selected/recommended mix which will be used in the field application.
- Summary of quality control test results meeting the aggregate requirements in Table 3.1 and Table 3.2.
- Mix design test results listed in Table 3.3.

3.6.2 Mix Design Requirements

The Micro Surfacing mix design shall produce a JMF that meets the mix properties as specified in Table 3.3.

Table 3.3 Mix Design Property Requirements

Test Method	Description		Limit
ISSA TB-113	Mix Time @ 25°C (Minimum)		Controllable to 120 seconds
ISSA TB-139	Wet Cohesion (Minimum)	@ 30 minutes	12kg-cm
		@ 60 minutes	20kg-cm
ISSA TB-114	Wet Stripping (Minimum)		90%
ISSA TB-100	Wet Track Abrasion Loss (Maximum)	1-hour soak	538 g/m ²
		6-day soak	807 g/m ²
ISSA TB-147, Method A	Lateral Displacement (Maximum)		5%
	Specific Gravity after 1,000 Cycles of 57 kg (Maximum)		2.10

ISSA TB-109	Excess asphalt by LWT sand adhesion (Maximum)	538 g/m ²
ISSA TB-144	Classification Compatibility (Minimum)	11 Grade Points (AAA, BAA)

The mix design proportions shall be within limits specified in Table 3.4.

Table 3.4 Mix Design Proportions Limits

Component Materials	Limits (by dry weight of aggregate)	JMF Tolerance
Residual Asphalt Cement Content, %	5.5 to 10.5	±1
Mineral Filler, %	0.3 to 3.0 (Note 1)	-

Note 1: Mineral Filler content outside of the limits require acceptance by the Contract Administrator

The emulsion content for the rut fill mix shall be 1% lower than that of the surface lift mix as established through the mix design.

The Micro Surfacing mix design shall produce a stable mix to avoid premature breaking of the mix in the spreader box.

The Micro Surfacing mix shall be free of excess liquids which create segregation of the aggregate.

827. 4 EQUIPMENT

4.1 General

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

Equipment shall be on site and available for inspection and acceptance before the Work commences.

Equipment deemed un-satisfactory by Manitoba's representative shall be removed from the work site and Work will halt until equipment is replaced or repaired. Stoppage of Work will be at the Contractors' expense and no compensation will be made to the Contractor.

4.2 Paving Equipment

The paving equipment shall be specifically manufactured for Micro Surfacing. It shall consist of the components and capabilities listed below. The self-loading device, right-side driver station, and forward and reverse speed controls shall be as per the intended design of the original-equipment-manufacturer.

- A revolving multi-blade, double-shafted mixer to accurately deliver and proportion the mix constituents.
- An automatic-sequenced, self-propelled continuous flow mixing unit to thoroughly mix the constituent materials.
- Paver capable of side shifting to compensate for variations in the pavement geometry.
- Storage units of sufficient capacity to maintain an adequate supply of all mix constituents to the proportioning controls.
- Capable of continuous application of Micro Surfacing while loading the constituent materials.

- Equipped with right-side driver station to assist in following the road alignment during the Micro Surfacing application.
- Equipped with a spray bar ahead of the spreader box that is capable of fogging the existing surface with water.
- Equipped with rut filling boxes that have an inside width of 1.5 m and 1.8 m to fill ruts.
- Equipped with an adjustable surface lift spreader box capable of surfacing 3.0 to 4.3 m wide lanes.
- The surface lift spreader box shall be:
 - Hydraulically expandable and collapsible to change width, as required, during the Micro Surfacing application.
 - Equipped with an adjustable secondary strike-off that matches with the width of the spreader box and allows for varying pressure to control surface texture. Burlap will not be allowed.
 - **Equipped with a metal or stiff rubber strike-off that matches the width of the spreader box capable of levelling the pavement surface for scratch coat application.**
- The surface lift and rut filling boxes shall be:
 - Equipped with front seals to ensure no loss of the mixture at the road contact points.
 - The spreader box and rear strike-off shall be designed and operated to ensure a consistent mixture, free flow of material to the rear strike-off and uniform finishing of Micro Surfacing.

