

SECTION 331

MICROSURFACING SPECIFICATIONS

331.1 GENERAL:

The work covered by this specification consists of furnishing all labor, equipment, and materials for the application of a "quick traffic solid/polymer microsurface."

This specification covers the equipment and construction procedures for rut filling and/or resurfacing of existing paved surfaces. The microsurface shall be a mixture of cationic polymer modified asphalt emulsion, mineral aggregates, mineral filler, water and other additives properly proportioned, mixed and spread on the pavement surface in accordance with this specification and as directed by the Engineer.

331.2 MATERIALS:

The Contractor shall supply all materials necessary for the performance of the work in accordance with the specifications. The asphalt emulsion, aggregate, and mineral filler shall be as specified in Section 714. Materials shall be approved by the Engineer prior to the start of construction. Certificates of Compliance will accompany each delivery of emulsion.

The Contractor shall be responsible for the safety of all materials of which he has taken delivery until they are in place on the road, and shall take all necessary precautions to avoid loss by fire or theft, or damage by water, and shall bear the cost of replacing any such material that is lost, spilt, destroyed or damaged after delivery.

331.3 PROPORTIONING:

The microsurface shall be proportioned in accordance with the mix design. Calibrated sign flowmeters shall be provided to measure both the addition of water and additives to the pugmill. Emulsion and cement flow shall be tied directly to aggregate flow. All additive flows shall be calibrated.

331.3.1 Performance: The microsurface mixture shall be proportioned per the mix design to ensure:

(A) Trafficability - the material will permit controlled traffic without damage to the surface within thirty (30) minutes and uncontrolled traffic without damage within sixty (60) minutes, per Section 331.4.2.2.

(B) Prevent development of bleeding, raveling, separation or other distress for seven (7) days after placing the microsurface.

331.4 MIX DESIGN:

331.4.1 General:

331.4.1.1: The Contractor shall provide a job mix formula from an approved laboratory and present certified test results for the Engineer's approval. Compatibility of the aggregate and polymer modified emulsion shall be certified by the emulsion manufacturer. All the materials used in the job mix formula shall be representative of the materials proposed by the Contractor for use in the project.

331.4.1.2: All the products used in the construction shall have certifications from the suppliers and they shall be given to the Engineer upon delivery to the project.

331.4.1.3: Mix design and proportioning will be approved by the Engineer prior to the start of the project.

331.4.2: Specifications:

331.4.2.1: The Engineer shall approve the mix design prior to use. The specification limits are as follows:

| | |
|------------------------------|---------------------------------------|
| Residual Asphalt (ASTM D244) | 6% - 11.5% by dry weight of aggregate |
| Mineral Filler (ASTM C136) | 0.1% - 1% by dry weight of aggregate |
| Polymer Content/Type | 4% min. (see Section 714.4) |
| Additive | As required for mix properties |
| Water | As required for mix properties |
| Aggregate Grading | Meets Section 331.4.2.4 |
| Consistency (ISSA T-106) | 2.5 to 3.0 cm |
| Traffic Time | See Section 331.4.2.2 |
| Abrasion Loss (ISSA TB-100) | 75 g/ft ² maximum |
| Adhesion (ISSA TB-114) | 90% minimum |
| Loaded Wheel Sand Adhesion | See Section 331.4.2.3 |

331.4.2.2 Modified Cohesion Test (ISSA TB-139): Furnish laboratory test data

mounted mixing machine which shall be able to accurately deliver and proportion the aggregate, mineral filler, water, additive, and polymer-modified asphalt emulsion to a revolving multi-blade mixer capable of minimum speeds of 200 RPM and discharge the product on a continual flow basis. The machine shall have sufficient storage capacity for aggregate, polymer modified asphalt emulsion, mineral filler, water, and additive to maintain an adequate supply to the proportioning controls.

331.6.3 Material Control:

331.6.3.1 Calibration: Each mixing unit to be used in the performance of the work shall be calibrated prior to construction. Calibration data, if done within the calendar year, using the same material, may be used, providing a verification of the aggregate feed agrees.

Individual volume or weight controls for proportioning each material to be added to the mix shall be provided, and shall be accessible to the Engineer. Each material control device shall be calibrated prior to work and documented for inspection by the Engineer.

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

331.6.3.3 Emulsion Pump: The emulsion pump shall be the positive displacement type with a jacketed housing for uniform heating. A revolution counter or similar device shall be fitted so that the amount of emulsion used may be determined at any time.

