

PAVER PLACED SURFACE TREATMENT

**\*\*From Bethel-Brookfield IM SURF(54)**

xx. DESCRIPTION. This work shall consist of applying a paver placed surface treatment, consisting of a warm polymer modified emulsified asphalt coat followed immediately with an ultra thin hot mix asphalt wearing course, in accordance with the Plans and as directed by the Engineer.

xx. MATERIALS. Materials shall meet the following requirements:

- (a) Performance-Graded Asphalt Binder. Performance-graded asphalt binder shall meet the requirements of Subsection 702.02 for PG 58-28.
- (b) Polymer Modified Emulsified Asphalt. The emulsified asphalt shall be a polymer modified type CRS-1P emulsion meeting the requirements of Subsection 702.04 and Table 1 below. The polymer modification of the emulsified asphalt shall be performed .....at the time of manufacture.

A Type D Certification shall be furnished in accordance with Subsection 700.02.

TABLE 1

POLYMER MODIFIED EMULSIFIED ASPHALT <sup>(a)</sup>			
Tests	AASHTO Test Method	Min.	Max.
<i>Emulsion</i>			
Viscosity, SFS, 25°C(77 °F), sec	T 59	20	100
Storage Stability Test, 1 d, 24 h, percent	T 59		1
Sieve Test <sup>(b)</sup> , percent	T 59		0.1
<i>Residue from Evaporation Test</i>			
Residue <sup>©</sup> , percent	T 59	63	
Penetration, 25°C (77°F), 100 g, 5s, dmm	T 49	60	150
Elastic Recovery, percent	T 301	65	
Solubility in Organic Solvent, percent	T 44	97.5	
<sup>(a)</sup> After standing undisturbed for 24 hours, the emulsion will be smooth and homogeneous throughout with no white, milky separation, pumpable and suitable for application through spray bars. Modify the emulsion prior to emulsification.			
<sup>(b)</sup> The sieve test may be waived if successful application of the material has been achieved in the field.			
<sup>©</sup> If residue by Evaporation fails to meet the requirements for residue by Distillation, the test shall be repeated using the distillation method (AASHTO T 59), with modifications to include distillation temperature and time in accordance with the manufacturer's recommendations.			

- (c) Aggregate for Paver Placed Surface Treatment. Aggregate shall meet the requirements of Subsection 704.10, except as modified in Table 2 below:

TABLE 2  
AGGREGATE PROPERTIES

Properties	Test Method	Test Requirement
One Fractured Face	ASTM D 5821	95 percent min.
Two Fractured Face	ASTM D 5821	90 percent min.
Fine Aggregate Angularity	AASHTO T 304	45 percent min.
Flat and Elongated (1 to 3 ratio)	ASTM D 4791	25 percent max.
L.A. Wear	AASHTO T 96	30 percent max.
Sand Equivalent	AASHTO T 176	60 percent min.
Soundness (sodium sulfate)	AASHTO T 104	12 percent max.
Clay Lumps and Friable Particles	AASHTO T 112	2 percent max.
Methylene Blue	AASHTO T 330	10 percent max.

- (1) Mineral Filler. Mineral filler may be used to aid in meeting the gradation requirements. Mineral filler shall meet the re

TABLE 3  
MINERAL FILLER GRADATION REQUIREMENTS

100% passing .600 mm (No. 30) sieve
75-100% passing .075 mm (No. 200) sieve

xx. COMPOSITION OF MIXTURE.

- (a) Paver Placed Surface Treatment. Formulate a job mix formula (JMF) that satisfies the design limits specified in Table 1 - Mixture Requirements. The JMF for each mixture shall establish a single percentage of aggregate passing each sieve and a single percentage of bituminous material to be added to the aggregate mixture. The gradation of the aggregate shall not vary more than the production tolerance from the mix design gradation (JMF) while also remaining within the specification gradation band. The mixture shall not contain reclaimed materials.

TABLE 1 - MIXTURE REQUIREMENTS

Sieve Size	Type A		Type B		Type C	
	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %
19.0 mm(3/4 inch)					100	
12.5 mm(1/2 inch)			100		85-100	± 4
9.5 mm(3/8 inch)	100		85-100	± 4	45-85	± 4
4.75 mm(No. 4)	40-55	± 3	24-38	± 3	24-41	± 3
2.36 mm(No. 8)	21-32	± 3	21-32	± 3	21-33	± 3
1.18 mm(No. 16)	16-26	± 3	16-23	± 3	15-26	± 3
0.600 mm(No. 30)	12-18	± 2	12-18	± 2	11-20	± 2
0.300 mm(No. 50)	8-13	± 2	8-13	± 2	8-16	± 2
0.150 mm(No. 100)	5-10	± 2	5-10	± 2	5-10	± 2
0.075 mm(No. 200)	4-7	± 2	4-7	± 2	4-7	± 2
% PG Binder	4.9 - 5.8		4.8 - 5.6		4.6 - 5.6	

