VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION FOR

LATEX MODIFIED EMULSION TREATMENT (MICRO-SURFACING)

August 14, 1996

I. DESCRIPTION

This work shall include furnishing and placing a latex modified emulsion to existing roadway surfaces in accordance with this provision and as directed by the Engineer.

II. MATERIALS

A. **Emulsified asphalt** shall be a quick set latex modified cationic emulsion conforming to the requirements of AASHTO M208 for a CSS-1h emulsion and the following:

1. Ring and ball softening point of the residue, minimum = 140°F.

2. Pass towel test (VTM-89) in the 30 minutes at room temperature with job materials.

3. Residue, percent by evaporation, minimum (VTM-78) 62%>.

4. Material shall be furnished in accordance with the Departments Asphalt Acceptance Program.

B. **Aggregate** shall be non-polishing crushed stone conforming to the requirements Section 202 of the Specifications, except the soundness loss shall not exceed 18%.

Gradation of the aggregate shall be in accordance with the following:

Screen Size	**Type B (% Passing)**	**Type C (% Passing)**	**Rutfilling (% Passing)**
3/8”	100	100	100
No. 4	90-100	70-95	70-95
No. 8	65-90	45-70	45-70
No. 16	45-70	32-54	32-54
No. 30	30-50	23-38	23-38
No. 50	18-33	16-29	16-29
No. 100	10-21	9-20	9-20

No. 200	5-15	5-12	5-12

C. **Mineral filler** shall be non-air entrained hydraulic cement, Type I, conforming to the requirements of Section 214 of the Specifications or hydrated lime conforming to the requirements of Section 240.02(a) of the Specifications. When requested by the Engineer a manufacturers Certification will be required.

D. **Water** shall conform to the requirements of Section 216 of the Specifications.

E. **Latex modifier** along with emulsifiers shall be milled into the asphalt emulsion by an approved emulsion manufacturer.

F. **Additives** may be used by the Contractor to provide control of the break/set time in the field. The type of additive shall be specified in the mix design.

G. **Sampling requirements** for gradation shall be taken from aggregate stockpiles designated by the Contractor. These stockpiles shall be located in the aggregate producer's quarry and acceptance for gradation will be based on an approved aggregate Producer's modified acceptance production control plan. Samples for Marshall tests and asphalt content shall be taken from the completed mix for testing by the Department. The frequency of sampling and testing will be established by the Engineer based upon the Department's acceptance program. The asphalt content will be determined by the Reflex Method (VTM-36) or nuclear gauge as determined by the Engineer.

III. MIX DESIGN

A. The mixture shall be designed in a Department approved lab by the Contractor for the Engineer's approval and the job mix formula shall provide the following:

1. Compatibility of latex, aggregate and emulsion in accordance with the Schulze-Breuer Test procedure. Other procedures approved by the Engineer may be used. The test shall be run at the design stage and when requested by the Engineer.

2. A minimum Marshall Stability of 1800 pounds when tested in accordance with VTM-95.

3. A flow of between 6 and 16 units when tested in accordance with VTM-95.

4. An asphalt content that produces 4.7% voids in total mix for surface and 6.5% voids for rutfilling when tested in accordance with VTM-95.

Aggregate used in the job mix formula shall be from the same source and representative of the material proposed by the Contractor for use on the project.

B. Proportioning of the mix design shall be within the following limits:

	Type B	**Type C**	**Rutfilling**
% Residual Asphalt	6.5 - 8.5	5.0 - 7.5	4.5 - 6.5
(by wt of dry aggr.)			
% Mineral Filler	0.26 - 3.00	0.25 - 3.00	0.25 - 3.00
% Latex Modified-Solids	3.0 Min.	3.0 Min.	3.0 Min.
(by wt of residual asp.)			
Additive	As Required	As Required	As Required

IV. **EQUIPMENT**

All equipment, including hand tools, shall be designed or suitable for the application of micro-surfacing and in good working condition.

A. **Mixing equipment** shall produce the asphalt mixture in a self-propelled, front feed, continuous loading, mixing machine. The unit shall deliver and proportion the aggregate, emu7lsion, mineral filler, control setting additive and water to a revolving mullet-blade shafted mixer and discharge the mixture on a continuous and uniform basis. A mobile unit will be permitted on areas less than 15,000 square yards provided a sufficient number of units are used to promote an efficient continuous type operation which minimizes disruption to traffic and provided the units are equipped with a twin shaft mixer capable of an operational speed of 60 feet per minute and have a capacity to store and mix components to produce a minimum of 5 tons of mix. All equipment shall be capable of delivering a continuous, uniform, properly proportioned, and homogenous mixture to the spreading unit.

Individual volume or weight controls for proportioning each material shall be provided and meters or counters shall be such that the Engineer may readily and accurately determine the amount of each material used at anytime.

The mixing machine shall be equipped with a water pressure system and nozzle type spray bar to provide a water spray immediately ahead of and outside the spreader box when required.

B. **Equipment calibration** shall be provided by the Contractor stating the current year data for each mixing unit using materials from the same sources as those to be used on the project. Data for each unit shall be in the form of a graphic

scale indicating the proportioning controls settings required to obtain the residual asphalt content as determined in the mix design. Such data shall be maintained with each unit.

C. **Spreading equipment** shall uniformly spread the paving mixture by means of a mechanical type spreader box attached to the mixer and equipped to agitate and spread the materials throughout the box. The box shall be designed and operated so all the mixed material will be kept homogenous and moving with no evidence of premature breaking during laydown. A front seal shall be provided to ensure no loss of the mixture at the road contact surface. The rear flexible seal shall act as a final strike off and shall be adjustable. The spreader shall be maintained to prevent the loss of the paving mixture in the surfacing super-elevated curves. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved and produces a free flow of material to the rear strike-off without causing skips, lumps, ripples or tears in the finished surface. A secondary strike-off may be used to improve surface texture.

Rutfilling, when required, shall be accomplished by means of a box specifically designed for that purpose. The box shall be of one-half lane width and have a dual chamber with an inner v configuration of augers to channel the large aggregate to the center of the rut and the fines to the edges of the rut fill pass. The box shall be equipped with dual steel strike-off to control both the width and depth of the rutfill.

D. **Pneumatic roller**, if required, shall be equipped with threaded tries having an air pressure of 40-60 psi.

V. PROCEDURES

A. **Beginning work**, the Contractor shall notify the Engineer at least three days prior to commencement.

B. **Surface preparation**, prior to applying the paving mixture, the surface shall be thoroughly cleaned of all vegetation, loose materials, dirt, mud and other objectionable materials and pre-wetted when required. Water used in pre-wetting the surface shall be applied evenly at a rate that will uniformly dampen the entire roadway surface.

When paving over hydraulic cement concrete an asphalt tack coat type CSS-1h diluted three parts water to one part asphalt shall be applied at a rate 0.05 gal per sq. yd.

All cost for furnishing and applying the tack coat shall be included in the price bid for “Latex Modified Emulsion Treatment”.

C. **Application types and rates**

1. Rutfilling shall be placed by means of a specially designed rutfilling box that will leave the surface crowned between 1/8 and ¼ inch per inch depth to allow for traffic compaction to approximately a level surface. The Contractor shall provide and use a ten foot straight edge to control the depth and crown.

2. