

## Asphaltic Binder Enhanced Friction Surface Treatment, Item SPV. 0180.XX

### A Description

This special provision describes providing an enhanced friction surface treatment (EFST) composed of aggregate in an asphaltic binder on HMA or concrete pavements.

### B Materials

#### B.1 Asphaltic Binder

Furnish polymer-modified cationic emulsified asphalt conforming to AASHTO M 316.

#### B.2 Aggregates

Furnish natural or synthetic aggregate that has a proven record of performance in applications of this type. Industrial by-products shall conform to category 1 or 2 under NR 538.08 of the Wisconsin Administrative Code. If using steel slag, the CaO and MgO contents shall be less than 0.6 percent.

Furnish aggregate that is fractured or angular in shape; resistant to polishing and crushing; clean and free of surface moisture; free from silt, clay, or other organic materials; compatible with the asphaltic binder; and meet the properties and gradation requirements in Tables 1 and 2.

**Table 1. Aggregate Properties**

Property	Requirements	Test Method
Moisture Content	≤ 0.2%	AASHTO T 255
Fine Aggregate Angularity	≥ 45%	AASHTO T 304, Method A
Micro-Deval	≤ 15% loss	ASTM D7428
LA Wear	≤ 10% loss @ 100 revolutions and ≤ 25% loss @ 500 revolutions	AASHTO T 96
Freeze-Thaw Soundness	≤ 9% loss @ 50, 16, or 25 cycles using Procedure A, B, or C, respectively	AASHTO T 103

**Table 2. Aggregate Gradation (AASHTO T27)**

Sieve Size	% Passing by Weight
No. 4	100
No. 6	95 - 100
No. 16	0-5
No. 30	0-1

#### B.3 Approval of Enhanced Friction Surface Treatment

A minimum of 20 working days before applying EFST, submit product data sheets and specifications from the manufacturer, and a certified test report from an independent laboratory verifying that the asphaltic binder and the aggregate meet all the requirements specified in Tables 1 and 2. Documents must be dated within three years.

If the engineer requests, provide samples of the polymer-modified emulsified asphaltic binder

and aggregate for department testing before applying EFST.

If using industrial by-products as aggregate, submit a certificate of compliance certifying which category the material conforms to under NR 538.08 of the Wisconsin Administrative Code. If using steel slag as aggregate, provide documentation verifying that the CaO and MgO contents are less than 0.6 percent.

## **C Construction**

### **C.1 General**

Conduct a meeting before applying EFST to establish procedures for maintaining optimum working conditions and coordination of the work. Submit recommended application procedures, including quality control practices, to the engineer for approval.

Store all aggregate in a dry environment and protect from contaminants on the job site.

### **C.2 Pavement Surface Preparation**

#### **C.2.1. Pavement Surface Repair**

Remove visibly unsound or disintegrated areas of the pavement surface as the plans show or the engineer directs.

Ensure that new concrete, or products used for HMA or concrete pavement repairs or patches, are fully cured before placing the EFST.

#### **C.2.2 Surface Preparation**

Cover and protect utilities, drainage structures, expansion joints on bridge decks, and other structures within or adjacent to the application location to prevent materials from adhering to or entering those structures.

Remove pavement markings that are within the treatment area. Cover existing pavement markings adjacent to the application if they are to remain in place.

Seal joints and cracks, or any portion of cracks, that are greater than 1/4 inch wide with a joint sealant conforming to ASTM D6690.

Completely remove any foreign matter resting on an HMA or concrete pavement surface that could prevent proper bonding of the asphaltic binder EFST by shot blasting.

Sufficiently clean HMA and concrete pavement surfaces by vacuum-sweeping and blowing, with oil-free compressed air, just before applying EFST. Compressors must be equipped with functioning oil/water separators. Cleaning must be done the same day that EFST will be applied. Ensure the surface is clean, completely dry, and free of all dust, dirt, clay, and other material that might interfere with the bond between the asphaltic binder and the existing pavement surface.

Keep vehicles and unnecessary equipment off the cleaned surface; only allow EFST application equipment on the clean surface. Apply EFST as soon as possible after pavement surface preparations are completed.

Abide by the established quality control practices. Request that the engineer inspect and approve

the pavement surface immediately prior to placing the EFST.

### **C.3 Application of the EFST**

Do not apply the EFST if any of the following exists:

- Pavement surface is wet, damp, or has received rainfall in the previous 24 hours.
- Pavement surface is not sufficiently clean.
- Ambient air temperature is below 60° F.
- Rain is predicted before EFST completion and proper set is achieved

Close treatment areas to traffic until EFST has completely set and the pavement surface has been vacuum-swept.

Construct EFST to the full width of the existing pavement surface or as the plans show or engineer directs. Extend the EFST application 2'-3' into the shoulders if application site is on a curve, Apply as a single layer 1/8 inch to 1/4 inch thick as a single layer 1/8 inch to 1/4 inch thick. . Abide by the established quality control practices.

Heat the asphaltic binder to the supplier-specified temperature using equipment conforming to [standard spec 455.3.2.2.2](#). The department will reject overheated or otherwise damaged asphaltic binder.

Apply the asphaltic binder uniformly over the pavement surface using an automated tank distributor conforming to [standard spec 455.3.2.2.3](#). Use a minimum application rate of 0.25 gallons per square yard. Use enough asphaltic binder to cover the pavement surface and sufficiently embed half the thickness of the aggregate; do not apply so much that it covers the aggregate or bleeds in hot weather. Adjust application rate, as needed, based on the pavement surface type, profile, and condition. Adjust the pressure and the speed of the equipment to achieve the proper application thickness.

Do not contaminate the wet asphaltic binder or allow it to set and impair bonding of the aggregate.

Dry or moisten the aggregate to ensure that it is damp to surface dry. Immediately after applying the asphaltic binder, while it is still brown in color and before it begins to break, distribute aggregate over the surface using a standard chip spreader or equivalent machine that can provide uniform, consistent coverage. Completely cover the treated surface but limit the application to an amount easily embedded in and bonded by the asphaltic binder. Immediately cover any visible wet or bare spots, or areas with excessive asphaltic binder, with additional aggregate before the binder sets and before rolling.

Roll the surface according to [standard spec 475.3.5\(2\)](#) immediately after placing the aggregate. Stop rolling as soon as the asphalt sets or hardens to preserve the asphalt-to-aggregate bond.

After all the water evaporates and the emulsified asphalt has completely set, remove excess loose surface aggregate by sweeping, blowing, or vacuuming. Do not tear or otherwise damage the surface. Excess aggregate that is recovered by a vacuum sweeper can be reused if clean, uncontaminated and dry. Remove and replace damaged areas or areas with excess or insufficient

aggregate coverage. Clean expansion joints, utilities, and drainage structures of all debris before opening to traffic.

Additionally, within 3 to 7 days after opening to traffic, vacuum sweep the pavement surface to remove loosened aggregate from the enhanced friction surface area, the shoulders, and any other areas within and immediately adjacent to the EFST site.

**D Measurement**

The department will measure Asphaltic Enhanced Friction Surface Treatment by the square yard acceptably completed.

**E Payment**

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV. 0180.XX	Asphaltic Enhanced Friction Surface Treatment	SY

Payment for Asphaltic Binder Enhanced Friction Surface Treatment is full compensation for testing materials; for preparing the pavement surface; for providing the EFST; for cleanup; and for vacuum sweeping and disposing of excess material after the completion and again 3 to 7 days after completion.

The department will pay for pavement repairs, joint and crack sealing, and traffic control separately under other contract bid items or, absent the appropriate bid items, as extra work.