4.3 Water Truck

The Contractor shall provide a water truck with a minimum capacity of 16,000 L, equipped with spray bar for watering granular shoulders during Micro Surfacing operation.

Granular shoulders shall be watered as directed by the Contract Administrator to minimize dusty condition on and along the roadway.

No additional payment will be made for the supply of water truck as it will be considered incidental.

4.4 Sweeper

Power sweeper capable of cleaning gravel, sand, dirt and other debris from the roadway surface.

4.5 Equipment Calibration

The Micro Surfacing equipment shall be calibrated in the presence of the Contract Administrator, before the commencement of Work. Calibration will not be permitted on statutory holidays.

The equipment shall be calibrated as per ~~the ISSA Inspector's Manual for High Performance Slurry Systems~~ or the equipment manufacturers' calibration method. **The calibration procedure shall include a metered verification for each material used.**

The Contractor shall use representative Micro Surfacing aggregate for the calibration.

Representative samples of the Micro Surfacing mix shall be taken directly from the Micro Surfacing equipment, if directed by the Contractor Administrator. Data obtained from the proportioning devices on the Micro Surfacing machine may be used to determine individual material quantities and application rate.

The equipment shall be recalibrated if any component that affect material proportioning is replaced. Equipment will not be allowed for use on the project until the re-calibration has been completed and accepted by the Contract Administrator.

827. 5 CONSTRUCTION

5.1 Construction Limits

The Contractor shall meet with the Contract Administrator on site prior to starting each section to discuss the following construction limits:

- Start and end locations
- Width of the treatment
- **Locations of rut fill and scratch coat application**
- Treatment area of intersection(s)
- Other pertinent information

5.2 Surface Preparation

Existing surface shall be clean, free from dust, dirt, excessive moisture and other unacceptable material prior to the application of Micro Surfacing.

The Contractor shall be responsible for installing protective covers on manholes, catch basins, valve chambers, expansion joint and other utility structures.

The surface preparation shall require acceptance of the Contract Administrator prior to the start of the Micro Surfacing application.

5.2.1 Protective Cover Installation

The Contractor shall install protective covers in such a way that they are not displaced by the spreader box and/or imbedded between the existing road surface and the Micro Surfacing material.

The Contractor shall mark all protective covers so that they may be relocated after the Micro Surfacing operation is complete.

During the installation and removal of the protective covers, the Contractor shall take the necessary steps to prevent foreign material from entering the utility structure or expansion joint.

Protective covers must be removed within 24 hours of completion of the Work at each job site or before the roadway is reopened to traffic.

Where required, the Contractor shall remove protective covers during heavy rains to prevent localized flooding and replace them before starting or restarting the operation at no additional cost.

The supply, installation, removal and disposal of all protective covers shall be considered incidental.

5.3 Spreading

When conditions warrant, the road surface ahead of the spreader box shall be fogged with water. The rate of application of the fog spray shall be adjusted with the changes in ambient temperature, humidity, pavement surface texture, and surface condition.

The Contractor shall ensure deleterious and loose aggregate materials from the paving equipment does not contaminate the road surface ahead of the spreader box. If the road surface is contaminated, the Contractor shall stop work and correct the issue.

The paver shall produce a uniform mixture in which all particles are thoroughly coated.

A sufficient amount of material shall be carried in all parts of the spreader for complete coverage of the applicable surface width. The Contractor shall not overload the spreader box.

The paver shall produce a uniformly textured surface free of rippling, Streaking, tearing and Flushing or other surface irregularities. If excessive rippling, streaking, tearing and flushing develops, the Work shall be stopped until the Contractor corrects the issue.

Longitudinal edge lines at intersections, curbs, and shoulders shall align with the road alignment to provide a good appearance. Longitudinal edge lines shall not vary by more than ± 100 mm from road alignment in any 200 m long section.

