New Jersey Department of Transportation
1035 Parkway Avenue, PO Box 600, Trenton, New Jersey 08625-0600

Baseline Document Change Announcement

ANNOUNCEMENT: BDC15S-01

DATE: March 26, 2015

SUBJECT: Introduction of Pavement Preservation Treatments
- **Addition of new Division 420 (PAVEMENT PRESERVATION TREATMENTS) to the 2007 Standard Specification, revision to Subpart 504.02.01; and Subsection 901.07 and addition of Subsections 902.09, 902.10 and Section 1012**

A new Division, "Division 420" has been added to the 2007 Standard Specifications to introduce specifications for the "Pavement Preservation Treatments". Also, added are the corresponding materials/equipment specifications in Sections 902 and 1012 respectively.

The new Division 420 comprises of two sections at the present:

1. Section 421 Micro surfacing and Slurry Seal
2. Section 422 Fog Seal

It is expected that more Sections will be added to this Division in the future.

The following revisions have been incorporated into the Standard Input SI2007 as of March 26, 2015.

THE FOLLOWING DIVISION IS ADDED:

DIVISION 420 – PAVEMENT PRESERVATION TREATMENTS

SECTION 421 – MICRO SURFACING AND SLURRY SEAL

421.01 DESCRIPTION

This section describes the requirements for micropaving joints, micro surfacing and slurry seal.

421.02 MATERIALS

421.02.01 Materials

Provide materials as specified:

Tack Coat:
Emulsified Asphalt, Grade SS-1, SS-1h, Grade CSS-1, CSS-1h 902.01.03
Micro Surfacing 902.09
Slurry Seal 902.10

421.02.02 Equipment

Provide equipment as specified:

Bituminous Material Distributor 1003.07
Pneumatic-Tired Compactor 1002.01
Mechanical Sweeper 1008.03
Micro Surfacing and Slurry Seal Paver 1012.01

Provide hand squeegees, shovels, and other equipment necessary to perform the work. Provide cleaning equipment such as power brooms, air compressors, water flushing equipment, and hand brooms adequate for surface preparation.

421.03 CONSTRUCTION

421.03.01 Micro Surfacing Rut Filling.

Fill ruts in the wheel paths and restore the designed profile of the pavement cross section as shown on the Plans and as directed by the RE. Fill ruts which are 1/2" or less with a single full lane micro surfacing operation. Fill ruts which are greater than 1/2" in depth with a separate rut filling operation. Fill ruts which are greater than 1 1/2" in depth with multiple applications utilizing a rut filling equipment. Do not over fill rut areas. Cure rut filling and level-up material for at least twenty-four (24) hours before additional material is placed.

421.03.02 Micropaving Joints.

Clean the joint, removing unsound patches and loose material. Use micro surfacing Type II as specified in 902.09 and rut filling equipment modified to provide a 2 feet wide application of material to fill in open longitudinal joints and rumble strips as shown on the plans and as directed by the RE. For joint filling greater than 2" in depth perform multiple applications to even out settlement of the material after curing. Avoid excess crowning and over filling of joints and rumble strips. Cure each pass of material under traffic for at least twenty-four (24) hours before additional material is placed.

421.03.03 Micro Surfacing

A. Micro Surfacing Plan. At least 20 days before beginning placement of material, submit a detailed plan of operation to the RE for approval that includes the following:

1. Paving contractor's superintendent qualifications with a list of at least 5 successful projects, including project owner contact information.
2. Size and description of crew.
3. Number, type, model of equipment and material control/metering devices along with the current calibration documentation.
4. Lighting plan for nighttime operations as specified in 108.06 for milling and paving.
5. Method of locating, protecting and maintaining manholes, inlets, other utilities and RPM's.
6. Paving procedures for maintaining continuous operation as specified.
7. Paving sequence. Indicate that the surface is to be constructed for the full lane width as a single paving operation.
8. Schedule, hours of operation, and production rates for the Project.
9. Plant and stockpile locations for aggregate, emulsion, mineral filler and additives.
10. Method of maintaining modified emulsion temperature during transportation.
11. Method of constructing joints.
12. Quality control plan outlining the material testing, number and frequency planned in order to ensure compliance.
13. Mix design of the mixture, the AASHTO accredited laboratory used and the test results of the mixture.

Do not begin paving until the RE approves this plan. Submit an adjusted plan before making adjustments to the paving operation.

B. Weather Limitations. Do not place material if the surface temperature of the underlying pavement is below 50 °F or if the National Weather Service is forecasting temperatures below 50 °F during installation or within 3 hours after installation.

Do not place material if the existing surface is wet. Do not place material if it is precipitating and when precipitation is imminent. If within the 3 hours of placement, the National Weather Service locally forecasts a 50 percent chance, or greater, of precipitation during the scheduled placement, then postpone the placement of material. The Contractor may resume operations when the chance of precipitation is less than 50 percent, and the surface is dry.

C. Test Strip. Construct a test strip of at least 500 feet in length on the roadway before initial placement commences. Ensure that the tack coat has been placed as specified in 401.03.02. Ensure the test strip is performed during weather and sunlight conditions which represents project production placement of the material. While constructing the test strip, record the following information and submit to the RE:

1. **Ambient Temperature.** Measure the ambient temperature at the beginning and end of each day's operation.
2. **Base Temperature.** Measure the surface temperature of the existing pavement at the beginning and end of each day's operation.
3. **Weather Conditions.** Document the wind speed, weather conditions, time of day, and humidity at the time of placement.
4. **Tack Coat**. Measure to verify the proper application rate, coverage and temperature of tack coat for compliance.
5. **Material Quantities.** Measure to verify the proper proportions of emulsion, cement, aggregate, additives (if any) and temperature of the mixture during placement. Measure to verify the proper application rate of the mixture for compliance.
6. **Roller Pattern.** Provide details on the number of rollers, type, and number of passes used on the test strip.
7. **Initial Set Time.** Record the initial time of placement. Verify that the mixture has achieved initial set within 30 minutes of placement.
8. **Performance Under Traffic.** Verify that the surface shows no visual signs of distress when exposed to traffic after curing for 1 hour.

