

**1. Description**

This work shall consist of furnishing all materials, equipment, labor and preparation necessary for the application of the polymer modified asphaltic rejuvenating emulsion - Scrub Seal. The applied material shall completely seal the pavement surface and provide a uniform textured surface, suitable for placement of hot mixed asphalt, micro-surfacing, slurry seal, fog seal or as a finished surface.

The work shall be completed as follows: Prepare the pavement surface; apply the polymer modified asphaltic rejuvenating emulsion and scrub the applied emulsion with a scrub broom as specified herein; apply aggregate, roll the aggregate, broom the aggregate with a secondary broom when specified,; sweep and dispose of excess aggregate.

**2. Materials**

**POLYMER MODIFIED BITUMINOUS REJUVENATING EMULSION BINDER- GRADE CMS-2P**

<b>EMULSION PROPERTY</b>	<b>MIN</b>	<b>MAX</b>	<b>TEST METHOD</b>
VISCOSITY @ 50°C (122°F) (cPs)	110	880	ASTM D7226
RESIDUE BY EVAPORATION, W%, MIN	65		ASTM D6943 <sup>1</sup>
SIEVE, W%, MAX <sup>2</sup>		0.1	AASHTO T59
PARTICLE CHARGE	POSITIVE		AASHTO T59
DEMULSIBILITY 35 mL, 0.8% Sodium Dioctyl sulfosuccinate, %		20.0	AASHTO T59
STORAGE STABILITY, W%, 24 HOURS <sup>2</sup>		1.0	AASHTO T59
<b>RESIDUE PROPERTY (BY VACUUM DISTILLATION)</b>			
G*/SINδ @ 52°C , (kPa)	2.2		ASTM D7403
MSCR @ 10°C, %R @3.2kPa, %	55		ASTM D7405
PENETRATION @ 4°C, MIN <sup>3</sup>	40		AASHTO T49
<b>REJUVENATING AGENT PROPERTY</b>			
VISCOSITY, 60°C (140°F), cPs	50	300	ASTM D4402
FLASH POINT, COC, °F	>425		ASTM D92
SATURATES, W%		30	ASTM D2007
SOLUBILITY IN N-PENTANE, W%	99.0		ASTM D2007
MASS LOSS AFTER RTFO OR TFO, W%		6.5	AASHTO T240 OR T179
VISCOSITY RATIO		3.0	AASHTO T179

1. ASTM D7404 is an acceptable alternate test method for determination of % residue in emulsion.
2. This test requirement on representative samples is waived if successful application of the material has been achieved in the field.
3. Test conditions: 200 g at 60s

**COARSE AGGREGATE**

The coarse aggregate shall be 100% crushed material from quarried stone, natural gravel or other high quality aggregate excluding sources containing magnesium or calcium carbonite and meet the following requirements:

**PHYSICAL REQUIREMENTS**

<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>TEST METHOD</b>
L.A. ABRASION LOSS @ 500 REVOLUTIONS, %		35	AASHTO T96
DELETERIOUS MATERIAL, W%		1.0	AASHTO T113
CRUSHED PIECES, 1 FRACTURED FACE, %	100		WISDOT CMM 8-60
SODIUM SULFATE SOUNDNESS TEST, 5 CYCLE, R4, %	15		AASHTO T104

**GRADING REQUIREMENTS - ASTM C-117**

<b>SIEVE</b>		<b>TYPE I</b>
1 Inch	(25mm)	100
¾ inch	(19mm)	100
½ inch	(12.5mm)	100
3/8 inch	(9.5mm)	100
5/16 in	(8.0mm)	90-100
No. 4	(4.75mm)	10-80
No. 8	(2.36mm)	5-30
No. 16	(1.18mm)	0-15
No. 200	(75um)	0-5

### **3. Equipment**

All equipment required for performance of the work shall be approved before construction is to begin, and shall be maintained in satisfactory operating condition. The Contractor shall furnish an accurate thermometer, hand brooms and other small tools and equipment essential for the completion of the work.

#### **PRESSURE DISTRIBUTOR**

The pressure distributor shall have a computerized rate control that automatically adjusts the distributor's pump to the ground speed. The pressure distributor shall be capable of heating and re-circulating the bituminous binder to the specified temperature. The proper nozzles shall be used for the material and rate specified.

