



Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS FOR POLYMER-MODIFIED MICROSURFACING

Effective Date
January 16, 2008

THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

01055.01 DESCRIPTION.

This work consists of applying a properly proportioned, mixed, and uniformly spread mixture of polymer-modified emulsified asphalt, mineral aggregate, mineral filler, water, and necessary additives on existing roadway surfaces.

01055.02 MATERIALS.

A. Polymer-Modified Emulsified Asphalt.

Polymer-Modified Emulsified Asphalt shall be a blend of CSS-1H emulsified asphalt and latex-based polymer. The polymer-modified emulsified asphalt shall be a quick-set polymer-modified CSS-1H.

The polymer material shall be milled or blended into asphalt or blended into emulsifier solution prior to emulsification process.

The amount and type of latex-based polymer modifier shall be determined by the laboratory performing the mix design. The amount required shall be based on the percent of asphalt by weight (mass) of asphalt, and 3% polymer solids shall be considered minimum. The Contractor shall provide to the Engineer at the time of delivery a certification from the emulsion manufacturer that 3% minimum polymers have been added to the emulsion.

The polymer-modified emulsified asphalt shall be CSS-1H and shall conform to the requirements of AASHTO M 208, with the following modifications and additions:

The storage stability and cement mixing test is not required for this emulsion.

TEST
AASHTO T 59

QUALITY
Residue after distillation

REQUIREMENTS
62% minimum

The standard distillation procedure shall be modified as follows:

The temperature on the lower thermometer shall be brought slowly to 350°F +/- 10°F (177°C +/- 5°C) and maintained at this level for 20 minutes. The total distillation shall be completed in 60 minutes +/- 5 minutes from the first application of heat.

TEST ON RESIDUE		
AASHTO T 53	Ring and Ball Softening Point	135°F (57°C) minimum

B. Aggregate.

The mineral aggregate shall be composed of a combination of crushed stone and mineral filler meeting the following requirements:

Crushed stone shall be produced from sources with an abrasion loss not greater than 30% and a freezing-and-thaw loss of not greater than 10 (Iowa Materials Laboratory Test Method 211, Method A) when tested using aggregate crushed to 3/4 inch (19 mm) maximum size. It shall be free of deleterious materials. The aggregate shall be of Type 2 or Type 3 friction classification in accordance with Materials I.M. T-203. The aggregate shall have a sand equivalent of not less than 60, as determined in accordance with AASHTO T 176.

The job mix (target) gradation shall be within the gradation band specified. The percent passing shall not go from the high end to the low end of the range for any two consecutive screens.

Sieve Size	Percent Passing
3/8" (9.5 mm)	100
#4 (4.75 mm)	90-100
#8 (2.36 mm)	65-90
#16 (1.18 mm)	45-70
#30 (600 µm)	30-50
#50 (300 µm)	18-30
#100 (150 µm)	10-21
#200 (75 µm)	5-15

C. Mineral Filler.

The mineral filler shall meet the requirements for Type I Portland Cement in accordance with Section 4101 of the Standard Specifications, and shall be free of lumps.

D. Water.

The water shall be in accordance with Section 4102 of the Standard Specifications.

E. Additives.

Additives may be added to the emulsion mix or any of the component materials to provide control of the quick-set properties and increase adhesion. Additives must be included as part of the mix design and be certified as to their compatibility with other components of the mix.

F. Composition and Quality of Mixture.

An approved mix design will be required prior to beginning placement of the microsurfacing mixture. The Contractor shall be responsible for the designing and proportioning the mixture. The mix design shall be prepared by a laboratory having three years experience in designing microsurfacing. The microsurfacing mixture shall be designed in accordance with the International Slurry Surfacing Association (ISSA) guidelines. The proposed mix design shall be submitted to the Materials Bituminous Engineer in the Central Laboratory for approval with a copy to the District Materials

Engineer. The Central Laboratory will review the mix design within 14 calendar days. The proposed mix design shall include all test results, proportions of all ingredients of the mixture, and gradation of the aggregate proposed for use.

The mix design shall designate the proportions to be used within the following limits:

- Mineral aggregate for microsurfacing: 10-20 pounds per square yard (dry weight) (5-11 kg/m² (dry mass)).
- Polymer-Modified Emulsified Asphalt, P.M. CSS-1H: residual asphalt 6% to 12% by dry weight (mass) of aggregate.
- Mineral Filler: 0.5% to 3.0% by dry weight (mass) of aggregate.
- Water: as needed to provide proper consistency.