Submit test strip results to the RE. The RE will analyze the test strip results in conjunction with the approved mix design to approve the test strip. Do not proceed with production placement until receiving written permission from the RE.

If the test strip does not meet requirements, make adjustments and construct a second test strip. If the second test strip does not meet requirements, suspend operations until written approval to proceed is received from the RE.

Before making adjustments to the operations, notify the RE in writing. The RE may require a new test strip to verify the performance of the adjusted operations.

D. Surface Preparation. Ensure repairs are completed prior to beginning installation. Ensure rut filling and micropave joints have cured for at least 24 hours prior to applying material.

Ensure that manholes, inlets, utilities, curbs, RPM's, structures, rumble strips, traffic striping and traffic markings to remain are protected by methods approved by the RE. Do not proceed with placement until the RE approves the prepared surface.

Clean the surface of the pavement to remove all dust, debris, oil, and any other materials that may prevent bonding of the treatment to the existing surface. Ensure that the surface is clean and dry.

Apply tack coat prior to application of the treatment as specified in 401.03.02.

E. Micro Surfacing Application. Apply the mixture over the full lane width as specified in table 421.03.03-1.

Table 421.03.03-1 Job Mix Types and Application

Aggregate Type (See Table 902.09.03-1)	Location	Application Rate (lbs./yd^2)
Type II	Surface Course	16 – 22

	Intermediate Course	10 – 20
Type III	Rut filling	20 – 40 (See ISSA[1] A143)

1. International Slurry Seal Association (ISSA)

Operate equipment to prevent the loss of the mixture on super-elevated curves. Spread the mixture to fill cracks and minor surface irregularities and leave a uniform high-skid resistant application of aggregate and asphalt on the surface. Operate spreader box so a uniform consistency is achieved without causing skips, lumps or tears in the finished surface.

Carry a sufficient amount of material, at all times, in all parts of the spreader box, so complete coverage is obtained. Water may be sprayed into spreader box to facilitate spreading without harming the mix. No lumping, balling or unmixed aggregate is permitted in the finished surface.

Adjustments to the additive may be required for slow setting where hand spreading is needed. Use squeegees and lutes to spread the mixture in areas inaccessible to the spreader box and areas requiring hand spreading. When hand spreading, pour the mixture in a small windrow along one edge of the surface to be covered and then spread uniformly by a hand squeegee or lute. Make a neat appearing seam where two passes join. Ensure transverse joints of micro surfacing are made straight, clean, and perpendicular to the direction of travel. The maximum overlap of longitudinal lane line joints is 3 inches. Ensure micro surfacing longitudinal joints are parallel to, and not offset by more than 3 inches maximum from, the final traffic striping. Immediately remove excess material from ends of each run.

Do not leave streaks in the finished surface. If streaking develops, stop the operation and submit a corrective action plan to the RE. Do not resume operations until the RE approves the plan.

F. Compaction. Do not roll until the material has cured sufficiently to avoid damage by the roller. Use a pneumatic-tired compactor as specified in 1002.01, except ensure the roller is equipped with a water-spray system. Roll the material with a minimum of at least 2 passes of the pneumatic-tired compactor. The RE may direct additional passes to eliminate roller marks or facilitate compaction of rut filled areas.

G. Opening to Traffic. Allow the material sufficient curing time before opening to traffic. Remove loose material from the traveled way before opening to traffic. If the material becomes damaged replace the damaged area.

H. Applying Striping and Traffic Markings. Allow material to cure for at least 2 weeks before applying permanent traffic striping and traffic markings. Use temporary traffic striping and markings as directed by the RE until the material has cured.

I. Surface Quality Requirements. Ensure that there is no excess buildup, uncovered areas, or rough areas on the pavement surface including the longitudinal and transverse joints. The RE will visually inspect the pavement for approval. The RE may reject areas of pavement that are unsatisfactory based on visual inspection. Correct areas of the pavement that the RE rejects. Visual inspection by the RE is considered sufficient grounds for such rejection.

The RE may use a 10 foot straightedge to verify transverse profiles of finished surfaces. Correct areas that have more than 1/4 inch deviation between any 2 contact points of the straightedge in a manner approved by the RE. Following correction, retest the area to verify conformance with this requirement.

J. Ride Quality Requirements. The Department will evaluate the final surface placed in the traveled way as specified in 401.03.03.J.

421.03.04 Slurry Seal

A. Slurry Seal Plan. At least 20 days before beginning placement of slurry seal, submit a detailed plan of operation to the RE for approval as specified in 421.03.03.A

B. Weather Limitations. Place slurry seal in weather as specified in 421.03.03.B.

C. Test Strip. Construct a test strip as specified in 421.03.03.C.

D. Surface Preparation. Prior to starting slurry seal, prepare the existing surface as specified in 421.03.03.D.

E. Slurry Seal Application. Apply the slurry seal mixture as specified in 421.03.03.E, except that application rate should be as specified in table 421.03.04-1.

Table 421.03.04-1 Job Mix Types and Application		
Aggregate Type (See Table 902.10.03-1)	**Location**	**Application Rate (lbs./yd^2)**
Type I	Surface Course Intermediate Course	10 - 14
Type II	Surface Course Intermediate Course	16 – 20

1. International Slurry Seal Association (ISSA)

F. Compaction. Roll slurry seal as specified in 421.03.03.F.

G. Opening to Traffic. Open to traffic as specified in 421.03.03.G.

H. Applying Striping and Traffic Markings. Apply traffic striping and traffic markings as specified in 421.03.03.H.

I. Surface Quality Requirements. The Department will evaluate the surface quality of slurry seal as specified in 421.03.03.I.

