

AGGREGATE SEAL COAT TECHNICAL SPECIFICATIONS

GENERAL

This article sets forth the technical requirements governing the quality of the labor and materials used in the project.

All materials not conforming to the specifications indicated shall be considered defective and rejected and shall be removed from the site of work. All material specifications will be constructed under the provisions of the Missouri Standard Specifications for Highway Construction as provided.

1. SCOPE OF WORK

- 1.1 Description: This work consists of an application of asphaltic emulsion followed with an application of graded aggregate surfacing material. The work performed under this contract shall consist of furnishing all labor, equipment, traffic control devices, and materials to construct a single-layer aggregate surface treatment over an existing asphaltic concrete pavement.
- 1.2 The polymer modified emulsified asphalt seal coat shall be constructed in accordance with these specifications and in conformity to the lines, grades, thickness and cross sections shown on the plans, or established by the Engineer.
- 1.3 A double seal coat application will involve a thorough sweeping of the pavement after the first application has cured followed by a second application in accordance to the specifications.
- 1.4 **Design Aggregate and binder application rates.** The McLeod mix design method shall be used and all computations (target stockpile gradation and application rates of CHFRS-2P and cover aggregate) shall be submitted to the Engineer for review with the submittal of the bid. The mix design shall include the material sources intended for use on the project and shall be submitted with the bid.

2 MATERIALS

- 2.0 All material shall conform to Missouri Standard Specifications for Highway Construction, Division 1000, Materials Details, and specifically as follows:

Item	Section
Cationic High Float Rapid Set Emulsion (CHFRS-2P)	409
Aggregate for Polymer Modified Asphalt Seal Coats (Porphyry, Grade A1 3/8"x1/4"inch MoDOT	1003
Sand	1002

- 2.1 CHFRS-2P shall also meet the requirements of tests conducted in accordance to ASTM D2397 and shall have a minimum Elastic Recovery of 65%. The material shall have a minimum float value of 1800 when tested in accordance to ASTM D 139. The Cationic High Float Polymer Modified Emulsion (CHFRS2P) must be milled from a pre-modified Asphalt or milled with an unmodified asphalt, a SBR Polymer and BASF blending agent (NX-1122X) or approved equal.
- 2.2 The emulsion application rate will be determined by the engineer based on a site by site evaluation. Application rates may range from 0.35 to 0.40 gallons per square yard for a single lift.

- 2.3 The porphyry aggregate shall have a Bulk Specific Gravity of 2.55 to 2.75 when tested in accordance with ASTM C127. The aggregate shall not have a percent of wear exceeding 20 when tested in accordance with AASHTO-T96 (Los Angeles Abrasion). Application rate of aggregate will range from 22 to 26 pounds per square yard.
- 2.4 All aggregate shall be stockpiled on an asphalt or concrete surface, not located in a flood plain.
- 2.5 Sand from the Mississippi River or the Missouri River basin may be used for blotter material, if needed.
- 2.6 When a prime coat is required in a double seal coat application MC-30 cut back asphalt manufactured in accordance to Section 2015 of Missouri Standard Specifications for Highway Construction will be used. An application rate between 0.25 and 0.35 gallons per square yard will be used unless otherwise modified by the owner/engineer.

3 EQUIPMENT

The following equipment or its equivalent will be required:

- 3.4 Distributor: The Contractor shall provide a distributor, for heating and applying bituminous materials, that meets the requirements of Section 409.4 of Missouri Standard Specifications for Highway Construction. The tachometer shall be readily visible to the operator and have a dial reading registering liters per minute (gallons per minute) passing through the nozzle. The thermometer well shall not be in contact with a heating tube. A hose and spray nozzle attachment shall be provided for applying asphalt material to patches and areas inaccessible to the spray bar. The distributor shall be provided with heaters that can be used to bring the asphalt material to spray application temperature. The distributor shall have a computer controlled application system and be equipped with a bitumeter with a dial gauge-registering (feet) meter of travel per minute and shall be visible by the driver

The extended width of application of the spray bar shall be 24 feet with provision for lesser width when necessary.

