SECTION 507 — SLURRY SEAL AND MICRO-SURFACING

507.01 DESCRIPTION. Construct an asphalt emulsion seal course using Slurry Seal (SS) or Micro-Surfacing (MS).

507.02 MATERIALS.

Slurry Seal and Micro-Surfacing 923

507.03 CONSTRUCTION.

507.03.01 Weather Restrictions. Place asphalt emulsion seal when the air and surface temperatures are at least 50 F. The morning minimum surface temperature may be 40 F provided the ambient temperature is expected to rise to or above 60 F and is not expected to fall below 32 F within 24 hours after placement. Cease placement when the surface or air temperature falls below the specified limits. Do not place asphalt emulsion seal when it is raining or foggy.

507.03.02 Mixing Equipment. Use a self-propelled, front feed, continuous loading mixing machine. The machine shall proportion and deliver the materials to a revolving, multi-blade, shafted mixer; and discharge it continuously and uniformly.

The mixer shall have devices that control the proportioning of each material. Calibrate the mixer for the mix design in the presence of an Administration representative, or submit certified calibration documents for approval to ensure the SS or MS treatment meets the job mix formula.

Calibrate the equipment using actual project materials and every time there is a change in material source or composition. Submit a source of materials and a mix design for approval in accordance with 923.04 with corresponding test data from an approved lab at least three weeks in advance of the paving operation.

The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, additives, and water to maintain an adequate supply of the materials for the proportioning controls. Add the proper amount of mineral filler to the aggregate before introduction into the
mixture. Use mixing machines equipped with water pressure systems and nozzle spray bars to provide a water spray ahead of and outside the spreader box when required.

Truck mounted machines with positive, non-slipping aggregate delivery systems, but without a front feed continuous loading feature, may be used on project segments of less than 15 000 yd$^2$ or for spot repairs. Have at least two truck mounted machines on the project prior to construction.

Provide the data for each unit in graphic form indicating the stone gate setting required to obtain the residual asphalt content as determined in the mix design.

Individual volume or weight controls for proportioning each material shall be provided and meters or counters shall be such that the Engineer may determine the amount of each material used at any time. The Contractor shall provide aggregate weigh tickets, a daily delivery summary, and an estimate of aggregate lost or otherwise not used.

507.03.03 Spreading Equipment. Spread the asphalt emulsion seal uniformly by means of a mechanical squeegee box attached to the mixer and equipped with paddles mounted on an adjustable shaft to continuously agitate and distribute the materials. Use equipment that provides sufficient turbulence to prevent the mix from setting in the box or causing excessive side buildup or lumps. Attach flexible seals where the box contacts the road, front and rear, to prevent loss of the mixture. Do not spray additional water into the spreader box. Equip the spreader box with a burlap drag (approximately 18 in. wide), or other approved screed to create a smooth surface.

MS material may be used to fill ruts, utility cuts, depressions in the existing surface, etc, as directed. Fill ruts of 0.5 in or greater in depth with a rut-filling box; 5 or 6 ft in width. Ruts in excess of 1-1/2 in. deep may require multiple applications with the rut-filling box to restore the cross-section. Apply a full width scratch course with the spreader box when rutting or deformation is less than 1/2 in. using a metal or stiff rubber strike-off. Apply the material at a sufficient rate to level the pavement surface. The leveling course may or may not meet the application rate suggested in 507.03.07. Cure all rut-filling and leveling material under traffic for at least 24 hours before additional material is placed.

507.03.04 Quality Control Plan. Submit a Quality Control Plan for approval at least 30 days prior to the placement of any asphalt emulsion seal. The Quality Control Plan shall contain a list of technicians working on the project and their qualifications, the current year equipment calibration data and a statistically based procedure of random sampling.

The Quality Control Plan shall show how the Contractor proposes to control the equipment, materials, production, and asphalt emulsion seal operation to ensure conformance with these Specifications. Discuss the Quality Control Plan requirements in the pre-pave meeting.