J. Ride Quality Requirements. The Department will evaluate the final surface placed in the traveled way as specified in 401.03.03.J.

421.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
MICRO SURFACING AGGREGATE, TYPE II	TON
MICRO SURFACING AGGREGATE, TYPE III	TON
MICRO SURFACING AGGREGATE, TYPE III RUT-FILLING	TON
MICRO SURFACING EMULSION	GALLON
SLURRY SEAL AGGREGATE, TYPE I	TON
SLURRY SEAL AGGREGATE, TYPE II	TON
SLURRY SEAL EMULSION	GALLON
MICROPAVING JOINTS	LINEAR FOOT

The Department will make payment for TACK COAT as specified in 401.04.

The Department will make payment for REMOVAL OF TRAFFIC STRIPES, REMOVAL OF TRAFFIC MARKINGS, TRAFFIC STRIPES, and TRAFFIC MARKINGS as specified in 610.04.

The Department will measure MICRO SURFACING EMULSION and SLURRY SEAL EMULSION by the volume delivered, converted to the number of gallons at 60 °F as calculated by the temperature-volume correction factors specified in 902.01, with the exception that micro surfacing emulsion required for MICROPAVING JOINTS is included in the price per linear foot.

The Department will measure MICRO SURFACING AGGREGATE TYPE II, MICRO SURFACING AGGREGATE TYPE III, MICRO SURFACING AGGREGATE TYPE III RUT-FILLING, SLURRY SEAL AGGREGATE TYPE I, and SLURRY SEAL AGGREGATE TYPE II by the ton as indicated on the certified weigh tickets, excluding unused material.

SECTION 422–FOG SEAL

422.01 DESCRIPTION

This section describes the requirements for furnishing and applying a fog seal surface treatment with a fine aggregate cover. This section also describes the requirements for applying a fog seal strip over centerline rumble strips (CLRS) and HMA longitudinal cold joints.

422.02 MATERIALS

422.02.01 Materials

Provide materials as specified:

Fine Aggregate for Fog Seal 901.07.02

1 **Asphalt Emulsion.** For fog seal surface treatment, fog seal of centerline rumble strips and HMA longitudinal cold joint provide emulsified asphalt of grades SS-1, SS-1h, RS-1 or RS-2 in accordance with AASHTO M 140; or provide cationic emulsified asphalt of grades CSS-1, CSS-1h, CRS-1, or CRS-2 in accordance with AASHTO M 208; and ensure all emulsified asphalts are provided as specified in 902.01.03.

2 **Polymerized Maltene Emulsion.** As an alternative for asphalt emulsion specified above for fog seal strip of centerline rumble strips and HMA longitudinal cold joints, provide JOINTBOND® emulsion. JOINTBOND® is proprietary to Pavement Technology, Inc. of Westlake, OH, telephone number (800)333-6309. For new pavements, use JOINTBOND®. For pavements that are more than 12 months old, use JOINTBOND® PM.

Slow setting emulsified asphalts may be diluted 1 part emulsion to 1 part water. All dilution must be done at the place of manufacture.

Other emulsified asphalt designed specifically for fog sealing may be used if approved by the Bureau of Materials. Determine the application rate by the amount of residual asphalt required as specified in 422.03.01.E.

422.02.02 Equipment

Provide equipment as specified:

Bituminous Material Distributor 1003.07
Mechanical Sweeper 1008.03
Mechanical Fine Aggregate Spreader 1012.02

422.03 CONSTRUCTION

422.03.01 Fog Seal Surface Treatment

A. Fog Sealing Plan. At least 20 days before beginning placement of fog sealing, submit a detailed plan of operation to the RE for approval that includes the following:

1. Fog sealing contractor's superintendent's qualifications with a list of at least 5 successful projects, including project owner contact information.
2. Size and description of crew.
3. Number, type, model of equipment and material control/metering devices along with the current calibration documentation.
4. Fog seal material type, dilution amount, manufacturer, MSDS, handling and installation guidelines, weather limitations and Quality Control plan.
5. Lighting plan for nighttime operations as specified in 108.06 for paving.
6. Schedule, hours of operation, and production rates for the Project.
7. Plant or storage locations for fog sealing emulsion, sand and additives.
8. Method of maintaining fog-sealing emulsion temperature during transportation and operation.
9. Quality control plan outlining the material testing, number and frequency planned in order to ensure compliance.
10. Method of protecting manholes, valve boxes, drop inlets and other service entrances are protected from the fog sealing.
11. Method of protecting RPMs from fog sealing

Do **not** begin fog sealing until the RE approves the plan. Submit an adjusted fog sealing plan to the RE for approval before making adjustments to the fog sealing operation.

B. Weather Limitations. If within the 3 hours of fog sealing, the National Weather Service locally forecasts a 40 percent chance or greater of precipitation during the scheduled placement, postpone the placement of fog seal. Do not fog seal if it is precipitating or when precipitation is imminent. The Contractor may resume fog sealing operations when the chance of precipitation is less than 40 percent, and the surface is dry.

Do not place fog sealing if the surface temperature of the underlying pavement is below 50 °F.

