

SECTION 02720

BITUMINOUS SURFACE TREATMENT

PART 1 - DESCRIPTION

1.01 General

This specification covers the materials and construction requirements for the squeegee application of penetrating and void filling bituminous surface treatment for asphalt surfaces. The objective of the bituminous surface treatment is to extend the life of existing asphalt surface and to fill small voids from deterioration and age as well as retain an adequate skid resistant surface.

PART 2 - MATERIALS

2.01 Materials

A. Bituminous Material

1. The bituminous material shall be a high solids, polymer-modified, fiber-reinforced, mineral-stabilized asphalt emulsion fortified with special surfactants to promote superior adhesion and durability.
2. Bituminous material shall meet the following ASTM Test Standards:

- D-140 Sampling of Bituminous Materials
- D-466 Methods of Testing Film Deposits from Bituminous Emulsions
- B-117 Salt Spray (FOG) Testing
- D-529 Recommended Practice for Accelerated Weathering Test of Bituminous Materials
- D-2939 Bituminous-Base Emulsions for Use as Protective Coatings

B. Aggregate

1. The aggregate shall be crushed limestone, crushed granite, or crushed slag meeting the requirements of ASTM D 692 and Tennessee Department of Transportation (TDOT) Specification 903.11 Aggregate for Asphaltic Concrete Surface Courses (Hot Mix), except the gradation which shall be as specified below. The aggregate shall be proportioned to produce a uniform gradation meeting the following requirements:

**GRADATION LIMITS FOR AGGREGATE
BASED ON WASH GRADATION**

Sieve	Design Master Range (Total Percent Passing)	Mixture Control Tolerances
3/8 in. (9.5 mm)	100	
No.4 (4.75 mm)	90-100	±6.0
No.8 (2.36 mm)	65-90	±5.0
No.16 (1.18 mm)	45-70	±5.0

No.30 (600 µm)	30-50	±4.0
No.50 (300 µm)	20-38	±4.0
No.100 (150 µm)	12-28	±3.0
No.200 (75 µm)	8-16	±3.0

2. Mineral aggregate shall be 100% crushed rock. Aggregate shall be clean, hard, sound, durable, uniform in quality and free from any detrimental quality of soft, disintegrated material, organic material, oil, alkali or other deleterious substance. In order to insure that all material is crushed, 100% of the parent material shall be larger than the largest stone in the gradation used.
3. Aggregate will be accepted at the job site or stockpile. Stockpiled aggregate shall be accepted on the basis of five (5) gradation tests performed according to AASHTO T2 (ASTM D75). Materials will be accepted if an average taken from all five (5) tests fall within the gradation tolerances. In the case where the averaged test results proves to be out of tolerance, the Contractor shall either remove the unacceptable material and replace it with acceptable material or blend other aggregate with the stockpiled material to bring it into gradation tolerances. New material to be used in blending shall meet all quality tests prior to blending. Blended aggregate shall produce a consistent mix. In either case, whether aggregate is replaced or blended, a new Mix Design shall be submitted.
4. Stockpiles shall be screened if problems in application occur due to oversize material in the mix.
5. Contractor shall be responsible for performing gradation tests and submitting the results to the Engineer for acceptance. Gradation testing shall be considered incidental to the project and no additional pay shall be granted for meeting this requirement.

PART 3 - EXECUTION

3.01 Field Tolerances

- A. Bituminous Surface Treatment Material shall be homogeneous and show no separation or coagulation that cannot be overcome by moderate stirring.
- B. Bituminous Surface Treatment Material shall meet the following chemical and physical characteristics:

Non Volatiles %	41-46%
Ash Non Volatiles %	35-55%
Specific Gravity 25°C	1.25 Minimum
Drying Time	8 hour Maximum
Adhesion & Resistance to Water	No Penetration or Loss of Adhesion
Resistance to Heat	No Blistering or Sagging
Flexibility	No Cracking or Flaking
Resistance to Impact	No Chipping, Flaking or Cracking

3.02 Equipment

A. General

1. All equipment, tools and machines used in the performance of this work shall be maintained in satisfactory working order at all times in order to insure a high quality product.

B. Dual Spray/Squeegee Equipment

1. Dual spray/squeegee machine shall be an all-wheel drive, self-contained power-propelled unit provisioned with an activated squeegee and broom assembly. The equipment shall be equipped with a floating front box squeegee with rear angling squeegee capable of spreading a finishing course of bituminous material and can adjust to varying lane widths to 12 or 14 feet.
2. The material pumps shall be hydraulically driven dual diaphragm pump with dual butterfly discharge valves.
3. The squeegee machine shall be equipped with a round tank and true full sweep agitation by rubber wiper blades
4. The tank shall be of sufficient capacity for adding aggregate to assure suspension and true distribution of bituminous surface treatment.
5. Squeegee machine shall have a water fog system and spray bar with accompanying wand and emergency brake.
6. Hand squeegees shall only be allowed in areas where practicality prohibits the use of mechanized equipment.

