

# MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-410-5

CODE: (SP)

DATE: 01/14/2025

SUBJECT: Bituminous Surface Treatment

Section 410, Bituminous Surface Treatment, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby deleted in toto and replaced as follows.

## SECTION 907-410 - BITUMINOUS SURFACE TREATMENT

**907-410.01--Description.** This work consists of the construction of a single layer bituminous surface treatment (chip seal) in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the Engineer. The application rates of asphalt material and aggregates will vary with aggregate size and existing roadway conditions but, for bid purposes only, the bituminous material and cover material shall be estimated by the Contractor. The rates in the below table are provided as guidance for the Contractor if desired with ranges in parentheses. The Engineer will review the actual application rates.

Seal Aggregate Gradation	Seal Aggregate Estimated Application Rate <sup>1</sup> , ft <sup>3</sup> / yd <sup>2</sup>	Bituminous Material	Bituminous Material Estimated Application Rate <sup>1</sup> , gal/yd <sup>1</sup>
Size No. 7	0.30 (0.28-0.32)	AC	0.28 (0.23-0.33)
Size No. 8 or 89	0.25 (0.23-0.27)	AC	0.23 (0.18-0.28)
Size No. 7	0.30 (0.28-0.32)	Emulsified Asphalt	0.38 (0.33-0.43)
Size No. 8 or 89	0.25 (0.23-0.27)	Emulsified Asphalt	0.35 (0.30-0.40)

<sup>1</sup> Values shown are the best estimate followed by the range that could occur on the actual project.

**907-410.01.1--Fog Seal.** When specified on the plans or in the contract documents, this work may require the placement of a fog seal coat on an existing or newly place surface. The fog seal shall be placed at locations shown on the plans or as directed by the Engineer.

### **907-410.02--Materials.**

**907-410.02.1--Bituminous Material.** The type and grade of bituminous materials will be specified in the contract and shall conform to the applicable requirements of Section 702.

**907-410.02.2--Cover Material.** Cover material shall meet the applicable requirements of Subsection 703.14, but in any instance the cover material requirements listed below govern. The kind and type will be specified in the contract. The sampling location for cover material testing is project stockpile(s).

- The maximum allowable passing the #200 sieve will be 1.5% for any cover material used.

- For the Size No. 89 aggregate the range for passing the #8 sieve shall be 0-20%.

Only one type of aggregate or combination of aggregates shall be used on a particular project except with written permission of the Engineer.

Sites for stockpiles of materials shall be grubbed and cleaned prior to storing the aggregates, and the ground shall be firm, smooth, and well drained.

**907-410.02.3--Mix Design.** The Contractor shall submit to the Engineer for approval the application rates for the cover material and bituminous material using a design method such as that described by AASHTO R 102. This design must be performed at a minimum of one time per construction season and can be required more frequently by the Engineer. This mix design provides the project a target, or design, application rate for bituminous material in gal/yd<sup>2</sup> and cover material in lbs/yd<sup>2</sup>.

**907-410.03--Construction Requirements.**

**907-410.03.1--General.** Prime coats, when specified, shall meet the requirements of Section 408. After the application of a prime coat, the primed surface shall be kept in continuous repair. All holes, raveled areas, and areas deficient in prime shall be patched and repaired with approved materials.

Prior to any chip sealing operation, "Loose Rock" signs shall be installed and remain in place until all sealing operations are complete. Prior to any daily sealing operation, portable "Loose Rock" signs shall be installed in accordance with the drawing in the plans or contract documents. Portable signs shall be installed and remain in place on a daily basis in the active sealing area. Payment for signs shall be made under pay item no. 618-A: Maintenance of Traffic.

**907-410.03.2--Seasonal and Weather Limitations.** Emulsified asphalt and cut-back asphalt shall be applied only when both the air and pavement temperatures are above 70°F. Asphalt cement shall be applied only when both the air and surface temperatures are above 75°F.