331.6.3.4 Fines Feeder: An approved fines feeder is required that will provide a uniform, positive, accurately metered range of 0 to 1 percent by dry aggregate weight. The fines feeder shall have a counter so the amount of mineral filler can be determined at any time.

331.6.3.5 Liquid Additive: The mixing machine shall be equipped with a liquid additive system that provides a pre-determined amount of additive to the mixing chamber. This additive system must be equipped with a counter that can determine the amount used at any time.

331.6.3.6 Water System: The mixing machine shall be equipped with a water system that provides a pre-determined amount of water to the mixing chamber. This water system must be equipped with a counter that can determine the amount used at any time.

331.6.4 Operator Controls: Controls will allow the operator to sequence and proportion the material per the mix design.

331.6.5 Spray Bars: The mixing machine shall be equipped with a water pressure system that provides a water spray immediately ahead of and outside the spreader box.

331.6.6 Spreading Equipment:

331.6.6.1: The paving mixture shall be spread uniformly by means of mechanical type laydown box attached to the mixer, equipped with agitation, to spread the materials throughout the box without any dead zones. The paddles shall be designed and operated so all the fresh mix will be agitated. Flexible seals, front and rear, shall be in contact with the road surface to prevent loss of mixture from the box. The spreader box shall be equipped with hydraulic cylinders for controlling the thickness of the spread mixture.

331.6.6.2: The rut filling spreader box shall have 6 to 8 skids to provide for leveling and filling uneven depressed areas. Two adjustable steel strike-off plates are required. The rear flexible seal shall act a final strike-off and shall be adjustable. The steel strike-offs shall be controlled by hydraulic cylinders placed at the rear of the spreader box.

331.6.6.3 The spreading equipment shall be maintained free from build-up of the mixture on the paddles or side walls. Skips, lumps, or tears will not be allowed in the finished product.

331.7 APPLICATION:

331.7.1 General: The microsurface shall be of the desired consistency when deposited in the spreader box and nothing more shall be added to it. The mixing time shall be sufficient to produce a complete and uniform coating of the aggregate and the mixture shall be chuted into the moving spreader box at a sufficient rate to maintain an ample supply across the full width of the strike-off squeegee at all times.

331.7.2 Weather: Microsurfacing shall not be placed if either the pavement or air temperature is below 50 degrees F and falling, but may be applied if both the air and pavement temperature are at least 45 degrees F and rising, and it is not raining.

331.7.3 Protection of Existing Surfaces: The Contractor shall take all necessary precautions to prevent microsurface or other material used from entering or adhering to gratings, hydrants, valve boxes, manhole covers, bridge or culvert decks, and other road fixtures. Immediately after resurfacing, the Contractor shall clean off any such material and leave any grating, manholes, etc. in a satisfactory condition.

331.7.4 Fogging Pavement: The surface shall be pre-wetted by fogging ahead of the spreader box. The rate should be adjusted as dictated by the pavement temperature, surface texture, humidity, and dryness of existing pavement.

331.7.5 Mix Stability: The mix shall possess sufficient stability so that premature breaking of material in the spreader box does not occur. The mixture shall be homogeneous during mixing and spreading; it shall be free of excess water or emulsion, and free of segregation of the emulsion and aggregate fines from the coarser aggregate.

331.7.6 Application Rate: The application rates, pounds per square yard of mix

specified, are average rates; the surface texture variation throughout the work will dictate the actual spreading rates. The strike-off squeegee shall be adjusted to provide a microsurface thickness which will completely fill the surface voids and provide an additional thickness not exceeding one and one-half times the largest top-size stone. The requirement of 1-1/2 stone depth does not apply to rut filling operations as these depths vary greatly according to the surface irregularities.

331.7.7 Joints: No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints. A maximum of 4.0" overlap will be permitted on longitudinal joints. The Contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the work. Half passes and odd width passes will be used in minimal amounts. If half passes are used, they cannot be the last pass on any area. Care shall be taken to ensure straight lines along curbs and shoulders. No runoff will be permitted on these areas.

Construction joints shall be neat in appearance and shall be tapered or feathered to conform to the existing surface. All excess material shall be removed from the surface upon completion of each run.

331.7.8 Handwork: Approved squeegees and lutes shall be used to spread the mixture in areas inaccessible to the spreader box and in other areas where hand spreading may be required.

331.7.9 Protection of the Microsurface: Adequate means shall be provided by the Contractor to protect the uncured product. Any damage done to the product shall be repaired at the Contractor's expense.

331.7.10 Damage to the Microsurface: The Contractor's responsibility to replace microsurface damaged by unexpected rain after spreading shall be limited to the period within four (4) hours of placement of the microsurface.