All handwork required behind the spreader boxes shall be performed with hand squeegees or other devices approved by Contractor Administrator. The use of burlap attached to the hand squeegees or the back of a shovel shall not be permitted for restoring surface imperfections.

5.3.1 Rut Filling Application

Rut filling shall be performed to correct roadway cross fall and improve surface drainage. It consists of two (2) rut pulls of 1.5 m or 1.8 m wide, or combination of, on each lane. The rut filling shall produce a crown, as shown in Figure 1, to allow for compaction under traffic.

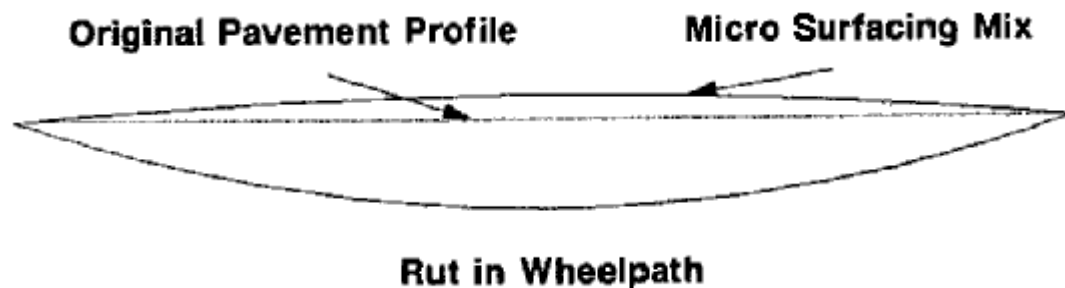


Figure 1 - Rut Filling Application

Additional filling may be required outside of the wheel ruts to re-establish cross slope. Those areas will be identified onsite by the Contract Administrator.

5.3.2 Scratch Coat Application

If specified, a scratch coat of Micro Surfacing shall consist of one (1) full coverage 3.0 to 4.3 m wide application on each lane to fill ruts, cracks and shallow potholes prior to the surface application.

A scratch coat of Micro Surfacing must provide full lane width coverage and be applied with the spreader box using a metal or stiff rubber strike-off with the ability to level the pavement surface.

5.3.3 Surface Lift Application

A surface lift of Micro Surfacing shall consist of one (1) full coverage 3.0 to 4.3 m wide application on each lane.

Additional surface lift application(s) may be required for intersections, turning lanes, paved shoulders and parking lanes and other areas as identified by the Contract Administrator.

5.4 Curing Period

Each rut-filling and surface lift material shall be allowed to cure under traffic for at least 24 hours before additional Micro Surfacing is placed. Curing time may be extended or shortened as determined by the Contract Administrator.

5.5 Joints

For the surface applications, the Contractor shall place longitudinal joints on lane lines throughout the project.

Partial width passes will be allowed only when it is necessary provided that it is not be the last pass of any paved area.

No excess buildup, uncovered areas, or unsightly appearance shall be permitted on longitudinal or transverse joints.

The maximum overlap between successive passes of Micro Surfacing shall not exceed 100 mm on longitudinal joints.

Surface deviation at any transverse or longitudinal joint shall not exceed 10 mm.

5.6 Clean Up

Micro Surfacing material shall be removed from all areas, such as utility access, gutters and shoulders, as directed by the Contract Administrator.

The Contractor shall remove all debris associated with the Work on a daily basis.

5.7 Weather Limitations

Micro Surfacing shall not be permitted if the atmospheric and surface temperatures is below 10°C and falling.

Micro Surfacing shall be permitted if the atmospheric and surface temperature is 7°C and rising.

No Micro Surfacing shall be applied when the temperature in the forecast drops below 3°C at the project location within 24 hours after its application.

The Micro Surfacing shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

When weather conditions are unfavorable, or are likely to become unfavorable, as determined by the Contract Administrator, paving operations may be suspended by the Contract Administrator without liability or cost to the Manitoba.