Cut-back asphalt shall not be placed during the period between October 15 and March 1. No prime shall be placed when soil and weather conditions would prevent the proper placement and retention of the materials.

Bituminous materials for surface treatment shall not be placed during the period between November 1 and March 1, nor when weather conditions otherwise prevent the proper placement and retention of the materials.

On projects where completion of seal coats between November 1 and March 1 is determined to be in the public interest, the Engineer may permit variations from the above under the condition that all the following requirements are met:

- (a) The air and pavement temperature is 70°F or higher.
- (b) Asphalt cement used is cut back with naphtha of the type that will yield from 5-10 percent off at 680°F when tested by method AASHTO T 78 and the naphtha is added at the refinery.

- (c) As an alternate to (b), the Contractor substitutes a rapid setting cationic emulsified asphalt meeting the requirements of AASHTO M 208.
- (d) Aggregate is satisfactorily air dried in covered storage, or mechanically dried.
- (e) The sun is shining.
- (f) Aggregate is applied immediately behind the distributor.
- (g) No shot is made after mid-afternoon, and rolling is increased as directed for shots made after noon.
- (h) The Contractor retains full responsibility for the acceptable quality of the work within the intent of the contract, these conditions notwithstanding.
- (i) The work is performed under these modifications at no additional cost to the State.

Blanket authorization will not be given for use of the above modification but will be given only when completion of the surface treatment would make the facility available for use by public traffic, or for subsequent construction.

Prior to November 1 and after March 1, when the requirements of these specifications are being met, but conditions are less than good for the adhesion of cover aggregate to the bituminous material, the Engineer may permit or require, at no additional cost to the State that the asphalt cement be cut back with naphtha as previously indicated. Less than good placement conditions shall be understood to include, but not limited to: lower than desirable temperature; higher than desirable humidity; surface dampness; or coolness of the foundation or aggregate.

**907-410.03.3--Equipment.** All equipment used on the project shall be evaluated by the Engineer. The following or equivalent equipment shall be furnished.

**907-410.03.3.1--Bituminous Heating Equipment.** This equipment shall heat and maintain the bituminous material within specification requirements without damaging the material. The heating equipment shall be supplied with at least one accurate asphalt thermometer.

**907-410.03.3.2--Asphalt Distributor.** The asphalt distributor shall be self-propelled with a ground speed control device interconnected with the emulsified asphalt pump such that the specified application rate will be supplied at any speed. The asphalt distributor shall be capable of maintaining the emulsified asphalt at the specified temperature. The spray bar nozzles shall produce a uniform double or triple lap application fan spray, and the shutoff shall be instantaneous, with no dripping. All nozzles shall be oriented at the same angle between 15 and 30 degrees using the wrench supplied by the distributor manufacturer. Each asphalt distributor shall be capable of maintaining the specified application rate within  $\pm 0.015$  gal/yd<sup>2</sup> for each load.

**907-410.03.3.3--Rotary Brooms.** Rotary brooms shall be constructed to permit the revolutions of the broom to be adjusted to its progression and to permit adjustment of the broom in relation to the surface. The broom bristles shall be stiff enough to sweep clean without injury to the surface.

**907-410.03.3.4--Pneumatic-Tire Rollers.** Multiple self-propelled pneumatic-tire rollers capable of ballast loading, either with water or sand to allow the weight of the machine to be varied from 6 to 8 tons to achieve a minimum contact pressure of 80 lb/in.<sup>2</sup> shall be used. The alignment of the axles shall be such the rear axle tires, when inflated to the proper pressure, can compact the voids untouched by the front-axle tire. All tires shall be as supplied by the roller manufacturer.

Width of the rollers shall exceed 60 in.

Steel wheel rollers will not be allowed.