The distributor shall be provided with a full circulatory system that includes the spray bar.

The distributor shall be cleaned of foreign contaminants before it is used.

- 3.2 Broom: A mechanical type power broom shall be used for removing loose material from the surface to be treated and for removing loose aggregate after work is completed. The broom shall have a minimum storage capacity of 2 cubic yards. The broom must also be equipped with plastic bristles.
- 3.3 Rollers: A minimum of two oscillating-type pneumatic-tire rollers shall be required to roll aggregate after spreading. The pneumatic-tire rollers shall be self-propelled with smooth-tread pneumatic tires of equal size staggered on the axles at such spacing and overlaps as will provide uniform pressure to seat the cover aggregate into the bituminous material without fracturing the aggregate particles. The pneumatic-tire rollers shall weigh from 5 to 8 tons (4.5 to 7 metric tons), shall be operated at a speed not be exceed per hour 5 mph , shall have a contact pressure of 60 psi to 80 psi and shall have a total compacting width of not less than 60 inches (152 cm).
- 3.4 Aggregate Spreader: The aggregate spreader shall be a self-propelled mechanical spreader, equipped with a computer guided system and positive controls capable of uniformly distributing

a 24 foot wide band of aggregate at a prescribed rate in a single-pass operation over the surface to be sealed. The operation of aggregate spreaders at speeds which cause aggregate to "roll over" after striking the emulsion covered surface will not be permitted. Aggregate spreaders will not be operated on uncovered polymer modified emulsified asphalt. Spreaders shall be calibrated before operation on the project.

- 3.5 Hauling Equipment: Hauling equipment shall be operated in a prudent manner and at moderate speeds that will not damage the new chip seal or create a hazard to the traveling public. Trucks that transport aggregate shall be legally licensed, in good working condition, and be equipped with the safety devices required by the United States Department of Transportation.

4. **CONSTRUCTION REQUIREMENTS**

- 4.1 Weather Limitations: Polymer modified emulsified asphalt shall not be applied when the pavement or air temperature is below 70° F, nor if the relative humidity is higher than 75%, nor if the wind velocity will prevent the uniform application of the bitumen or aggregate. The seal coat shall be applied when the pavement surface is dry, and when the weather is not foggy or rainy. The placing of polymer modified emulsified asphalt seal coat will not be allowed before May 1 or after September 30.
- 4.2 Preparation of Surface: Immediately before applying the polymer modified emulsified asphalt, any loose material, grease, and other petroleum distillates, dirt, clay or other objectionable organic or inorganic materials shall be removed from the surface to be sealed. Cleaning shall be performed by sweeping, flushing or other means necessary to remove all objectionable material from the pavement surface. Material removed from the surface shall not be mixed with cover aggregate. The surface should be clean and dry as approved by the Engineer.
- 4.2.1 The CONTRACTOR shall be responsible for furnishing and placing masking materials over all sewer, utility and traffic control device covers and inlet grates located in the roadways to be treated. All such materials shall be removed and disposed of after the surfacing material has cured.
- 4.3 Application of polymer modified emulsified asphalt: The polymer modified emulsified asphalt shall be applied by means of a pressure distributor in a slow, uniform, continuous spread, without missing or overlapping, at a truck speed consistent with the placement of the cover aggregate. Unless otherwise provided, the polymer modified emulsified asphalt shall be applied to one-half the width of the surface at a time, with the center lap of the application placed at the lane line of the traveled way and kept as narrow as practicable. The other side of the roadbed shall be left open to traffic. Polymer modified emulsified asphalt shall not be applied a greater distance than can be immediately covered by aggregate before the emulsion breaks or as approved by the Engineer.
- 4.3.1 The application rate of polymer modified emulsified asphalt for the chip seal shall be within the limits in Section 2.2. A minimum of 200 gallons (750 Liters) of polymer modified emulsified asphalt shall remain in the distributor tank at all times except for the last shot on the project. The emulsion should be uniformly applied through the pressure distributor at a temperature specified by the Engineer between 150° F (66° C) and 185° F (85° C). The temperature used for spraying at a given spray bar pressure should not be that which causes fogging when the asphalt material leaves the spray bar.
- 4.3.2 The angle of the spray nozzles and the height of the spray bar shall be set to provide a triple coverage fan pattern. The frame of the distributor shall be blocked or snubbed to the axle of the truck to maintain a constant spray bar height above the road surface during discharge of the load. An alternate method of maintaining constant spray bar height may be approved.
- 4.3.3 To ensure uniform application of the polymer modified emulsified asphalt at the beginning of each distributor load, a portion of the roadbed surface shall be covered with building paper. The area covered by the building paper shall be used at the starting point for each distributor load or each part of a load after a temporary delay. If the cut-off is not positive on the distributor, the use of paper shall be required at the end of each spread. For the next application, the leading