5.8 Opening to General Traffic

Traffic shall be kept off the freshly placed Micro Surfacing mat until it is able to carry traffic without damage. The Contractor shall be responsible for repair or replacement of the damaged Micro Surfacing.

5.9 Road Surface Condition at Seasonal Shutdown

All scratch coat and rut pull shall be covered by the surface lift prior to seasonal shutdown.

827. 6 QUALITY CONTROL

The Contractor shall meet the requirements of Manitoba's *Standard Construction Specification for Quality Control (No. 110)*.

The Contractor shall perform process and quality control sampling, testing and inspection to ensure that Micro Surfacing and its construction conform to the Contract requirements.

The Contractors shall provide an electronic document management system (DMS) accessible to the Contractor and Department. The DMS shall contain records not limited to testing, inspection, mix design, construction documents and non-conformance reports.

6.1 Testing Frequency and Test Methods

Recommended frequencies and test methods are listed in Table 6.1 and 6.2.

Table 6.1: Aggregate for Micro Surfacing

Test or Action	Frequency	Test Method
Gradation	1 per 500 tonnes	ASTM C136 ASTM C117
Fractured Faces Content, Min. %	1 per 400 tonnes	ASTM D5821
Total Lightweight Particles Content, Max. %	2	ASTM C123
Ironstone Content, Max. %	2	MEB C221
Sand Equivalent, Min. %	2	ASTM D2419
L.A. Abrasion Loss, Max. %	2	ASTM C131, Method B

Note: Testing for lightweight particles and ironstone content can be reduced based on location of the aggregate source.

Table 6.2 Construction of Micro Surfacing

Test of Action	Frequency	Test Method
Application Rate	Continual Inspection	N/A

Cross-Fall	Continual Inspection	N/A
Surface Defects and Segregation	Continual Inspection	<i>ISSA Inspectors Manual for High Performance Slurry Systems</i>
Aggregate Moisture Content	Daily	ASTM C566 or other approved method

6.2 Construction Document

The Contractor shall complete a *Distribution and Inspection Form* provided by the Contract Administrator.

The *Distribution and Inspection Form* will document quantity of emulsified asphalt, distance travelled and inspection of the Work.

The Contractor shall provide a legible copy to the Contract Administrator on a weekly basis.

827. 7 QUALITY ASSURANCE

7.1 General

The Contract Administrator will conduct Quality Assurance testing and inspection of the emulsified asphalt quality, materials, segregation and surface defects to determine its acceptability.

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

The Contractor shall supply bags/containers for sampling and the Contract Administrator will provide the tags/labels. Quality Assurance inspection and testing will be performed at no cost to the Contractor.

The inability of the Contract Administrator to provide Quality Assurance test results shall not relieve the Contractor of their obligation to remedy any defect.

7.2 Emulsified Asphalt Quality

The Contractor shall be responsible for sampling the emulsified asphalt 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 emulsified asphalt delivered to the Contractor's storage tanks. The Contract Administrator will be present during the sampling process unless otherwise authorized by the Contract Administrator.

Unless otherwise specified, the emulsified asphalt shall conform to the latest Specifications for Emulsified Asphalt on the approved products list (APL).

7.3 Aggregate Gradation

Aggregate samples will be taken from the working face of the staging area stockpile, during the construction of Micro Surfacing.

The Contract Administrator will identify three (3) sample locations in each Lot for Quality Assurance Testing.

The Contractor shall obtain two (2) samples from each sample location, in the presence of the Contract Administrator, as per *MEB P047 Sampling Aggregate Materials for Laboratory Testing* –

Front End Loader Method. One sample will be used for Quality Assurance and the other will be reserved for the prospective Appeal testing.

The Contract Administrator will test the aggregate gradation as per the test methods listed in Table 3.3.

7.4 Mix Properties

The Contract Administrator will locate a test site(s) in each section to verify residual asphalt content of the loose mix. Additional test sites may be required at the discretion of the Contract Administrator.

The Contractor shall obtain a sample of the Micro Surfacing mix from each test site, in the presence of the Contract Administrator, directly from the Micro Surfacing paver.