C. Test Strip. Construct a test strip of at least 100 feet in length on the roadway before initial placement commences. Ensure the test strip is performed during weather and sunlight conditions which will represent project production placement of the fog sealing mixture. While constructing the test strip, record the following information and submit to the RE:

1. **Ambient Temperature.** Measure the ambient temperature at the beginning and end of the fog sealing operation.
2. **Base Temperature.** Measure the surface temperature of the existing pavement at the beginning and end of the fog sealing operation.
3. **Weather Conditions.** Document the wind speed, weather conditions, time of day, and humidity at the time of placement.
4. **Emulsion Temperature**. Measure the temperature of the emulsion in the distributor truck. Ensure that the emulsion is heated to the optimum application temperature as per the manufacturer prior to starting.
5. **Application Rate Verification.** With the RE present, check the application rate setting in the bituminous material distributor. With the RE present, verify the temperature of the fog sealing mixture during placement. With the RE present, verify application rate calibration using ASTM test method D2995 except that the tiles should be 3 feet by 3 feet in dimension. After the emulsion has completely cured, weigh the tiles again to verify asphalt residual.
6. **Set Time.** Record the initial time of placement. Notify the RE when the material has completely set and is ready to be opened to traffic.
7. **Performance Under Traffic.** Do not allow traffic on the fog seal until it has completely cured. Verify that the fog sealing shows no visual signs of distress when exposed to traffic.

Upon completion of the test strip, submit test strip documentation to the RE. The RE will review the test strip documentation and visually assess the coverage of the fog seal application. Do not proceed with production fog sealing until receiving approval from the RE.

Before making adjustments to the fog sealing operations, notify the RE in writing. The RE may require a new test strip to verify the performance of the adjusted fog sealing operations.

D. Surface Preparation. Ensure all repairs and rumble strips are completed prior to beginning fog seal installation. Clean the surface of existing pavement to remove all dust debris, oil and any other materials that may prevent bonding of the fog seal. Ensure that the surface is clean and dry. Remove traffic stripes and traffic markings as specified in 610.03.08.

Ensure that manholes, inlets, utilities, curbs, RPM's, structures, traffic striping, and traffic markings to remain are protected from the fog seal by methods approved by the RE. Do not proceed with placement of the fog seal until the RE approves the prepared surface.

E. Fog Sealing Application. Ensure that the temperature of the emulsion prior to starting is at the application temperature recommended by the manufacturer but not exceeding 160 °F. Apply the fog seal uniformly at the rate determined during the test strip to provide a residual asphalt of between 0.06 to 0.10 gallons per square yard using a bituminous distributer.

Ensure that the fog seal material completely covers the pavement surface and is not streaked or ribboned. Ensure that the distribution is even with no uncoated areas or puddles of excess emulsion. Correct uncoated or lightly coated areas by applying additional fog seal emulsion. Blot areas showing an excess of fog seal with sand approved by the RE. Remove excess sand and emulsion material. In areas inaccessible to distributor spray bars, use hand spraying equipment.

The RE may reject areas where fog seal has been applied that is uncoated, ribboned, streaked or has excess emulsion material and rendered unsatisfactory. Visual inspection by the RE is considered sufficient grounds for such rejection.

F. Fine Aggregate Application. Immediately after the fog seal has been applied, apply fine aggregate at a rate of 0.25 to 0.5 pounds per square yard. Ensure sand is applied uniformly over the area where fog seal has been applied. Remove excess material by sweeping prior to opening to traffic.

The RE may reject areas where fine aggregate has been applied that is not sufficiently covered or has excess fine aggregate material and rendered unsatisfactory. Visual inspection by the RE is considered sufficient grounds for such

rejection.

G. Opening to Traffic. Allow the material sufficient curing time, as recommended by the manufacturer, before opening to traffic. Sweep to remove loose and excess aggregate by methods approved by and to the satisfaction of the RE before opening to traffic.

H. Applying Striping and Traffic Markings. Allow fog seal to cure for at least 2 weeks before applying permanent traffic striping and traffic markings. Use temporary traffic striping and markings as directed by the RE until the fog seal has cured.

I. Surface Quality Requirements. Ensure that there is no excess buildup, uncovered areas, or rough areas on the fog seal. The RE will visually inspect the fog seal for approval. The RE may reject areas of fog seal that are unsatisfactory based on visual inspection. Areas where fog seal has been applied that do not have sufficient aggregate cover or have excess aggregate material may be rendered unsatisfactory. Correct areas of the fog seal that the RE rejects. Visual inspection by the RE is considered sufficient grounds for such rejection.

422.03.02 Fog Seal Strip

A. Fog Sealing Plan. At least 20 days before beginning placement of fog sealing, submit a detailed plan of operation to the RE for approval as specified in 422.03.01.A.

B. Weather Limitations. Fog seal in weather as specified in 422.03.01.B.

C. Test Strip. Construct a test strip of at least 100 feet in length on the roadway before initial placement commences as specified in 422.03.01.C, except that the tiles as specified in 422.03.01.C.5 should be 2 feet by 2 feet in dimension.

D. Surface Preparation. Prepare the existing surface as specified in 422.03.01.D. When using polymerized maltene emulsion, the Contractor may leave the existing traffic stripes and traffic markings in place and may install new traffic stripes and markings as specified in 601.03 prior to fog seal.

E. Fog Sealing Application. Ensure that the temperature of the asphalt emulsion prior to starting is at the application temperature recommended by the manufacturer but not exceeding 160 °F. If using asphalt emulsion, apply the fog seal uniformly at the rate determined during the test strip to provide a residual asphalt of between 0.06 to 0.10 gallons per square yard using a bituminous distributer. If using polymerized maltene emulsion, apply according to manufacturer's recommendations.

Apply fog seal in a 2 feet wide strip centered over the center line rumble strip or HMA longitudinal cold joint, ensuring complete coverage of the rumble strip or HMA longitudinal cold joint. Ensure that the fog seal material completely covers the pavement surface and is not streaked or ribboned. Ensure that the distribution is even with no uncoated areas or puddles of excess emulsion. Correct uncoated or lightly coated areas by applying additional fog seal emulsion. Blot areas showing an excess of fog seal with sand approved by the RE. Remove excess sand and emulsion material. In areas inaccessible to distributor spray bars, use hand spraying equipment.

The RE may reject areas where fog seal has been applied that is uncoated, ribboned, streaked or has excess emulsion material and rendered unsatisfactory. Visual inspection by the RE is considered sufficient grounds for such rejection.