PG Binder percentage shall be based on an optimum binder content corresponding to an estimated film thickness of asphalt of at least 10 microns when calculated using the effective asphalt content in conjunction with the surface area for the aggregates in the JMF according to the following formula.

$$Wea = SA \times S \times S_{gasp}$$

where

Wea = Weight of effective asphalt binder (KG per KG of aggregate)

SA = Surface area of aggregate (SM per KG of aggregate)

S = Minimum estimated film thickness of asphalt (M)

S<sub>gasp</sub> = Specific gravity of asphalt

TABLE 2 - SURFACE AREA FACTORS

Sieve Size	Surface Area Factors (SM/KG)		
	Type A	Type B	Type C
19.0 mm(3/4 inch)			0.41
12.5 mm(1/2 inch)		0.41	0
9.5 mm(3/8 inch)	0.41	0	0
4.75 mm(No. 4)	0.41	0.41	0.41
2.36 mm(No. 8)	0.82	0.82	0.82
1.18 mm(No. 16)	1.64	1.64	1.64
0.600 mm(No. 30)	2.87	2.87	2.87
0.300 mm (No. 50)	6.14	6.14	6.14
0.150 mm(No. 100)	12.29	12.29	12.29
0.075 mm(No. 200)	32.77	32.77	32.77

Draindown from the loose mixture shall not exceed 0.10% when tested in accordance with AASHTO T 305. The draindown shall be tested at optimum asphalt content plus 0.5%. The temperature shall be the mixing temperature plus 15°C (60°F). The temperature shall not exceed 180°C (360°F).

If granite or quartzite aggregates are used in the mixture, an anti-strip additive shall be added as specified in Subsection 704.15.

No work shall be started until the Contractor has submitted and the Materials and Research Engineer has approved a mix design. The design shall include cold feed gradations, mixing times, the percentage of each ingredient including bitumen, JMF from such a combination, and the optimum mixing and compaction temperatures. The stockpile gradation data shall be derived by wet sieve analysis. All data and calculations used to determine aggregate properties, optimum binder content (film thickness), and draindown (T 305) shall be included with the mix design submittal.

At the time the mix design is submitted, the Contractor shall indicate and make available for sampling and testing the PG asphalt binder and stockpiles of all aggregates proposed for use. A minimum of 10 working days shall be allowed for the testing, evaluation, and approval of the submitted mix design.

Once a mix design is approved, the JMF is valid until a change is made in aggregate source, PG binder grade, or PG binder source. If a change is made in aggregate source, a new mix design shall be submitted and a minimum 10 working day evaluation period shall be allowed prior to resuming production. If a change is made in the PG binder grade or PG binder source, a new PG binder evaluation shall be submitted and a minimum 10 working day evaluation period allowed prior to resuming production. If there is a change in source for the polymer modified emulsion, a Type D certification specific to that source shall be submitted to the Engineer before resuming production.

The Engineer may approve changes in the design's JMF or discontinue use of the design if placement, finishing, or compaction characteristics are determined by the Engineer to be unsatisfactory.

- xx. BITUMINOUS MIXING PLANT AND TESTING. The requirements of Subsection 490.05 apply except as modified herein.

The Superpave Gyratory Compactor is not required under this specification as specimen fabrication is not applicable for paver placed surface treatment.

- xx. QUALITY ACCEPTANCE. Paver placed surface treatment will be tested at the rate of once per 500 T (500 ton) of material

produced. Polymer modified emulsified asphalt will be tested at the rate of once per day of production.

Paver placed surface treatment will be tested for gradation and asphalt content (based on printed ticket weight). The application rate of the polymer modified emulsified asphalt will also be calculated to ensure target values are within tolerance. Acceptance sampling and testing will be conducted by Agency personnel in accordance with the Agency's Quality Assurance Program.

If any analyzed sample is outside of the testing tolerances and/or other design criteria as defined herein, immediate adjustments shall be made by the Contractor. After the adjustment, the resulting mix will be sampled and tested for compliance with these specifications. With the permission of the Engineer, the plant may continue production, pending results of these tests, but if the Engineer deems that it is in the best interest of the project, the Engineer may at any time order plant production stopped. In this event, additional adjustments shall be made and tested on a trial basis until the deficiency is corrected.

- xx. WEATHER AND SEASONAL LIMITATIONS. Paver placed surface treatment shall not be placed when the ambient air temperature and temperature at the paving site in the shade and away from artificial heat is below 10°C (50°F).

Paver placed surface treatment shall not be placed on a wet or frozen surface or when weather or other conditions would prevent the proper handling, finishing, or compacting of the material, unless otherwise approved by the Engineer.

Paver placed surface treatment shall not be applied before May 15<sup>th</sup> or after October 15<sup>th</sup>.