The residual asphalt cement content of the Micro Surfacing mix will be determined as per *ASTM D2172- Quantitative Extraction of Bitumen from Bituminous Paving Mixtures*.

7.5 Segregation and Surface Defects

Each lane-km, including shoulders will be inspected for areas of segregation and surface defects.

The Contract Administration will utilize the *ISSA Inspectors Manual for High Performance Slurry Systems* to identify surface defects.

The Contractor shall provide 24 hours notice for acceptance testing/inspection of the Work in each section and arrange an on-site meeting with the Contract Administrator.

827. 8 APPEALS

The Contractor may Appeal the results of Quality Assurance testing for any aggregate properties.

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 the aggregate stockpile which are provided to the Contract Administrator subsequent to the Contractor's receipt of the Quality Assurance test results 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 received within the allotted time period.

The Contractor shall bear all costs of Appeal testing unless the new test results indicate acceptance. The cost for Appeal testing will be based on the cost that Manitoba pays its Service Provider for the Appeal test in question (including tax) plus 10% for administration. Manitoba will select the Appeal testing Service Provider on the basis of competitively tendered lowest qualified price that does not pose 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 for acceptance.

Manitoba will not be responsible for any delays including but not limited to Contractor's downtime, or other costs as a results of the Appeal.

827. 9 ACCEPTANCE CRITERIA

9.1 General

The acceptance of materials, segregation and surface defects shall be based on the following criteria from the Quality Assurance test results:

- Emulsified Asphalt Quality
- Aggregate Properties
- Mix Properties
- Segregation and Surface Defects

If the results fall in rejection, corrective action shall be performed as per Section 10.

9.2 Emulsified Asphalt Quality

Emulsified asphalt with test results failing to meet the specification will be subjected to pay adjustment depending on the extent of the problem.

The Contract Administrator will notify the Contractor of test results that do not meet specification.

9.3 Aggregate Properties

The Acceptance of the aggregates will be based on the material characteristics from the Quality Assurance test results.

Pay adjustment will apply if the gradation from the representative Lot does not meet all the requirements.

The Contract Administrator will accept the material into the Work at a reduced payment to the Unit Price unless the pay adjustment is equal to or greater than 10%.

9.3.1 Pay Adjustment for Gradation

Price adjustment is based on the deviation of the Lot Mean from the specification limits in Table 3.1.

Table 9.1 Pay Adjustments for Gradation

Sieve Size	Mean Deviation from Specification Limit (Dsl), %	Unit Price Adjustment, Percent Reduction per tonne, %
9.5 mm	≤3	=1 x Dsl
	>3	Reject
4.75 mm, 2.36 mm, 1.18 mm, 0.600 mm, 0.300 mm, 0.150 mm	1 to 5	=1 x Dsl
	>5	Reject
0.075 mm	1 to 3	=1.5 x Dsl

	>3	Reject
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The pay adjustment for each Lot will be the sum of the pay adjustment for each sieve.

$$\text{PayReduction per tonne} = PRT \times (\text{Sum of Percent Reduction in Table 9.1})$$

Where:

$$PRT = \text{Price per tonne of emulsified asphalt}$$

If the Sum of Percent Reduction in Table 9.1 exceeds 10%, the representative Lot will be rejected and corrective actions may apply.

9.4 Mix Properties

The deviation of residual asphalt cement content from the JMF shall not exceed the tolerance listed in Table 3.4.

If deviation of residual asphalt cement content does not meet the job mix formula tolerance, the Contractor will be notified of the deficiencies by the Contract Administrator within 24 hours of the Contract Administrator receiving the information.

The Contract Administrator may rescind the Micro Surfacing mix design acceptance if it cannot be demonstrated that the material is compliant with the specified requirements.

9.5 Segregation and Surface Defects

Surface defects include but are not limited to: Streaking, Flushing, tearing, shoving, transverse rippling, uncovered areas and excessive build up at joints.