F. Applying Striping and Traffic Markings. If using asphalt emulsion, place striping as specified in 159.03.06 prior to opening to traffic. If permanent striping was not applied prior to fog sealing, allow fog seal to cure for at least 2 weeks before applying permanent traffic striping and traffic markings.

G. Opening to Traffic. Open to traffic as specified in 422.03.01.G.

H. Surface Quality Requirements. Ensure fog seal strip meets the requirements specified in 422.03.01.I.

422.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
FOG SEAL SURFACE TREATMENT	GALLON
FOG SEAL STRIP	LINEAR FOOT

The Department will make payment for REMOVAL OF TRAFFIC STRIPES and REMOVAL OF TRAFFIC MARKINGS as specified in 610.04.

The Department will make payment for TRAFFIC STRIPES, ___" as specified in 610.04.

The Department will measure FOG SEAL SURFACE TREATMENT by volume of residual asphalt by converting the quantity of emulsion to the number of gallons at 60 °F as calculated by the temperature-volume correction factors specified in 902.01 and then multiplying by the % residual asphalt in the emulsion from the certificate of compliance from the manufacturer.

SECTION 504 – STRUCTURAL CONCRETE

504.02.01 Materials
THE FOLLOWING MATERIAL REFERENCE IS CHANGED TO:

Grit for Epoxy Waterproofing..... 901.07.01

SECTION 901 – AGGREGATES

THE ENTIRE SUBSECTION IS CHANGED TO:

901.07 GRIT

901.07.01 Grit for Epoxy Waterproofing. Use grit for spreading over the epoxy waterproofing that is a subangular, natural, 98 percent silica sand. Ensure that 90 percent of the total sample by weight falls between the No. 4 and No. 30 sieves, with 0 percent passing the No. 30 sieve.

901.07.02 Fine Aggregate for Fog Seal. Use fine aggregate for spreading over fog seal that conforms to 901.05.02 and the gradation requirements in Table 901.07.02-1:

Table 901.07.02-1 Gradation Requirements for Fine Aggregate used on Fog Seal

Sieve Size	Percent Passing
No. 8	100
No. 16	90 - 100
No. 50	70- 100
No. 200	0 - 2

SECTION 902 – ASPHALT

THE FOLLOWING SUBSECTIONS ARE ADDED

902.09 MICRO SURFACING

902.09.01 Composition of the Mixture

Ensure that the micro surfacing mixture components conform to the following:

1. **Micro Surfacing Emulsion.** Use polymer modified emulsified asphalt. Ensure that the emulsified asphalt and emulsified asphalt residue is a quick set polymer modified asphalt emulsion conforming to the requirements of AASHTO M 208 for a CQS-1h emulsion and the following:
    a. Use a minimum of 3 percent polymer material, by weight of asphalt.
    b. Ensure that the polymer material is milled or blended into the asphalt prior to the emulsification process by an emulsion manufacturer approved by the ME.

c. Ensure that the polymer modifier and any additives enable the micro surfacing material to receive normal traffic within one hour without causing damage to the surface. The cement mixing test is waived for this emulsion. .

d. Ensure that the emulsified asphalt and the emulsified asphalt residue meet all of the quality test criteria in section 4.1.2 of the International Slurry Surfacing Association (ISSA) "Recommended Performance Guideline for Micro Surfacing"; A 143

2. **Aggregate.** Use only manufactured stone sand and crushed stone that conform to 901.05. Ensure that the fine aggregate has a Sand Equivalent value of 65 percent minimum when tested according to AASHTO T 176.

3. **Mineral Filler.** Use mineral filler that conforms to ASTM D 242 and is free of lumps.

4. **Water.** Use water that conforms to 919.08.

5. **Other Additives.** The Contractor may use other additives to provide control of the break/set time in the field. Ensure that the type of additive is specified in the mix design.

902.09.02 Mix Design of Micro Surfacing Mixture

A. Mix Design Requirements. Ensure that an AASHTO accredited lab, with at least five successfully completed micro surfacing projects greater than 5,000 square yards each, performs the mix design. Submit the mix design and certified test results of the micro surfacing mixture for approval in accordance with the provisions of ASTM D 6372, Standard Practice for Design, Testing, and Construction of Micro Surfacing and the following:

1. Ensure that the aggregate used in the job mix formula is from the same source and representative of the material proposed for use on the project.
2. Ensure that the compatibility of the aggregate, micro surfacing emulsion, water, mineral filler, and other additives is evaluated in the mix design. Perform the mix design using materials consistent with those supplied by the contractor for the project. Ensure the micro surfacing mix conforms to the requirements as specified in Table 902.09.02-1.

902.09.02-1 Micro Surfacing Mixture Requirements

Tests	ISSA Test Method	Specification
Mix Time @ 77 °F Mix Time @ 100 °F	TB 113	Controllable to 120 seconds minimum Controllable to 35 seconds minimum
Wet Cohesion @ 30 minutes minimum (set) @ 60 minutes minimum (traffic)	TB 139	 12 kg-cm minimum 20 kg-cm or near spin minimum
Wet Stripping	TB 114	90 % minimum
Wet-Track Abrasion Loss One-hour soak Six-day soak	TB 100	 50 g/ft^2 (538 g/m^2) maximum 75 g/ft^2 (807 g/m^2) maximum
Lateral Displacement	TB 147	5% maximum
Specific Gravity after 1,000 cycles of 125 pounds (56.71 kg)	TB 147	2.10 maximum
Excess Asphalt by LWT Sand Adhesion	TB 109	50 g/ft^2 (538 g/m^2) maximum
Classification Compatibility	TB 144	11 grade points minimum (AAA, BAA)

