9.5 MM SBS POLYMER-MODIFIED BITUMINOUS CONCRETE PAVEMENT

**From Dorset-Danby NH SURF(24)

xx. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 490 of the Standard Specifications, except as modified below.

xx. MATERIALS. Materials shall meet the following requirements:

(a) Polymer-Modified Asphalt Binder. The polymer-modified asphalt binder shall have a performance grade of PG 76-34. The asphalt supplier shall provide testing in accordance with AASHTO R 29 "Grading or Verifying the Performance Grade of an Asphalt Binder" Section 6.0 – Test Procedure for Grading an Unknown Asphalt Binder and AASHTO M 320 to verify the performance grade of the asphalt binder. Additionally, the modified asphalt binder shall be tested in the Asphalt Binder Cracking Device (ABCD) to determine the thermal cracking temperature of the binder.

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

(a) Emulsified Asphalt. Emulsified asphalt shall meet the requirements of EMULSIFIED ASPHALT of Section 900.

(c) Aggregate. The aggregate blend for the Polymer-Modified Thin Overlay (PMTOL) shall meet all Superpave aggregate consensus property requirements listed in Table 5 of AASHTO M 323 "Superpave Volumetric Mix Design" and the source property requirements specified in Table 1 below. The aggregate blend shall be classified as coarse or fine as outlined in AASHTO M 323 Section 6.1.3 – Gradation Classification.

TABLE 1 – SUPERPAVE SOURCE PROPERTY REQUIREMENTS

Test	Applicable Method	Limitations
LA Abrasion, % loss	AASHTO T 96	35% max.
Sodium Sulfate Soundness, % loss	AASHTO T 104	16% max.

(d) Mineral Filler. Mineral filler, if necessary in addition to that naturally present in the aggregate, shall meet the requirements of AASHTO M 17.

xx. JOB MIX FORMULA. The PMTOL mixture shall be a Superpave 9.5 MM mixture conforming to the gradation and asphalt binder content requirements specified in Table 2 below:

TABLE 2 – MIXTURE REQUIREMENTS FOR PMTOL

Sieve Designation	Percent by Mass Passing	Production Tolerances
12.5 mm (1/2”)	100	± 6
9.5 mm (3/8”)	90 – 100	± 6
4.75 mm (#4)	≤ 90	± 6
2.36 mm (#8)	32 –67	± 4
0.075 mm (#200)	2 – 10	± 1
Asphalt Binder %	Min. 6.5	± 0.3

AASHTO R 35 “Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt” shall be used to develop a mixture that will meet the specified design criteria in accordance with AASHTO M 323 “Standard Specification for Superpave Volumetric Mix Design.” A copy of all design test data used in developing the mix design, including graphs, shall be submitted with the mixture design. The job mix formula shall establish the percentage of aggregate passing each sieve and the percentage of polymer-modified binder to be added to the aggregate. In addition, all mixtures shall meet the volumetric properties outlined in AASHTO M 323 Table 6. No change in the job-mix formula may be made without prior written approval.

In addition to the criteria previously noted, the mixture will satisfy the following criteria depending on whether or not RAP is included in the mixture:

TABLE 3 – MIXTURE A (NO RAP)

Property	Device/Test	Criteria
Thermal cracking temperature of the modified asphalt binder	Asphalt Binder Cracking Device (ABCD)	Equal to or colder than the low temperature performance grade of the binder
Thermal cracking temperature of extracted binder from the mixture	Asphalt Binder Cracking Device (ABCD)	± one grade from the low temperature performance grade of the binder
Thermal cracking temperature of mixture	Thermal Stress Restrained Specimen Tensile Strength Test (TSRST) - AASHTO TP10-93	± 6°C from the low temperature performance grade of the binder
Cracking	Overlay Test -TXDOT Test Designation Tex-248-F	Mixtures shall exhibit average overlay test cycles to failure (93% load reduction) ≥ 300
Fatigue Life*	Flexural Beam - AASHTO T 321	≥100,000 Cycles
Rutting	Asphalt Pavement Analyzer - AASHTO TP 63 at the standard PG high temperature for the project location	Average rut depth for 6 specimens is ≤ 4 mm at 8,000 loading cycles

* It is preferred that the strain level should be equal to the strain in the existing HMA layer or alternatively use a strain level of 750 micro strain.