Flushing larger than 1m² and Streaking in any 25 m² area greater than 13mm wide and 100mm long or 25mm wide and 75mm long shall be identified as a deficiency.

All identified segregation and surface defects shall be rejected and are subject to corrective action.

827. 10 CORRECTIVE ACTIONS

10.1 Unacceptable Micro Surfacing and Repair Requirements

Each unacceptable (rejected) Micro Surfacing or Micro Surfacing component will be subjected to corrective actions.

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

The Contractor shall submit a proposal to the Contractor Administrator to remedy all required corrective actions in accordance to this specification

The Contractor shall not undertake any correction on any defective Work prior to receiving acceptance of the proposal from the Contract Administrator.

The width of the Micro Surfacing overlay shall be no less than the width used for the original construction and shall extend to a length determined by the Contract Administrator.

827. 11 WARRANTY

11.1 Warranty Period

The warranty period shall be 12 months after acceptance of the Work in the Contract. If warranty repairs are required, the warranty period shall be extended for an additional 12 months after corrective actions are completed.

11.1 Warranty Repairs

The Contract Administrator will inform the Contractor of necessary warranty repairs in writing during the warranty period.

Warranty repairs shall be in accordance with *Section 10 Corrective Actions* and Table 11.1.

Table 11.1 Warranty Repairs

Deficiency	Description	Corrective actions
Flushing	More than 1m ²	<ol style="list-style-type: none"> 1. Remove and replace Micro Surfacing in affected area. 2. Overlay the affected area with Micro Surfacing.
Delamination	More than 2 percent of Segment	<ol style="list-style-type: none"> 1. Remove and replace Micro Surfacing in affected area.
Ravelling/Aggregate Loss	More than 2 percent of Segment	<ol style="list-style-type: none"> 1. Remove and replace Micro Surfacing in affected area. 2. Overlay the affected area with Micro Surfacing.

827. 12 METHOD OF MEASUREMENT

Micro Surfacing will be measured in tonnes of emulsified asphalt used.

Adjustments in the length, width and thickness of the Micro Surfacing lift may be required, as directed by the Contract Administrator.

Once the Contractor reaches the estimated tender quantity of emulsified asphalt for a single section, the Contract Administrator may elect to discontinue Micro Surfacing operations for that particular section.

The Contract Administrator will not consider any claims from the Contractor for discontinuing operations after approximate tender quantities are met.

827. 13 BASIS OF PAYMENT

The Contractor must provide copies of all certified weigh scale tickets representing the quantity of emulsion asphalt materials delivered, prior to payment.

The Unit Price per tonne of emulsified asphalt for "Micro Surfacing" (Oil Supplied by Contractor) will be payment in full for all labour, equipment, material and associated activities necessary to complete the Work in accordance to this specification.

Repair, changes in application rates or warranty Work will be considered incidental to the Contract.

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

13.1 Emulsified Asphalt Cement Cost Adjustment

Manitoba will adjust payment to the Contractor based on the Departments Asphalt Cement price index. The price index will be used to calculate the cost adjustment per tonne of emulsified asphalt accepted into the Work.

The price index is based on the price, excluding taxes, of asphalt cement grade PG 58-28. The price index for each month reflects the average of the same month's prices and will be circulated on the last day of the month. The price index established for the month will apply to quantity of Work accepted in the same month.

The emulsified asphalt cement (EAC) cost adjustment per tonne is calculated based on the residual asphalt cement content using the following formula:

$$EAC \text{ Cost Adjustment} = (Index_m - Index_{tc}) * (EACQuantity_m * \frac{AC_{res}}{100})$$

Where,

Index_m = Manitoba Index for the month in which paving occurs, \$

Index_{tc} = Manitoba Index for the month prior to tender closing, \$

EACQuantity_m = Quantity of EAC placed for the month, Tonnes

AC_{res} = Minimum residual asphalt cement content required as per specification requirements

EAC cost adjustments will be made as a lump sum separately from the Unit Price on progress payments.