3. Ensure proportioning of the mix design is within the limits in Table 902.09.02-2:

Table 902.09.02-2 Mix Design Proportion Requirements

Component Materials	Limits
Residual asphalt	5.5 to 11.5% by dry weight of aggregates
Mineral filler	0.0 to 3% by dry weight of aggregates
Polymer-based modifier	min. of 3% polymer solids based on bitumen weight content
Additives	as needed
Water	as required to ensure proper mix consistency

4. Ensure that the proportions of aggregate and mineral filler are provided and within the limits of Table 902.09.03-1.

B. Mix Design Report. Submit the final mix design in the following format:

1. Source of each individual material.
2. Aggregate:
   a. Gradation
   b. Sand Equivalent
   c. Abrasion Resistance
   d. Soundness
3. Field Simulation Tests:
   a. Wet Stripping Test
   b. Wet Track Abrasion Loss
   c. Classification Compatibility
   d. Trial Mix Time @ 77 °F and 100 °F
4. Interpretation of Results and the Determination of a Job Mix Formula (JMF):
   a. Percentage of Mineral Filler (minimum and maximum)
   b. Percentage of Water, including aggregate moisture (minimum and maximum)
   c. Percentage of Mix Set Additive (if required)
   d. Percentage of Modified Emulsion
   e. Residual Content of Modified Emulsion
   f. Percentage of Residual Asphalt
   g. Combined Aggregate Gradation (JMF)
5. Signature and date

902.09.03 Sampling and Testing

The ME will perform sampling and testing of the aggregate at least 10 days prior to the start of work. The ME will sample aggregate from stockpiles designated and constructed for each mixture type on the project. The ME will sample the aggregate according to AASHTO T 2 and test according to AASHTO T 11 and T 27 using the following sampling frequency:

1. When the project quantity for the specified mixture type is less than 500 tons, designate the entire quantity as one lot and divide into three equal sublots for sampling. Obtain one sample from each sublot and submit to the ME for testing. The ME will randomly select only one of the three samples and test for compliance with Table 902.09.03-1. If the sample tested meets the specification, the entire lot is acceptable for use on the project. If the sample fails, the ME will test the remaining two samples. If the two samples both meet specification, the entire lot is acceptable for use on the project. If either of the two additional samples fails to meet the specification, the entire lot is rejected.
2. When the project quantity for the specified mixture type is 500 tons or greater, divide the aggregate into equal lots at the discretion of the ME, but in no case is the lot size to exceed 1,000 tons. Divide each lot into three equal sublots and obtain one sample for each sublot. The ME will randomly select only one of the three samples and test for compliance with Table 902.09.03-1. If the sample tested meets the specification, the entire lot is acceptable for use on the project. If the sample fails, the ME will test the remaining two samples. If the two samples both meet specification, the entire lot is acceptable for use on the project. If either of the two additional samples fails to meet the specification, the entire lot is rejected.

Take precautions to ensure that approved stockpiles of aggregate do not become contaminated at the jobsite. Screen oversize aggregate or foreign materials from the aggregate prior to delivery to the mixer.

During the micro surfacing application, in the presence of the inspector, sample the mixture twice daily or as directed from the pug mill discharge chute. Use a rectangular non-absorptive container, such as a loaf pan, of sufficient size to obtain a sample from the entire cross section of the mixture being discharged. Ensure that an AASHTO accredited lab, with at least five successfully completed micro surfacing projects greater than 5,000 square yards each, analyzes the mix for binder content and compliance with specifications. Submit certified results to the ME. The ME may perform independent testing.

Ensure that the asphalt content is within ± 0.40 of the JMF. If the asphalt content is outside of the allowable tolerance,

recalibrate or adjust the mixing machine. The RE may stop the micro surfacing operation if two or more samples fail to conform to the tolerance. Take corrective action or re-design the micro surfacing mixture. Resume operations only after RE has approved the corrective action.

Use aggregate, including mineral filler, which conforms to the gradation in Table 902.09.03-1.

Table 902.09.03-1 Gradation Requirements for Aggregate and Mineral Filler

Sieve Size	Type II Percent Passing	Type III Percent Passing	Stockpile Tolerances from JMF
3/8"	100	100	-
No. 4	90-100	70-90	±5%
No. 8	65-90	45-70	±5%
No. 16	45-70	28-50	±5%
No. 30	30-50	19-34	±5%
No. 50	18-30	12-25	±4%
No. 100	10-21	7-18	±3%
No. 200	5-15	5-15	±2%

902.10 SLURRY SEAL

902.10.01 Composition of the Mixture

Ensure that the slurry seal mixture components conform to the following:

1. **Slurry Seal Emulsion.** Use polymer modified emulsified asphalt. Ensure that the emulsified asphalt and emulsified asphalt residue is a quick set polymer modified asphalt emulsion conforming to the requirements of AASHTO M 208 for a CQS-1h emulsion and the following:
    a. Use a minimum of 3 percent polymer material, by weight of asphalt.
    b. Ensure that the polymer material is milled or blended into the asphalt prior to the emulsification process by an emulsion manufacturer approved by the ME.
    c. Ensure that the polymer modifier and any additives enable the slurry seal material to receive normal traffic within one hour without causing damage to the surface.
    d. Ensure that the emulsified asphalt and the emulsified asphalt residue material conform to the requirements in table 902.10.01-1.

902.10.01-1 Emulsified Asphalt and Residue Requirements

Tests	Test Method	Specification
Tests on Emulsified Asphalt		
Storage Stability, 24 hours, percent	AASHTO T 59	1 % maximum
Residue by Distillation[1], percent	AASHTO T 59	62 % minimum
Tests on Asphalt Residue		
Softening Point by Ring and Ball	AASHTO T 53	135 °F minimum

1. Test temperature held at 350 °F for 20 minutes.

2. **Aggregate.** Use only manufactured stone sand and crushed stone that conform to 901.05. Ensure that the fine aggregate has a Sand Equivalent value of 45 percent minimum when tested according to AASHTO T 176.