**907-410.03.3.5--Trucks.** Trucks of sufficient number and size to adequately supply the material shall be furnished.

**907-410.03.3.6--Aggregate Spreaders.** A self-propelled mechanical type aggregate spreader with a computerized spread control, capable of distributing the aggregate uniformly to the required width and at the designed rate shall be used.

**907-410.03.3.7--Other Equipment.** Drag brooms shall be furnished and used as conditions dictate.

**907-410.03.3.8--Equipment Calibration.** The Contractor shall provide proof of calibration of the asphalt distributor and the aggregate spreader. Calibration shall be conducted no earlier than five days prior to chip seal operations. The Contractor shall submit the results of the calibration procedure to the Engineer.

Uniformity of the aggregate applied transverse to the pavement centerline shall be in accordance with ASTM D5624. Tolerance for each pad tested for transverse spread rate shall be  $\pm 10$  percent of the average of the total transverse rate.

**907-410.03.4--Preparation of Surface.** The entire surface to be treated and at least one foot (1') on each side shall be cleaned by sweeping, blowing, or other methods until all dust, mud, clay lumps, and foreign material is removed. A primed base shall be properly cured and approved prior to application of bituminous material.

**907-410.03.4.1--Cleaning Pavement.** The roadway surface shall be cleaned by sweeping no more than 30 minutes prior to application of the emulsified asphalt and aggregate. However, this 30-minute window may be extended if authorized by the Engineer in cases where extending the time does not jeopardize a clean surface prior to chip seal operations. The pavement shall be swept with a motorized broom to remove loose material. Depressions not reached by the motorized broom with a hand broom shall be cleaned. The outer edges of the pavement to be sealed including an adjacent paved shoulder shall be cleaned.

**907-410.03.4.2--Protecting Accessories.** Utility castings (manholes, gate valve covers, catch basins, sensors, etc.) shall be covered to prevent coating with emulsified asphalt. Suitable covering includes plywood disks, Kraft paper, roofing felt or other approved methods. The protective coverings shall be removed before opening the road to traffic.

**907-410.03.4.3--Stripe Removal.** Prior to the chip seal operations, the Contractor shall remove all existing thermoplastic striping, thermoplastics legends, and raised pavement markers within the chip seal limits. Such removal shall be performed to the satisfaction of the Engineer.

**907-410.03.5--Application of Bituminous Material.** Bituminous material shall not be applied until the prepared surface has been approved by the Engineer and any application rate adjustments

must be approved by the Engineer. Where practicable, shots shall be at least 500 feet in length, and longer shots are desirable. No shot shall be in excess of a length which can be covered with aggregate before the bitumen hardens.

The bituminous material shall be uniformly heated and maintained within the specified temperature range during application. All material damaged by heating shall be rejected, and if a section has been treated with damaged material it shall be removed and replaced by the Contractor without additional compensation.

Emulsified asphalt material shall be applied with a pressure distributor at the specified rate, and at a temperature of 140° to 180°F. All other bituminous material shall be applied with a pressure distributor at the temperature range set out in Subsection 702.11. It shall be uniformly applied full width in one operation unless the Engineer permits it to be applied in narrower widths.

The application rate of the bituminous material shall result in complete and uniform coverage of the pavement receiving the bituminous surface treatment. If the application of the bituminous material does not result in complete coverage, the Contractor shall cease operations and adjust the distributor bar height and/or nozzle(s) such that complete coverage is attained. At a minimum, the application rate of the bituminous material should be verified daily by the Department.

The type and condition of the surface being covered and the size of the aggregate being used, will affect the required application rate of asphalt material. The Contractor shall begin with application rates as recommended by the mix design and accepted by the Engineer. Actual rates shall be established during the first application of bituminous material/aggregate and adjusted to field condition changes as required.

The application shall be stopped before the distributor is completely empty, and the length of shots shall be computed so that the application is stopped before it begins to run light. At the beginning of the application, including joints with preceding applications, intersections, and junctions with all pavements, etc., the distributor nozzles shall be operating at full force when the application begins. Building paper or other suitable material shall be used to receive the initial application from the nozzles before the asphalt reaches the road surface at the joint. The material shall be removed immediately after use without spilling asphalt on the road surface.