Microsurfacing mixture shall meet the following requirements:

<u>TEST</u>	<u>DESCRIPTION</u>	<u>REQUIREMENTS</u>
ISSA TB-139	WET COHESION @ 30 minutes (set) @ 60 minutes (traffic)	10 lb-in (12 kg-cm) minimum 17 lb-in (20 kg-cm) minimum
ISSA TB-109	Excess Asphalt by LWT	50 g/ft ² (538 g/m ²) maximum
ISSA TB-114	Wet Stripping	Pass (90% minimum)
ISSA TB-100	Wet Track Abrasion Loss One hour soak Six Day Soak	50 g/ft ² (538 g/m ²) maximum 75 g/ft ² (807 g/m ²) maximum
ISSA TB-147A	Lateral Displacement	5% maximum
	Specific Gravity after 1000 cycles of 125 lbs. (57 kg)	2.10 maximum
ISSA TB-144	Classification Compatibility	(AAA, BAA) 11 grade points minimum
ISSA TB-113	Mix Time @ 77°F (25°C)	Controllable to 120 sec. minimum

01055.03 CONSTRUCTION.

A. Equipment.

The spreading machine shall be designed and manufactured to perform microsurfacing work, including prewetting the surface. The material shall be mixed by an automatic sequenced, self-propelled microsurfacing mixing machine, able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive and water to a revolving multi-blade double shafted mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, control additive and water to ensure a constant flow of a homogeneous slurry mixture.

Individual volume or weight controls for proportioning each material to be added to the mix shall be provided. Each material control device shall be calibrated and properly marked.

The aggregate feed to the mixer shall be equipped with a revolution counter or similar device so that the amount of aggregate used may be determined at any time.

The emulsion pump shall be of a positive displacement type and shall be equipped with a revolution counter or similar device so that the amount of emulsion used may be determined at any time.

The mixing machine shall be equipped with a pressurized water system and a nozzle-type spray bar to provide water spray to the roadway surface immediately ahead of and outside the spreader box.

The mixing machine shall be equipped with fines feeder that delivers a uniform, positive, accurately-metered, predetermined amount of mineral filler at the same time and location that the aggregate is fed.

The Contractor shall calibrate the mixing unit in the presence of the Engineer prior to the start of construction.

The Contractor shall provide nurse trucks to ensure that legal axle loads are maintained and a steady rate of progress in the laying of the microsurfacing is made.

B. Weather Limitations.

The microsurfacing material shall be spread only when the temperature on a shaded portion of the existing surface is 50°F (10°C) and rising and when the weather is not foggy or rainy.

Microsurfacing material shall not be placed after October 1 without written permission from the Engineer.

C. Materials Handling.

Samples of individual materials and the microsurfacing mixture shall be furnished by the Contractor as specified in the contract documents.

1. Stockpiling of Aggregate.

The mineral aggregate shall be screened and weighed at the Contractor's stockpile prior to job site delivery. Precautions shall be taken to insure that stockpiles do not become contaminated with oversized rock, clay, and silt. Excess moisture which would interfere with the amount of asphalt required in producing the desired homogeneous mixture will not be permitted. The stockpile shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted.

2. Storage of Emulsion.

The polymer-modified emulsified asphalt shall be weighed by approved scales or may be measured by volume. The Contractor shall provide suitable storage facilities for the polymer-modified emulsified asphalt. The facilities shall be equipped to prevent water from entering the emulsion, and shall be adequately heated to prevent freezing of the polymer-modified emulsified asphalt.

D. Preparation of Surface.

The area to be microsurfaced shall be thoroughly cleaned of all vegetation, loose aggregate, soil tracked onto the roadway and other objectionable material immediately prior to placing microsurfacing.

E. Test Strip.

A minimum 300-foot (100 m) test section to determine surface characteristics and set time shall be constructed and approved by the Engineer prior to commencing paving operations. A portion of the test section shall be at least 3/4 inch (19 mm) thick.

F. Spreading.

When required by local conditions, the surface shall be prewetted at a rate to dampen the entire surface without any free-flowing water ahead of the spreader box. The rate of application of the fog spray shall be adjusted during the day to suit temperatures, surface texture, humidity, and dryness of the pavement.