TABLE 4 – MIXTURE B (IF RAP INCLUDED IN THE MIXTURE)

Property	Device/Test	Criteria
Thermal cracking temperature of the modified asphalt binder	Asphalt Binder Cracking Device (ABCD)	Equal to or colder than the low temperature performance grade of the binder
Thermal cracking temperature of extracted binder from the mixture	Asphalt Binder Cracking Device (ABCD)	± one grade from the low temperature performance grade of the binder
Thermal cracking temperature of mixture	Thermal Stress Restrained Specimen Tensile Strength Test (TSRST) - AASHTO TP10-93	± 6°C from the low temperature performance grade of the binder
Cracking	Overlay Test -TXDOT Test Designation Tex-248-F	Mixtures containing RAP shall exhibit average overlay test cycles to failure (93% load reduction) within ± 10 percent of the overlay test cycles to failure of control specimens without RAP [minimum of three test specimens per mixture]
Fatigue Life*	Flexural Beam - AASHTO T 321	≥100,000 Cycles
Rutting	Asphalt Pavement Analyzer - AASHTO TP 63 at the standard PG high temperature for the project location	Average rut depth for 6 specimens is ≤ 4 mm at 8,000 loading cycles

* It is preferred that the strain level should be equal to the strain in the existing HMA layer or alternatively use a strain level of 750 micro strain.

xx. RECLAIMED ASPHALT PAVEMENT. The amount of RAP in the PMTOL mixture will be limited to 25 percent RAP or the amount of RAP corresponding to 1% binder replaced, whichever is less. The percent binder replaced shall be calculated by the following equation:

$$\text{Binder Replacement, \%} = \frac{(\text{Percent Binder in the RAP}) \times (\text{Percent RAP in Mixture})}{}$$

Fractionated RAP is preferred, but not required. RAP shall be clean and free of all foreign material. The maximum size of RAP should correspond to the NMAS used in the mixture (9.5 mm). All volumetric properties are the same as for the PMTOL mixture without RAP (Mixture A).

Extensive testing of the RAP material shall be completed prior to the mixture design. Copies of all test results must be submitted with the PMTOL mixture design for JMF approval. No material may be added to the RAP stockpiles after the requisite testing samples have been taken. Table 5 below outlines the required RAP testing and the corresponding number of replicates (random sampling shall be used throughout):

TABLE 5 – REQUIRED RAP TESTING

Test	Applicable Method	Number of Replicates
Binder Content	AASHTO T 308 (Ignition Oven) or AASHTO T 164 (Centrifuge)	4
Extraction and Recovery of RAP Binder	AASHTO T 319 (Rotovap) or T 170 (Abson)	Replicates sufficient to provide quantity adequate for subsequent binder testing
Determine Performance Grade of Extracted Binder	AASHTO R 29 - Section 6.0	4
Recovered RAP Aggregate Gradation	AASHTO T 11 & AASHTO T 27	4
Specific Gravity of Recovered RAP Aggregates	AASHTO T 84 & T 85	4
Maximum Theoretical Specific Gravity of RAP	AASHTO T 209	4

xx. SURFACE PREPARATION OF EXISTING PAVEMENT. It is recommended that the existing pavement surface be prepared as outlined in NAPA Information Series 135 Table 1 “Suggested Approaches to Surface Preparation Prior to Thin Overlay Based on Distresses.”

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (9.5 MM SBS Polymer-Modified Bituminous Concrete Pavement) to be measured for payment will be the number of metric tons (tons) for a lot of mixture complete in place in the accepted work as determined from the weigh tickets.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (9.5 MM SBS Polymer-Modified Bituminous Concrete Pavement) will be paid for at the Contract unit price per metric ton (ton). Payment will be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price bid for Special Provision (9.5 MM SBS Polymer-Modified Bituminous Concrete Pavement).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 490.16 will be paid for under the appropriate Section 631 pay item included in the Contract.

Payment will be made under:

Pay Item	Pay Unit
900.680 Special Provision (9.5 MM SBS Polymer-Modified Bituminous Concrete Pavement) (X% RAP)	Metric Ton (Ton)