3. **Mineral Filler.** Use mineral filler that conforms to ASTM D 242 and is free of lumps.

4. **Water.** Use water that conforms to 919.08.

5. **Other Additives.** The Contractor may use other additives to provide control of the break/set time in the field. Ensure that the type of additive is specified in the mix design.

902.10.02 Mix Design of Slurry Seal Mixture

A **Mix Design Requirements.** Ensure that an AASHTO accredited lab, with at least five successfully completed slurry seal projects greater than 5,000 square yards each, performs the mix design. Submit the mix design and certified test results of the slurry seal mixture for approval in accordance with the provisions of ASTM D 3910, Standard Practice for Design, Testing, and Construction of Slurry Seal and the following:

1. Ensure that the aggregate used in the job mix formula is from the same source and representative of the material proposed for use on the project.
2. Ensure that the compatibility of the aggregate, slurry seal emulsion, water, mineral filler, and other additives is evaluated in the mix design. Perform the mix design using materials consistent with those supplied by the contractor for the project. Ensure the slurry seal mix conforms to the requirements as specified in Table 902.10.02-1.

902.10.02-1 Slurry Seal Mixture Requirements

Tests	ISSA Test Method	Specification
Mix Time @ 77 °F Mix Time @ 100 °F	TB 113	Controllable to 120 seconds minimum Controllable to 35 seconds minimum
Slurry Seal Consistency	TB 106	0.79 to 1.18 inches
Wet Cohesion @ 30 minutes minimum (set) @ 60 minutes minimum (traffic)	TB 139	 12 kg-cm minimum 20 kg-cm or near spin minimum
Wet Stripping	TB 114	90 % minimum
Wet-Track Abrasion Loss One-hour soak Six-day soak	TB 100	 50 g/ft^2 (538 g/m^2) maximum 75 g/ft^2 (807 g/m^2) maximum
Lateral Displacement	TB 147	5% maximum
Specific Gravity after 1,000 cycles of 125 pounds (56.71 kg)	TB 147	2.10 maximum
Excess Asphalt by LWT Sand Adhesion	TB 109	50 g/ft^2 (538 g/m^2) maximum
Classification Compatibility	TB 144	11 grade points minimum (AAA, BAA)

3. Ensure proportioning of the mix design is within the limits in Table 902.10.02-2:

Table 902.10.02-2 Mix Design Proportion Requirements

Component Materials	Limits
Residual asphalt	7.5 to 13.5% by dry weight of aggregates
Mineral filler	0.0 to 3% by dry weight of aggregates
Polymer-based modifier	min. of 3% polymer solids based on bitumen weight content
Additives	as needed
Water	as required to ensure proper mix consistency

4. Ensure that the proportions of aggregate and mineral filler are provided and within the limits of Table 902.10.03-1.

B Mix Design Report. Submit the final mix design in the following format:

1. Source of each individual material.
2. Aggregate:
   a. Gradation
   b. Sand Equivalent
   c. Abrasion Resistance
   d. Soundness
3. Field Simulation Tests:
   a. Wet Stripping Test
   b. Wet Track Abrasion Loss
   c. Classification Compatibility
   d. Trial Mix Time @ 77 °F and 100 °F
4. Interpretation of Results and the Determination of a Job Mix Formula (JMF):
   a. Percentage of Mineral Filler (minimum and maximum)
   b. Percentage of Water, including aggregate moisture (minimum and maximum)
   c. Percentage of Mix Set Additive (if required)
   d. Percentage of Modified Emulsion

e. Residual Content of Modified Emulsion
f. Percentage of Residual Asphalt
g. Combined Aggregate Gradation (JMF)

5. Signature and date

902.10.03 Sampling and Testing

The ME will perform sampling and testing of the aggregate at least 10 days prior to the start of work. The ME will sample aggregate from stockpiles designated and constructed for each mixture type on the project. The ME will sample the aggregate according to AASHTO T 2 and test according to AASHTO T 11 and T 27 using the following sampling frequency:

1. When the project quantity for the specified mixture type is less than 500 tons, designate the entire quantity as one lot and divide into three equal sublots for sampling. Obtain one sample from each sublot and submit to the ME for testing. The ME will randomly select only one of the three samples and test for compliance with Table 902.10.03-1. If the sample tested meets the specification, the entire lot is acceptable for use on the project. If the sample fails, the ME will test the remaining two samples. If the two samples both meet specification, the entire lot is acceptable for use on the project. If either of the two additional samples fails to meet the specification, the entire lot is rejected.
2. When the project quantity for the specified mixture type is 500 tons or greater, divide the aggregate into equal lots at the discretion of the ME, but in no case is the lot size to exceed 1,000 tons. Divide each lot into three equal sublots and obtain one sample for each sublot. The ME will randomly select only one of the three samples and test for compliance with Table 902.10.03-1. If the sample tested meets the specification, the entire lot is acceptable for use on the project. If the sample fails, the ME will test the remaining two samples. If the two samples both meet specification, the entire lot is acceptable for use on the project. If either of the two additional samples fails to meet the specification, the entire lot is rejected.

Take precautions to ensure that approved stockpiles of aggregate do not become contaminated at the jobsite. Screen oversize aggregate or foreign materials from the aggregate prior to delivery to the mixer.

During the slurry seal application, in the presence of the inspector, sample the mixture twice daily or as directed from the pug mill discharge chute. Use a rectangular non-absorptive container, such as a loaf pan, of sufficient size to obtain a sample from the entire cross section of the mixture being discharged. Ensure that an AASHTO accredited lab, with at least five successfully completed slurry seal projects greater than 5,000 square yards each, analyzes the mix for binder content and compliance with specifications. Submit certified results to the ME. To ensure mix compliance, the ME may perform independent testing.