507.03.05 Test Strip. Provide calibration data for the equipment before placing the test strip. Construct a test strip for approval prior to beginning the work and when there is a change in materials. Install the test strip at the beginning of a roadway project. The test strip will be
incorporated into the pay quantities if approved. Construct the test strip over one-full lane width; a minimum of 500 ft long. The mixture consistency and application rate for the test strip shall be representative of the mixture consistency and application rate for the project. Contact the Asphalt Technology Division of the Office of Materials Technology one week prior to constructing the test strip to have a representative present. Do not continue the work until the test strip has been approved. If the test strip is not approved, correct all deficiencies and provide another test strip. Work on the roadway will be permitted to continue once the test strip is successfully installed and approved. For each day’s paving after the approved test strip, submit a Production Report Form to the Office of Materials Technology at superpave@sha.state.md.us before 1pm, the week day before each day’s production. This form can be requested from the preceding e-mail address.

(a) **Slurry Seal.** Open the test strip to traffic within two hours after placement unless otherwise directed.

(b) **Micro-Surfacing.** Open the test strip to traffic within one hour after placement unless otherwise directed.

**507.03.06 Surface Preparation.** Perform surface preparation prior to applying the tack coat and prior to placing asphalt emulsion seal, as directed. Perform roadway patching in accordance with Section 505 and fill cracks in accordance with Section 510. Ensure the crack sealer is a compatible material (i.e., no rejuvenating agents or solvents used), that cracks are not overfilled and proper cure time as per manufacturer’s recommendations is allowed prior to placing the asphalt emulsion seal. Remove thermoplastic and waterborne pavement markings per Section 565.

Protect manholes, valve boxes, drop inlets and other service/utility entrances from the asphalt emulsion seal by a suitable method, as approved.

Clean the existing surface and remove all objectionable materials. Ensure the pavement surface is free of standing or pooling water prior to applying tack coat and asphalt emulsion seal.

Apply tack coat consisting of one part asphalt emulsion to two or three parts water to surfaces prepared for MS. Use an emulsion type and grade that is compatible with the asphalt emulsion seal. Apply at a rate of 0.05 to 0.10 gal/yd$^2$. Do not apply tack coat to surfaces prepared for SS.

**507.03.07 Application.** Spread the asphalt emulsion seal to repair slight irregularities and to achieve a uniform, skid resistant surface free of skips, lumps, or tears.

Use squeegees and lutes to spread the mixture in areas that are inaccessible to the spreader box and in areas that require hand spreading.

Additives may be used to provide a slower setting time when hand spreading is necessary. Pour the slurry seal in a small windrow along one edge of the surface to be covered, and spread
the material uniformly. Construct a smooth, neat seam where two passes meet. Remove excess material immediately from the ends of each run.

(a) Slurry Seal. Apply at the following target application rates and tolerances, based on the dry aggregate weight, unless otherwise specified:

<table>
<thead>
<tr>
<th>AGGREGATE TYPE</th>
<th>TARGET APPLICATION RATE AND TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II Mix</td>
<td>16 ±2 lb/yd²</td>
</tr>
<tr>
<td>Type III Mix</td>
<td>20 ±2 lb/yd²</td>
</tr>
</tbody>
</table>

(b) Micro-Surfacing. Apply in one or two coats as directed at the following target application rates and tolerances, based on the dry aggregate weight, unless otherwise specified:

<table>
<thead>
<tr>
<th>AGGREGATE TYPE</th>
<th>TARGET APPLICATION RATE AND TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II Mix</td>
<td>16 ±2 lb/yd² when one coat is specified</td>
</tr>
<tr>
<td>Type III Mix</td>
<td>22 ±2 lb/yd² when two coats are specified</td>
</tr>
<tr>
<td>Type II Mix</td>
<td>32 ±2 lb/yd²</td>
</tr>
<tr>
<td>Type III Mix</td>
<td>36 ±2 lb/yd²</td>
</tr>
</tbody>
</table>

Apply MS when specified or directed to fill ruts, utility cuts, depressions in the existing surface, etc., at the following target application rates and tolerances, based on the dry aggregate weight:

<table>
<thead>
<tr>
<th>AGGREGATE TYPE</th>
<th>RUT DEPTH</th>
<th>TARGET APPLICATION RATE AND TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type III Mix</td>
<td>0.5 – 0.75 inches</td>
<td>25 ±5 lb/yd²</td>
</tr>
<tr>
<td></td>
<td>0.75 – 1.00 inches</td>
<td>30 ±5 lb/yd²</td>
</tr>
<tr>
<td></td>
<td>1.00 – 1.25 inches</td>
<td>33 ±5 lb/yd²</td>
</tr>
<tr>
<td></td>
<td>1.25 – 1.50 inches</td>
<td>36 ±4 lb/yd²</td>
</tr>
</tbody>
</table>

Fill ruts using a specially designed rut filling box that will leave the surface crowned 1/8 to 1/4 in. per inch depth to allow for traffic compaction to an approximately level surface. The Contractor shall provide and use a ten-foot straight edge to control the depth and crown.

Furnish certified weigh tickets for all materials in accordance with 507.03.10.

507.03.08 Rolling. Rolling is required for parking facilities only. Roll parking facilities using a self-propelled, 10-ton (maximum) pneumatic-tire roller equipped with a water spray system, as directed. Do not commence rolling until the asphalt emulsion seal has cured sufficiently, as determined.
507.03.09 **Defective Work.** Correct defective work not meeting the following criteria, unless otherwise directed in writing and as determined; to the satisfaction of the Administration and at no additional cost.

(a) **Application Rate.** Areas where application rates deviate from the acceptable ranges in 507.03.07 will be considered defective work.

(b) **Finished Surface.** Provide a finished, uniform surface texture meeting the following requirements:

1. Limit areas of excessive asphalt (flushing) to less than 10 percent of the finished surface area. Areas of excessive asphalt are characterized by a smooth, shiny surface that may be tacky to the touch. Bleeding at joints is not allowed.

2. No tear and/or drag marks greater than 1 in. wide and 3 in. long.

3. No more than 12 tear and/or drag marks greater than 1/2 in. wide and 4 in. long per 10 ft of a lane.

4. No clumps and/or other foreign objects greater than 1-1/2 in. in diameter.

5. No transverse ripples or joints with greater than a 1/4 in. ridge, bump or depression as measured with a 10 ft straight edge.

6. No longitudinal streaks with greater than a 1/4 in. ridge, bump or depression, as measured with a 10 ft straight edge.

(c) **Longitudinal Joints.** Make a neat seam where two longitudinal passes join with no greater than a 1/4 in. bump, ridge or depression as measured with a 10 ft straight edge. Do not overlap longitudinal joints more than 4 in. except on irregular roadway widths as directed.

(d) **Longitudinal Edges.** Place material to the final widths specified. Make a neat longitudinal edge along the roadway lane, shoulder, and curb lines. Place edges flush with curbs. Place edges with no more than ±3 in. horizontal variance in any 100 ft of roadway.

(e) **Transverse Profile.** Fill ruts to have no depressions as measured with a 10 ft straightedge.

507.03.10 **Certification.** Furnish certified weigh tickets daily for the emulsion, residual asphalt content, latex emulsion, aggregate, and mineral filler. The weigh tickets will be used to determine in-place application rates.

507.03.11 **Sampling and Testing.** Sample the asphalt emulsion seal (mixture) and the asphalt emulsion at least once daily during paving. Provide samples for asphalt content from the completed mix produced by each mixing unit to be tested by the Administration. Asphalt
content will be determined by Ignition Method. Engineer to witness and submit the samples and proper documentation/certification to the Asphalt Technology Division of the Office of Materials Technology. Residual asphalt content and gradation will be determined in accordance T 30 and T 164, or T 308. The residual asphalt content shall be within +/- 1.5 percent of the Job Mix Formula (JMF). When successive tests for a mixing unit fail, or one test fails by more than 2 percent, that unit shall be removed from service until approved.