The microsurfacing mixture shall be spread homogeneously and uniformly by a mechanical type spreader box (normally 10 to 13 feet (3 to 4 m) wide), equipped with rotating paddles or spiral augers to agitate and spread the material uniformly throughout the box. Flexible seals shall be in contact with the road to prevent loss of the mixture from the box. A secondary strike off shall be provided to improve the surface texture. The spreader shall be maintained to prevent the loss of the microsurfacing mixture during the surfacing of superelevated curves. The mixture shall be spread to fill all crack and minor surface irregularities and leave a neat appearing uniform non-skid application of the aggregate and asphalt on the surface.

All excess material that overruns in gutters shall be removed or squeegeed back onto the surface. All excess material shall be removed from ends of each day's run immediately.

1. Application Rate.

Surface treatment shall be placed at a minimum application rate of 20 pounds per square yard (11 kg/m²).

2. Finished Surface.

The Engineer will make inspections of the finished surface at any time. On any 30 square yards (25 m²) of surface area inspected, the Contractor shall comply with the following:

- a. No more than four tear marks greater than 1/2 inch (13 mm) wide and/or 4 inches (100 mm) long.
- b. No tear marks greater than 1 inch (25 mm) wide and 3 inches (75 mm) long.
- c. No transverse ripples or longitudinal streaks of 1/4 inch (6 mm) or more in depth.

3. Joints.

Longitudinal and transverse joints shall be constructed without any buildups, uncovered areas or unsightly appearance, and shall comply with the following requirements:

- a. Longitudinal joints on lane lines shall be placed with less than 2 inches (50 mm) overlap on adjacent passes and no more than 1/4 inch (6 mm) difference in elevation between the adjacent passes.
- b. Transverse joints shall be constructed with no more than 1/8 inch (3 mm) difference in elevation across the joint.

4. Edges.

Edges shall be placed neatly and uniformly along the roadway lane, shoulder and curb lines. Edges shall be placed flush with curbs. Edges shall be placed no more than +/- 2 inches (50 mm) horizontal variance in any 100 foot (30 m), along roadway lane and shoulder. At locations where

feathered microsurfacing is identified in the contract documents, +/- 2 inches (50 mm) edge variance shall be eliminated.

G. Opening to Traffic.

Microsurfacing shall be sufficiently cured so that it will not deform or be picked up by vehicle tires. The Contractor shall provide signs, barricades, and flaggers necessary to control traffic around the areas under construction. Damage to the microsurfacing due to premature opening to traffic shall be repaired by the Contractor at no additional cost to the Contracting Authority.

Microsurfacing treatment shall be placed to sustain traffic within 1 hour after placement. The Contractor shall schedule microsurfacing placement to ensure that the traffic lanes are opened to traffic 30 minutes before sundown of the same working day. When traffic is maintained, the entire roadbed shall be free of construction equipment during non-working hours.

01055.04 METHOD OF MEASUREMENT.

Microsurfacing will be measured by the Engineer as follows:

A. Aggregate for Microsurfacing.

Aggregate used in accepted portions of work will be measured by the weight (mass) of the individual loads in tons (megagrams). No deductions will be made for moisture naturally occurring in the aggregate. The quantity of mineral filler will be included with the aggregate quantity.

B. Preparation of Surface for Microsurfacing.

For the length of pavement prepared in accordance with the contract documents, the length shown in the contract documents will be considered the length of preparation of surface for microsurfacing.

C. Emulsified asphalt for Microsurfacing.

Emulsified asphalt including polymer latex modifier used in accepted portions of work will be measured by volume or by weight (mass). No deductions will be made for water in approved emulsion. The volume shall be corrected for temperature to 60°F (16°C).

Materials wasted after being used for calibration purposes will be included in quantities measured for payment, but the amount shall not exceed 5 tons (5 Mg) of aggregate and 100 gallons (375 L) of emulsified asphalt. The quantities of materials used for construction of a test strip will be included in the quantities of the respective bid items.

01055.05 BASIS OF PAYMENT.

Microsurfacing will be paid for as follows:

A. Aggregate for Microsurfacing.

For the number of tons (megagrams) of aggregate used, the Contractor will be paid the contract unit price per ton (megagram). This payment shall be full compensation for furnishing all labor, equipment, and materials (except emulsified asphalt) to complete the work and construction of the test strip.

B. Preparation of Surface for Microsurfacing.

For the length of pavement prepared for microsurfacing, in accordance with the contract documents, the length shown in the contract documents, in miles (kilometers), the Contractor will be paid the contract unit price per mile (kilometer).

C. Emulsified asphalt for Microsurfacing.

For the number of gallons (liters) of emulsified asphalt used, the Contractor will be paid the contract unit price per gallon (liter). This payment shall be full compensation for furnishing the emulsified asphalt.