#### **SCRUB BROOM**

The scrub broom frame shall be constructed such that the scrub broom is attached to the distributor truck. The scrub broom must be equipped with the means to mechanically raise and lower the scrub broom off and onto the road surface at designated points of completion and start up. It shall be towable in the elevated position. The weight of the broom assembly shall be such that it does not squeegee the emulsion off the roadway surface.

The main body of the scrub broom shall be a frame minimum 6'-9" wide and 10 feet long. The maximum transverse rigid frame width at any point shall not exceed 6'-9". The nearest and furthest members, paralleling the back of the spreader truck, and diagonal members shall be equipped with emulsion scrub brooms. The leading member and the trailing member shall have broom heads angled at 10 to 15 degrees off the centerline of the supporting member. Each individual emulsion scrub broom attached to the scrub broom assembly shall be 3 1/2" w x 6 1/2" h x 16" l and have stiff nylon bristles. Bristle height is to be maintained at a minimum of 5 inches. The scrub broom shall be equipped with hinged wing assemblies attached to the main body not to exceed 4'-6" per side, with diagonals and equipped with emulsion scrub brooms. The purpose of the maximum rigid frame width and the hinged wing extensions is not only for maximum width of 16 feet but to maintain the scrubbing process consistently as surface textures and conditions along with cross-sections change along the existing roadway surface.

**NOTE:** The Contractor must supply a scrub broom as described for the purpose of scrubbing the polymer modified asphaltic rejuvenating emulsion. If the Contractor fails to supply the scrub broom specified, the project shall be shut down. Shut downs resulting from the failure to provide this specified scrub broom shall not excuse the Contractor from the provisions of contract working days.

#### **AGGREGATE SPREADER**

The aggregate spreader shall be self-propelled and shall be equipped with hoppers, revolving cylinders and adjustments necessary to produce a uniform distribution of material at the specified rate.

#### **PNEUMATIC TIRE ROLLER**

The pneumatic tire rollers shall weigh a minimum of five (5) tons.

#### 4. Pre-Paving On-Site Meeting

A meeting between the Contractor and Engineer will be held at the project site prior to beginning work. The agenda for this meeting will include:

- Review of Contractor's detailed work schedule
- Review of the traffic control plan
- Inspection of equipment
- Calibration and adjustment to equipment as needed

#### 5. Weather Limitations

The stress absorbing membrane interlayer scrub seal shall be placed when the pavement and atmospheric temperature is 50°F and rising. Placement is not permitted if it is raining, when the pavement surface has standing water, or when temperatures are forecasted to be below 40°F within 24 hours of placement.

#### 6. Qualifications

The Contractor shall: a) Be DOT pre-qualified or b) Have had a minimum of five (5) years' experience in the application of the polymer modified asphaltic emulsion as applied to SAMI; and c) have successfully completed at least three (3) SAMI projects utilizing the scrub-broom. References shall be supplied upon request.

#### 7. Construction

The Contractor shall follow the construction methods as described:

- Give the TCRC a minimum one week notice of start of work so that Road Work Ahead signs can be installed by the TCRC crew.
- Preparation of the surface shall include removal of all vegetation, dirt and debris from the roadway. The surface shall be cleaned by the Contractor and shall be reasonably dry when the bituminous binder is applied. Material cleaned from the surface shall be properly disposed of.
- The scrub seal shall be applied from edge of pavement to edge of pavement. The edges of the limits of the scrub seal application on both sides of the road shall be maintained in a neat and uniform line.
- Immediately following application of the polymer modified bituminous rejuvenating emulsion binder to the roadway surface, the material shall be scrubbed with the scrub broom for the purpose of forcing the emulsion into the existing surface voids and distributing the emulsion over variable roadway surface textures and conditions.
- The application of the polymer modified asphaltic rejuvenating emulsion and scrub broom operation shall cease +/- 40 feet prior to the end of the road section or intersection. The remaining polymer modified asphaltic rejuvenating emulsion shall be drug out by the scrub broom, and the remaining emulsified material required to complete the pass shall be applied only by the distributor at the specified rate.
- The specified aggregate shall be spread uniformly onto the bituminous binder prior to the emulsion breaking and as agreed to by engineer & contractor in field.
- Projects with segments greater than 20,000 square yards shall use a minimum of three (3) rollers. Rollers shall proceed at a maximum speed of 5 mph. the entire surface shall receive a minimum of two (2) roller passes. The first roller pass shall be performed within one minute of aggregate spreading.