507.03.12 Tie-Ins for Entrances and Connecting Roads. Make tie-ins at entrances and connecting roads as directed.

507.03.13 Traffic. Maintain active access control at intersections and entrances. When it is necessary to open to traffic early, lightly sand the surface using the same aggregate as in the mix. Remove excess aggregate from the roadway in curb and gutter sections as required. Broadcast clean aggregate used in the seal treatment over the mix at intersections and/or entrances for temporary access as directed. Repair traffic-damaged asphalt emulsion seal at no additional cost. Place temporary paint marking after the mix has cured. Place permanent pavement markings, including thermoplastic pavement markings, at least seven days after curing.

(a) Slurry Seal. Open the test strip to traffic within two hours after placement unless otherwise directed.

(b) Micro-Surfacing. Open the test strip to traffic within one hour after placement unless otherwise directed.

507.04 MEASUREMENT AND PAYMENT. Slurry Seal and Micro-Surfacing will be measured and paid for at the Contract unit price per square yard for one or more of the pertinent items listed below. The accepted quantity of Micro-Surfacing Rutfilling will be paid for at the Contract unit price per ton. Payment will be full compensation for furnishing and placing the aggregate, tack coat, mineral filler, tie-ins to entrances and connecting roads, emulsion, latex emulsion, test strip, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

507.04.01 Slurry Seal Using Type II Mix (One Coat).

507.04.02 Slurry Seal Using Type III Mix (One Coat).

507.04.03 Micro-Surfacing Using Type II Mix (One Coat).

507.04.04 Micro-Surfacing Using Type III Mix (One Coat).

507.04.05 Micro-Surfacing Using Type II Mix (Second Coat).

507.04.06 Micro-Surfacing Using Type III Mix (Second Coat).
507.04.07 Micro-Surfacing Type Rutfilling

507.04.08 Hot Mix Asphalt patches per 505.04.

507.04.09 Removal of Pavement Markings per Section 565.

507.04.10 Filling Cracks in Hot Mix Asphalt Pavement per Section 510.

507.04.11 Price Adjustment. Material not conforming to these Specifications may be accepted at a reduced price if the nonconformance is determined not detrimental to the work. The following price adjustment will apply:

(a) The residual asphalt content of samples will be averaged for each day’s production per lift and will be compared to the submitted mix design. The Contract unit price per square yard will be reduced 1 percent for each 0.10 percent the asphalt content is out of tolerance below the approved job mix formula, as per 507.03.12.

(b) The Contract unit price per square yard will be reduced 3 percent for each pound per square yard below the specified rate. This adjustment will be determined by comparing the certified delivery tickets with the project Specifications. No increase in the Contract Unit price will be considered for applications at more than the specified rate.

507.04.12 Price Adjustment for Asphalt Binder. A Price Adjustment (PA) will be made to provide additional compensation, or a credit to the Administration for fluctuations in the cost of asphalt binder.

The prevailing base index price will be the price specified for PG 64-22 Asphalt Binder posted at www.roads.maryland.gov (Business Center / Contracts Bids and Proposals) for adjustment purposes at time of bid opening.

The PA will made when the index price for the month of placement increases or decreases more than 5 percent of the prevailing base index price. Computations will be as follows:

Percent Change = ((Pp – Pb) / Pb) x 100

PA = (Q/2000) x AR x (Pp – (D x Pb))

Where:

PA = Price Adjustment for Slurry Seal or Micro-Surfacing
Q = Quantity of Slurry Seal or Micro-Surfacing placed in pounds
D = 1.05 for increases over 5 percent; 0.95 for decreases over 5 percent
Pp = Index price for PG 64-22 Asphalt Binder per ton for the month of placement
Pb = Prevailing base index price for PG 64-22 Asphalt Binder per ton
AR= Asphalt Residue expressed as a decimal

PA resulting in increased payment will be paid under the item Price Adjustment for Asphalt Binder. The item amount will be established by the Administration and shall not be revised. PA resulting in a decreased payment will be deducted from monies owed.