331.8 PAYMENT:

The micro-surfacing shall be paid for by the weight of the aggregate and weight of emulsified asphalt, as shown on certified weight tickets from the supplies delivered to the project, less weigh backs. The price shall be full compensation for furnishing, mixing and applying all materials; and for all labor, equipment, tools, design tests, and incidentals necessary to complete the job as specified herein.

Section 714

Microsurfacing Materials

714.1 GENERAL:

Microsurfacing materials shall consist of a properly proportioned mixture of cationic polymer modified asphalt emulsion, mineral aggregates, mineral filler, water, and other additives.

714.2 AGGREGATE:

714.2.1 Mineral Filler: Mineral filler, as required by the mix design, shall be any recognized brand of non-air-entrained Type I/II normal Portland cement that is free of lumps and clods, with a minimum of 85% passing the #200 sieve, added by weight of aggregate as specified by the mix design.

714.2.2 Mineral Aggregate: Mineral aggregate shall consist of sound, durable crushed stone or crushed gravel, per Section 701, and approved mineral filler. The material shall be free from vegetable matter and other deleterious substances. Aggregates shall be 100% crushed with no rounded particles. No natural sand will be allowed. The mineral aggregate shall conform to Table 715-1 for gradation only. Application rates shall be 18-24 pounds of aggregate/square yard for Type II, and 24-35 pounds/square yard for Type III.

The mineral aggregate and mineral filler shall have a sand equivalency value not less than 50 (ASTM D 2419) and be non-plastic.

If more than one kind of aggregate is used, the correct amount of each kind of aggregate needed to produce the required gradation shall be proportioned separately in a manner that will result in a uniform and homogeneous blend. The final blended aggregate shall meet the above requirements for grading, sand equivalency, and plasticity.

714.3 BITUMINOUS MATERIAL:

The Polymerized Emulsion is a slow-setting, cationic type emulsion for mixing applications and seal coats. A minimum of 4% saturated polymer shall be high sheared into the asphalt prior to the emulsification process. The Agency may choose to sample the polymerized asphalt for testing. The amount of polymer will be based on weight of polymer and asphalt (total weight) and be certified by the supplier. The polymerized emulsion will meet the following specifications listed in Table 714-1.

| Table 714-1 | | |
|---|---------------|----------------------|
| Polymerized Emulsion | | |
| Test | AASHTO Method | Specification Limits |
| Tests on Emulsion | | |
| Viscosity, SSF, @ 77°F. sec. | T-59 | 15-100 |
| Sieve Test, % | T-59 | 0.30 Maximum |
| Particle Charge | T-59 | Positive |
| Storage Stability, 24 hr. % | T-59 | 1.0 Maximum |
| Evaporation Residue, % | Arizona 512 | 60 Minimum |
| Tests on Evaporation Residue Arizona 504 | | |
| Kinematic Viscosity 275°F.cst | T-201 | 650 Minimum |
| Penetration, 77°F 100g @ 5 sec | T-49 | 40-90 |
| Softening Point, degrees F. | T-53 | 140 Minimum |
| Ductility, 77%, 5 cm/min. | T-51 | 60 Minimum |
| Tests on Evaporation Residue after RTFO | | |
| Kinematic Viscosity, 275°F. aging ratio, cst | T-201 | 2.5 Maximum |
| Softening Point, degrees F. | T-53 | 140 Minimum |
| The emulsion, upon standing undisturbed for a period of twenty-four (24) hours, shall show no white or milky colored substance on its surface, and shall be a homogeneous brown color throughout. | | |

714.4 MODIFIER TYPE AND CONTENT:

The modifier shall be saturated. The use of latex type modifier will be allowed only if both the test results and field performance are accepted by the Engineer. The asphalt cement shall contain a minimum of 4% solid polymer by weight of asphalt residue, sheared into the asphalt prior to emulsification. Plant verification by the Agency, and certification of the polymer content and type by the supplier, will be required throughout the duration of the contract. Each tank of emulsion produced shall be certified as to its compliance with these specifications; this certification shall be provided to the Agency.

714.5 WATER:

Water shall be potable water, free of any injurious impurities. The Contractor shall identify the water source to the Agency.

714.6 ADDITIVES:

Additives may be used to accelerate or retard the breaking point and set times of the mix, or to improve the resulting finished surface.

The use of additives in the mix shall be supplied in quantities predetermined by the laboratory mix design.

714.7 TEST CERTIFICATES AND REPORTS:

Test certificates and reports for the bituminous material shall be furnished in accordance with Section 711.3.