Ensure that the asphalt content is within ± 0.40% of the JMF. If the asphalt content is outside of the allowable tolerance, recalibrate or adjust the mixing machine. The RE may stop the slurry seal operation if two or more samples fail to conform to the tolerance. Take corrective action or re-design the slurry seal mixture. Resume operations only after RE has approved the corrective action.

Use aggregate, including mineral filler, which conforms to the gradation in Table 902.10.03-1.

Table 902.10.03-1 Gradation Requirements for Aggregate and Mineral Filler

Sieve Size	Type I Percent Passing	Type II Percent Passing	Type III Percent Passing	Stockpile Tolerances from JMF
3/8”	100	100	100	-
No. 4	100	90-100	70-90	±5%
No. 8	90-100	65-90	45-70	±5%
No. 16	65-90	45-70	28-50	±5%
No. 30	40-65	30-50	19-34	±5%
No. 50	25-42	18-30	12-25	±4%
No. 100	15-30	10-21	7-18	±3%
No. 200	10-20	5-15	5-15	±2%

DIVISION 1000 – EQUIPMENT

THE FOLLOWING SECTION IS ADDED:

SECTION 1012 – PAVEMENT PRESERVATION EQUIPMENT

1012.01 Micro Surfacing and Slurry Seal Paver

Provide fully automated self-propelled continuous flow type equipment that is specifically designed, equipped, calibrated, and operated for mixing and spreading slurry seal and micro surfacing conforming to the approved mix design and application rate. Immediately correct defects that adversely affect the functioning of the equipment or quality of the mixture. Perform calibration in the presence of the ME. Ensure that the documentation includes an individual calibration of each material at various settings that can be related to the machine metering devices. Any component replacement affecting material proportioning requires that the machine be recalibrated. Do not use a machine on the project until the calibration has been completed and accepted. Ensure the paver is equipped with the following:

1. **Mixing Equipment.** Ensure that the machine is specifically designed and manufactured to mix micro surfacing and slurry seal materials. Mix the material in an automatic-sequenced, self-propelled, micro surfacing and slurry seal mixing machine. Ensure that it is a continuous-flow mixing unit that accurately proportions and delivers the mix components, within 2 % of the required amount as per the mix design, into a revolving multi-blade double-shafted mixer. Sufficient storage capacity for all mix components is required to maintain an adequate supply to the proportioning controls.

   Ensure that the machine is capable of loading materials while continuing to apply micro surfacing and slurry seal. Ensure that the continuous-run machine is equipped to provide the operator with full control of the forward and reverse speeds during application and is equipped with opposite-side driver stations to assist in alignment. Ensure that the self-loading device, opposite-side driver stations, and forward and reverse speed controls are of original-equipment-manufacturer design.

   Provide material control devices, readily accessible and so placed that the inspector may determine the amount of each material used at any time.

   Provide machine with a water pressure system and nozzle type spray bar to provide a water spray ahead of and outside the spreader box.

   Locate mineral filler feed so the proper amount of mineral filler is dropped on the aggregate before discharge into mixer.

2. **Spreading Equipment.** Provide spreading equipment that agitates and spreads the mixture uniformly in the surfacing box by means of twin shafted paddles or spiral augers fixed in the spreader box. Ensure that a front seal is provided such that there is no loss of the mixture at the road contact point. Ensure that there is an adjustable rear seal which will act as a final strike-off. Ensure that the spreader box and rear strike-off is designed and operated so that a uniform consistency is achieved and a free flow of material is provided to the rear strike-off. Ensure that the spreader box has suitable means provided to side shift the box to compensate for variations in the pavement geometry.

   Ensure that a secondary strike-off is provided to improve surface texture. Ensure that the secondary strike-off is adjustable to match the width of the spreader box and allows for varying pressures to control the surface texture.

3. **Electronic Mix Control and Diagnostic (EMCAD) System.** Ensure the paver is equipped with a computer mix control and diagnostic system that records, displays, and prints the following:

   1. Individual sensor counts for emulsion, aggregate, mineral filler, water, and additive.
   2. Aggregate, emulsion and mineral filler output in pounds per minute.
   3. Spread rate in pounds per square yard.
   4. Percentages of emulsion, mineral filler, water, and additive.
   5. Cumulative total quantities of aggregate. Emulsion, mineral filler, water, and additive.
   6. Scale factor for all materials.

   Ensure the computer system is functional and capable of printing reports.

4. **Rut, Longitudinal Joint and Rumble Strip Filling Equipment.** Provide rut filling equipment with a steel V-configuration screed rut box commercially designed and manufactured to fill ruts as required. Ensure that the rut box can be adjusted to provide a mixture spread width of between 2 feet to 6 feet and have a moveable steel strike-off to control crown.

1012.02 Mechanical Fine Aggregate Spreader

Provide fully automated self-propelled fine aggregate spreading equipment with positive controls that is specifically designed, equipped, calibrated, and operated for spreading fine aggregate uniformly at the required width and application rate. Immediately correct defects that adversely affect the functioning of the equipment or quality of the fine aggregate application. Perform calibration in the presence of the ME. Ensure that the calibration documentation includes the fine aggregate at various application rate settings that can be related to the machine metering devices. Any component replacement affecting application rate requires that the machine be recalibrated. Do not use a machine on the project until the calibration has been completed and accepted.

Implementation Code R (ROUTINE)

Changes must be implemented in all applicable Department projects scheduled for Final Design Submission at least one month after the date of the BDC announcement. This will allow designers to make necessary plan, specifications, and estimate/proposal changes without requiring the need for an addenda or postponement of advertisement or receipt of bids.

Recommended By:

Richard Jaffe, P.E.
Director
Capital Program Support

Approved By:

Richard T. Hammer
Assistant Commissioner
Capital Program Management

RJ: KS: HP
BDC15S-01.doc