Spray bar nozzles shall be kept clean at all times, and should one become blocked during application of the bituminous material, the distributor shall be stopped immediately, and the nozzle cleaned before proceeding. Bare or light areas shall be immediately made uniform by use of a hand hose or pouring pot.

Due to possible spillage, the transfer of material from the delivery truck to the distributor shall be outside the limits of the roadway. Bituminous material shall not be discharged on the right-of-way when cleaning out the distributor. Any spillage shall be removed from the roadway and right-of-way.

During application of bituminous material, the Contractor shall provide adequate protection to prevent marring or discoloration of pavements, structures, curbs, trees, etc., adjacent to the area being treated.

Longitudinal joints, when permitted, shall be reasonably true to line and parallel to the centerline. The overlap in the application of the bituminous material shall be the minimum to assure complete coverage.

At construction joints, the treatment of the edges shall be blended so that there are no gaps, the elevations are the same, and the joints are free from ridges and depressions.

**907-410.03.6--Application of Cover Coat Material.** The application of cover material shall immediately follow the application of bituminous material. Adhesion of the cover aggregate to the bitumen is the Contractor's responsibility. Application rate adjustments must be approved by the Engineer.

Aggregate shall be spread directly from approved spreaders. Trucks or spreaders shall not drive on the uncovered bituminous material.

Aggregate shall be placed at the design application rate. If necessary, the rate of application may be adjusted so that some emulsified asphalt can be seen between the aggregate chips, but not so much that aggregate chips adhere to the pneumatic rollers. If needed, additional adjustments may be made to the rate of application during the project, at the discretion of the Engineer.

During the first day of production and at least once a week thereafter, the application rate of the seal aggregate shall be verified by the Department to assure that the appropriate application rate of the seal aggregate is applied. The rate can be verified by placing a tarp of at least 1.0 yd<sup>2</sup> area on the roadway surface. After allowing the seal aggregate spreader to pass over the tarp, the aggregate on the tarp should be collected and weighed to determine the weight of aggregate. The measured weight should then be compared to the target weight calculated in Subsection 907-410.02.03.

Upon determining the target weight, it should be compared to the actual measured weight. If the difference in the target weight and the actual measured weight is over 2.5 pounds, the seal aggregate distributor should be adjusted such that the spread rate is within the above tolerance. The above procedure shall be repeated until the spread rate is within the allowable tolerance.

If at any point during production, excessive seal aggregate is noted, the seal aggregate application rate should be verified, and the spread rate adjusted. The intent is to minimize the amount of excess seal aggregate. Excess seal aggregate removed from the roadway surface after brooming shall be removed from the job site and should not be reused in the seal aggregate operation.

The dry aggregate shall be spread uniformly to cover the bituminous material with the quantity of aggregate specified by the Engineer. All deficient areas shall be covered by additional material.

If needed, approved drag brooms and hand brooms shall be used to distribute the aggregate uniformly before and while the rolling operations are in progress.

The entire application of aggregate shall be rolled as soon as possible after application. Rolling shall be continued and repeated as often as necessary to key the cover material thoroughly into the

bituminous material over the entire surface.

Pneumatic rollers shall be used in the sequence that will provide the rolling pattern that results in the best adhesion of the aggregate to the bituminous material and the best surface qualities.

Subsequent to the initial application of the aggregate the Contractor shall distribute, as many times as is deemed necessary, loose aggregate over the surface to absorb free bituminous material and to cover areas deficient in aggregate. Immediately following each distribution, the Contractor shall roll the entire surface treatment or seal with a pneumatic-tire roller until the maximum quantity of aggregate is embedded in the bitumen. Rolling in each case shall be at least one complete coverage and as many additional coverages as necessary to properly embed the aggregate. All rolling shall be performed while the temperature is favorable for sealing the aggregate into the bitumen.