- Sweeping of the completed surface shall be accomplished prior to unrestricted use by traffic. The entire surface shall be clean of all loose material within 24 hours and prior to placement of any surface course.
- The Contractor shall protect all utility castings using tarpaper, plastic, or other approved material. All covers shall be properly fitted to the casting and protective covering removed upon completion of sweeping.

**8. Application of Bituminous Binder and Coarse Aggregate**

The bituminous binder shall be heated to specified temperature and uniformly placed to prevent ridges or streaks in the surface.

**BITUMINOUS BINDER**

The bituminous binder shall be applied at a temperature of 110°F to 180°F, and at the rate specified.

**COARSE AGGREGATE**

- Stockpiling and loading methods shall permit ready identification of material and minimize segregation and contamination of the aggregate.
- The moisture content of the coarse aggregate shall be below 4% and maintained throughout the project.
- Coarse aggregate shall be spread uniformly without ridges or gaps at the specified rates.
- Spreading of the aggregate shall be adjusted to produce a minimum of excess loose particles, shall provide complete coverage, and there shall be no “excessive” bleed-through after rolling.
- The spreading operation shall be accomplished in such a manner that neither the tires of trucks nor the spreader come into contact with the newly applied bituminous material.

**MATERIAL APPLICATION RATES**

**AGGREGATE APPLICATION RATE  
Pounds per Square Yard**

<u>APPLICATION TYPE</u>	<u>APPLICATION</u>	<u>TOLERANCE</u>
Scrub Seal	23	In Field Adjustments

**BINDER APPLICATION RATE  
Gallons per Square Yard**

<u>APPLICATION TYPE</u>	<u>APPLICATION</u>	<u>TOLERANCE</u>
Scrub Seal	0.30 - 0.40	± 0.05

The supplier of the scrub seal binder shall determine the application rate for emulsion and aggregate based on the existing pavement condition and aggregate size. This information shall be reported to the Engineer prior to beginning work and shall include an aggregate gradation on the job-specific materials

**9. Quality Control**

To measure compliance, the Contractor shall use the methods described in this section:

- Aggregate Gradation
- Aggregate Moisture Content
- Yield Check on Bituminous Binder
- Temperature Check on Bituminous Binder

If the Contractor’s test results exceed any of the identified quality control tolerances, the Engineer shall be immediately notified. The Engineer will review the explanation and the corrective action taken by the Contractor. Another test will be taken and if the results still exceed the quality control tolerance, placement shall stop. The Contractor shall immediately notify the Engineer, and identify the cause of the excessive deviation and detail corrective action necessary to bring the deficiency into compliance. The Engineer will give approval prior to resuming work.

**BITUMINOUS BINDER**

The application rate shall not exceed a tolerance of +/-0.05 gallons per square yard from the specified rate, and within the temperature range as specified.

**COURSE AGGREGATE**

The aggregate shall be clean and uniform, and shall be within the gradation range as specified. Moisture content shall not exceed the tolerance as specified. Apply the aggregates at a minimum rate of 23.0 pounds per square yard. Take all precautions to minimize contamination of the aggregate. All stockpiles will be in place a minimum of 10 calendar days prior to seal coat operations to allow time to sample, test and accept the stockpile.

Broom all seal coat operations both the same working day and the next working day, including private entrances and intersections.

**10. Method of Measurement**

The scrub seal will be measured by the square yard as provided for in the Contract Documents. The accepted quantities, measured as provided for above, will be paid for at the contract unit price for scrub seal.

**11. Basis of Payment**

Stress absorbing membrane interlayer scrub seal shall be paid for per square yard for furnishing all preparation, materials, equipment, labor, clean-up and incidentals necessary to complete the work as specified.

<u>Item</u>	<u>Description</u>	<u>Unit</u>
Special	Scrub Seal	Square Yard