edge of the paper is placed within 1/2 inch (13 mm) of the cut off line of the previously laid treatment. The paper shall be removed and disposed of in an approved manner. The distributor shall be moving forward at proper application speed when the spray bar is opened. A hand spray shall be used to apply emulsified asphalt necessary to touch up all spots missed by the distributor.

Any skipped areas or deficiencies shall be corrected. Junctions of spreads shall be carefully made to insure a smooth riding surface. The application of emulsified asphalt on adjacent Portland cement or asphaltic concrete pavements, curbs, bridges, or any areas not specified to be sealed shall be avoided. The CONTRACTOR shall immediately clean up any such spills to the satisfaction of the Engineer.

4.3.4 If the seal coat is to be constructed on a bituminous surface in which the binder material was other than asphalt cement, the placing of seal coat will not be permitted until the underlying bituminous course has cured from 15 to 30 days, as directed by the Engineer.

4.3.5 From 4 to 6 inches (10 to 15 cm) of the centerline edge of the initially treated lane shall be left uncovered with aggregate to allow for an overlap of asphalt binder when the remaining half of the surface is treated. The CONTRACTOR will be required to remove the excess material occurring as a result of dual application of product along construction seams.

5. **APPLICATION OF COVER AGGREGATE**

5.0 In general, the cover aggregate shall be placed within 30 seconds following the application of the emulsified asphalt. Operations shall not proceed in such a manner that the emulsified asphalt will be allowed to chill, set up, dry or otherwise impair retention of the cover aggregate. The cover aggregate shall be spread by means of a self-propelled mechanical spreader accurately measuring and uniformly spreading the aggregate.

5.1 The quantity of cover aggregate to be used per square yard may range from 20 to 30 pounds per square yard depending on the physical properties of the material used. The Engineer shall determine the exact rate. Aggregates shall be dry or surface damp (saturated Surface Dry-SSD) at the time of application. SSD shall be considered the condition when no visible film of water exists on the aggregate. The moisture content of the aggregate shall not exceed 2% by weight. The Engineer may require that the cover aggregate be moistened with water to enhance cohesive properties of the emulsified asphalt. Spreading shall be accomplished in a continuous manner, without stopping between trucks, and in such manner that the tires of the trucks or aggregate spreader at no time contact the uncovered and newly applied emulsified asphalt. All portions of the surface not covered by mechanical spreaders shall be hand spotted so that the entire surface will be uniformly covered. Light hand brooming may be necessary to distribute excessive aggregate.

5.2 Rolling: Rolling shall begin immediately behind the spreader and shall consist of at least two complete coverages with the pneumatic-tire roller. Initial rolling shall consist of one complete coverage and shall begin immediately behind the spreader. Initial rolling shall be completed within 15 minutes the time that the aggregate was spread. Asphaltic emulsion and aggregate shall not be spread more than 1,000 feet (105 meters) ahead of completion of initial rolling operations. The second roller shall be used for the second complete coverage to smooth and adequately seat the aggregate. All rolling shall be completed the same day as the cover aggregate is applied. Rolling shall proceed in a longitudinal direction, beginning at the outer edges of the treated surface and working toward the center. Each pass by the roller shall overlap the previous pass by one-half the width of the front wheels.