When it is in the public interest, the Construction Engineer may adjust the ambient air temperature requirements, pavement temperature requirements, or extend the dates of the paving season.

- xx. CONSTRUCTION REQUIREMENTS.

(a) Equipment.

- (1) Paving. Use a self-priming paver as approved by the Engineer. The self-priming paver shall be capable of spraying the polymer modified emulsified asphalt, applying the hot mix asphalt overlay, and smoothing the surface of the mat in one pass at a rate of at least 35 ft/minute. The self-priming paver shall be equipped with a receiving hopper, feed conveyor, emulsion storage tank, metered high-pressure emulsion spray bar, and a variable width, heated, ironing-type screed. The screed shall have the ability to be crowned at the center both positively and negatively

and have vertically adjustable extensions to accommodate the desired pavement profile.

- (2) Compaction. Use steel-wheeled double-drum rollers weighing at least 10 tons, equipped with functioning water systems and scrapers to prevent material from adhering to the roller drums.
  - (3) Hauling. Haul vehicles shall meet the approval of the Engineer prior to transporting the hot mix asphalt wearing course.
- (b) Surface Preparation. Perform all surface preparation prior to applying the wearing course. Thoroughly clean the entire area to be overlaid. The surface of the area to be overlaid shall be free of dirt, oil, and other foreign materials. Remove all debris and standing water. A damp surface is acceptable if favorable weather conditions are expected during paving operations. Cover all manhole covers, water boxes, catch basins, and other such utility structures within the area to be paved with plastic, building felt, or other material approved by the Engineer. Reference each for location and adjustment after paving. Remove the covers each day.
- (c) Application. Apply the polymer modified emulsified asphalt at a temperature of 60-77°C (140-170°F). Provide a uniform application across the entire width to be overlaid, at a rate of 1.00 ±0.11 L/SM (0.225 ±0.025 gal/yd<sup>2</sup>) for Type C, 0.85 ±0.11 L/SM (0.190 ±0.025 gal/yd<sup>2</sup>) for Type B, and 0.70 ±0.11 L/SM (0.150 ±0.025 gal/yd<sup>2</sup>) for Type A. The spray rate shall be continuously monitored and actual daily application rate shall be checked for each day's production of Paver Placed Surface Treatment (PPST) placement. Actual daily application rate shall vary by no more than ±0.025 gal/yd<sup>2</sup> on a daily basis. If the application rate specified for each Type is less than the target value for two consecutive days, the Contractor shall take corrective action as directed by the Engineer. Daily application rates shall be calculated using the following formula:

Daily Application Rate of polymer modified emulsified asphalt = (end meter reading - begin meter reading) L (gal)/daily area measured for payment under PPST SM (SY).

Field adjustments to the target application rate of polymer modified emulsified asphalt shall be determined based upon the existing surface condition of the pavement. Adjustments to the polymer modified emulsified asphalt target application rate shall be approved by the Engineer.

Equipment shall not come in contact with the polymer modified emulsified asphalt before the hot mix asphalt wearing course is applied. Immediately after applying the polymer modified emulsified asphalt, apply the hot mix asphalt overlay across the full width of the emulsion at a temperature of 145-170°C (293-338°F).

A load ticket shall accompany each vehicle supplying Hot Mix Asphalt (HMA). Make one legible copy of the load ticket available to the Agency's paving inspector prior to placement of the mixture. Each load ticket shall identify the type of mix used as outlined in TABLE 1 and show all of the following information:

- (1) Ticket number.
- (2) Plant identification.
- (3) Contract number.
- (4) Mix type (A, B, or C) and performance-graded binder (PG Binder).
- (5) Quantity (tons) of material in delivery vehicle.
- (6) Date and time.

A load ticket shall also be supplied for the polymer modified emulsified asphalt such that the weight of actual project usage can be determined.

- (d) Compaction. Begin compaction immediately after application of the wearing course. Use a minimum of two static passes. Vibratory compaction shall not be used unless otherwise approved by the Engineer. The roller(s) will not be allowed to stop on the freshly placed wearing course. Use an adequate number of rollers to complete compaction before the pavement temperature falls below 85°C (185°F). Protect the wearing course from traffic until the rolling operation is complete and the material has cooled sufficiently to resist damage.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Paver Placed Surface Treatment, Type C) to be measured for payment will be the number of square meters (square yards) of pavement surface treated in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Paver Placed Surface Treatment, Type C) will be paid for at the Contract unit price per square meter (square yard). Payment shall be full compensation for furnishing all labor, materials, and equipment necessary to complete the work. All necessary pavement repairs, crack sealing, joint sealing, and pavement marking removal will be paid for under the appropriate Contract items.

<u>Pay Item</u>	<u>Pay Unit</u>
900.675 Special Provision (Paver Placed Surface Treatment, Type X)	Square Meter (Square Yard)