3.03 Calibration

- #### **A.**
- Each mixing unit used in the performance of the work shall be calibrated in the presence of the Engineer or his representative. Previous calibration documentation covering the exact materials to be used on the project may be accepted, provided they were made during the same calendar year. Documentation shall include an individual calibration of each material at various settings, which can be related to the metering devices on the machine. No machine shall be used on the project until calibration has been completed and accepted.

B. Verification

1. At minimum, five (5) days prior to construction and after calibration, each machine to be used on the project shall install a test strip. All test strips shall be within the project area.

2. At the time test strips are being applied, samples of the bituminous surface treatment shall be taken by the Contractor's laboratory in order to verify mix consistency and proportioning. The rate of application shall also be verified.
3. In the event the test strip is not in compliance with project requirements due to the failure of any test, the Contractor shall make corrections and place another test strip at no additional cost to the Owner. Any unit failing to meet project requirements after three (3) trials shall not be permitted to operate on the project. Construction shall not commence until an acceptable test strip is placed.
4. The Owner reserves the right to obtain an outside testing firm to verify any and all testing results. Any outside testing shall be paid for by the Owner.

3.04 Weather Limitations

- A. Both pavement and air temperature shall be 50°F and rising at any time within a 24 hour period of application.
- B. Bituminous surface treatment shall not be applied when there is a danger of freezing within 24 hours of application.
- C. Bituminous surface treatment shall not be applied when weather conditions prolong opening traffic beyond a reasonable time (2-3 hours). The Contractor shall use his judgment when rain, freezing or any inclement weather is forecast.
- D. Any damage caused by inclement weather shall be repaired by the Contractor at his expense.

3.05 Surface Preparation

A. General

1. Immediately prior to the application of bituminous surface treatment, the Contractor shall clean the surface of all loose material and dirt. Treat all grease, oil, and gasoline spots or stains prior to sealing. Any standard cleaning method that thoroughly cleans the surface will be acceptable. If water is used, cracks shall be allowed to dry thoroughly before the application of bituminous surface treatment.
2. Pavement surface repairs shall be made prior to the application of the bituminous surface treatment. Patching shall be by hot-mix asphalt. Cracks shall be filled with hot pour crack filler. New asphalt surfaces should be allowed to cure for a minimum of four (4) weeks with temperatures at or above 70°F before applying the bituminous surface treatment.
3. All manhole lids, catch basin grates, water and gas valve lids, survey monuments, and any other such street appurtenances shall be protected prior to the application of the bituminous surface treatment. Protection shall allow the bituminous surface treatment application without adverse effect to the final finish.

B. Mixing Procedures

1. The bituminous surface treatment shall be mixed in accordance with the following mix design (based on 100 gallons for ease of calculation):

Bituminous Material	100 gallons
Aggregate	400lbs to 600lbs

If required, a small amount of water may be added to facilitate application of the mixed material.

C. Application

1. No bituminous surface treatment shall be applied until the engineer approves the cleanness of the roadway. No roadway shall be approved for bituminous surface treatment unless 48 hours of notice were provided to the City of Lakeland Engineering Department.
2. The slurry seal mixture shall be the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader at all times to attain complete coverage. Overloading of the spreader shall be avoided.
3. A tack coat shall be used at the Engineer's discretion. The application rate shall be 0.025 to 0.050 gallons of residual asphalt per square yard.
4. The bituminous surface treatment shall be installed in two (2) courses; a leveling course and a surface course. Both courses shall be installed in close conformity with the lines and grades of the roadway.
5. The bituminous surface treatment shall be applied at a rate of 0.17 to 0.20 gallons per square yard (45 to 55 square feet per gallon) per course. Application rates may vary due to the pavement age and porosity. The Engineer shall determine the application rate for each project.
6. Streaks left in the finished surface shall not be permitted. If excess oversize develops, construction shall be halted and the situation corrected by the Contractor. Work shall not resume until the Contractor satisfies the Engineer that corrections have been made. The Contractor shall screen the aggregate prior to using in the lay down operation as directed by the Engineer.

D. Joints

1. The Contractor shall provide a spreading machine of suitable width to produce a minimum number of longitudinal joints in the project area.

2. Joints showing excess buildup, uncovered areas, or unsightly appearance shall not be acceptable.
3. Whenever possible, longitudinal joints shall be placed on lane lines. Odd width passes and half passes shall be kept to a minimum.
4. Overlap of longitudinal joints shall not exceed six inches (6").

E. Hand Work

1. Areas that cannot be surfaced by machine application shall be surfaced manually using hand squeegees to provide uniform coverage.
2. Areas requiring handwork shall be accomplished at the same time as the machine application.
3. Surfaces done by hand shall have the same finish as those applied by the squeegee machine. The Contractor shall take care not to leave unsightly handwork.

F. Lines

1. The Contractor shall insure straight lines along curbs and shoulders. Runoff in these areas shall not be acceptable. Lines at intersection shall be kept straight to provide good appearance.

G. Clean Up

1. All areas, such as concrete flatwork, manhole covers, water and gas valve covers, and any surface where bituminous surface treatment should not be applied, shall be removed as directed by the Engineer.
2. During cleaning operations, excess bituminous surface treatment shall not be allowed to run into any storm sewer system.
3. The Contractor shall clean up the project site and remove any debris associated with the project on a daily basis.

END OF SECTION