5.3 Brooming: After the embedded aggregate has set, the surface shall be lightly broomed. Sweeper will not be allowed on the pavement until treatment has cured eight (8) hours. All loose aggregate shall be removed from the pavement, driveways and side streets using a power broom with light pressure, or a hand broom within 48 hours after initial surface treatment.

Subsequent brooming the following three days may be directed by the Engineer to ensure that the surface is free of loose aggregate that could cause vehicle damage. Pavement surfaced on a Friday will be swept on Saturday. Roads that are not swept within 48 hours of initial treatment, to the Engineer's approval, will cause application operations to cease and working days to be charged until all sweeping operations are complete. Maintenance of the surface shall include distribution of aggregate over the surface to absorb any free emulsified asphalt, to cover any area deficient in cover aggregate and to prevent the formation of corrugations. Clean sand may be used in lieu of aggregate to cover any excess of emulsified asphalt that comes to the surface. Generally, the maintenance shall be confined to the cooler hours of the day and shall be conducted so as not to displace embedded material. The surface shall be free of excess aggregate at the time of acceptance of the work (Final Inspection).

6. **TRAFFIC CONTROL**

- 6.0 Traffic Control and Safety: No traffic shall be permitted on the seal coat until all rolling has been completed. On roads where the posted speed limit is above 25 mph, the CONTRACTOR shall control traffic by means of pilot vehicles to a maximum speed of 20 mph (30 km/h) for a period from 2 to 4 hours after completion of rolling on two-lane two-way roadways under one-way traffic control. The Engineer shall determine the exact time. Pilot vehicles will not be required during sealing operations on shoulders. The CONTRACTOR'S supply trucks shall observe these traffic controls. The CONTRACTOR will be required to cover existing speed limit signs with "20 MPH" plates until the roadway has had its final sweeping application.
- 6.1 The beginning and end of the work zone shall have the following signs posted: "Flagger Ahead", "Fresh Oil", and "Road Construction Ahead". All side streets shall have "Road Construction Ahead" signs placed as directed by the Engineer and all signs shall conform to Section 1041 Construction Signs. All signs shall be installed on permanent holding frames, one foot above ground and shall remain in place at each job site until all sweeping operations are complete. Signs shall be safely installed so not to block vehicle or pedestrian line of sight and shall be resistant to wind gusts.
- 6.2 In accordance with Section 612.30.2, when traffic cannot be detoured, flaggers equipped with 2-way hand-held radios shall assist traffic and pilot cars through the project in a manner that provides safety for the traveling public, workmen, and equipment while imposing minimal interruption of the work. When applying seal coat to arterial roads and intersections, lanes shall be coned off for safety and traffic control during daylight hours. Cones shall conform to Section 616.3.1.
- 6.3 Safety precautions shall be used at all times during progress of the work. Workmen shall be equipped as required by the Manual on Uniform Traffic Control Devices.
- 6.4 The CONTRACTOR shall be responsible for prior notification of residents regarding access restrictions and for not parking on streets during seal coat operations. In cases where on-street parking exists, the CONTRACTOR shall furnish and install "No Parking" notices a minimum of 24 hours in advance of seal coat operations. All such signs shall clearly indicate the duration of the parking restriction.
- 6.5 On roads designated as arterials, rush hour restrictions will be enforced. No seal coat work will be permitted on these roadways from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. on weekdays.

7. **BASIS OF PAYMENT**

The accepted quantities of seal coat (or double seal coat) will be paid for at the unit price bid for the pay items included in the contract. No direct payment will be made for traffic control or placing and removing "No Parking" signs.

If prime is required accepted quantities will be paid at the unit price bid for the pay items included in the contract.