In all cases there shall be at least five complete coverages of the entire surface of the treatment with a pneumatic-tire roller.

**907-410.03.7--Control of Traffic.** Unless otherwise advised, the Contractor's operations shall be schedule such that all lanes of traffic are open to the traveling public at the end of each day. Considering time needed for curing and preparation prior to opening traffic, the Contractor should not apply bituminous material two (2) hours before dusk, or longer, to allow sufficient time for bonding of the aggregates.

After the surface treatment has been rolled and the bituminous material has cured a minimum of one (1) hour, or longer if necessary to sufficiently hold the aggregate in place, the Contractor shall perform an initial brooming operation consisting of lightly sweeping excess aggregate material from the surface. After the initial brooming has been completed, public traffic will be allowed on the roadway.

Immediately the next morning, a final brooming shall be performed to remove any remaining excess aggregate material from the previous day's seal operation.

**907-410.03.8--Quality Control.** The Contractor shall be responsible for quality control (QC) sampling and testing and shall submit a written Quality Control Plan (QCP) acceptable to the Engineer.

**907-410.03.8.1--Personnel.** The Contractor shall be responsible for staffing their project with qualified personnel.

**907-410.03.8.2--Testing Facilities and Equipment.** The Contractor shall supply any testing and equipment needed to comply with their approved QCP.

**907-410.03.8.3--Materials Testing.** The Contractor shall test the materials utilized in a manner to comply with their approved QCP and as required by the Engineer.

**907-410.03.8.4--Compliance with Specifications.** The Contractor shall attest in writing to the Department that the chip seal has been constructed in accordance with and meets the requirements of the specifications and their approved QCP at the conclusion of the project.

**907-410.03.8.5--Department Acceptance.** The Department will conduct acceptance sampling, testing, and inspection activities according to TMD-20-04-00-000 to ensure material quality, correct application rates, rolling, sweeping, and traffic control are within specification requirements.

**907-410.03.9--Fog Seal.** The placement of the fog seal shall be in accordance with the requirements set forth in Subsections 410.03.2, 410.03.3, 410.03.5, and 410.03.7, as applicable.

Fog seal shall be placed at a rate of 0.11 gallons per square yard, or as directed by the Engineer. When placing on a newly installed surface, the fog seal shall not be placed until after final brooming.

**907-410.04--Method of Measurement.** Accepted bituminous asphalt for surface treatment will be measured by the gallon as prescribed in Subsection 109.01. Unless otherwise specified, distributor tank measurement will be used. The volume of material over five percent above the quantity ordered for each shot will be deducted from measured quantities, except that 15 percent will be allowed for irregular areas where hand spraying is necessary.

Aggregate cover material will be measured by the square yard. The area of all cover material and the volume of all bituminous material lost, wasted, damaged, or rejected, or applied outside of designated areas, or in excess of the Engineer's directions and tolerances allowed, or contrary to the specifications, will be deducted from measured quantities.

Accepted quantities for asphalt for fog seal will be measured by the gallon as prescribed in Subsection 109.01. Unless otherwise specified, distributor tank measurement will be used. The volume of material over five percent (5%) above the quantity ordered for each shot will be deducted from measured quantities, except that 15 percent will be allowed for irregular areas where hand spraying is necessary.

**907-410.05--Basis of Payment.** Bituminous asphalt for surface treatment will be paid for at the contract unit price per gallon. Aggregate cover material will be paid for at the contract unit price per square yard. The prices thus paid shall be full compensation for completing the work.

Payment will be made under:

907-410-A: Asphalt for Surface Treatment, Grade - per gallon

907-410-B: Seal Aggregate Cover Material, Size \_\_\_\_, Kind - per square yard

907-410-C: Asphalt for Fog Seal, Grade - per gallon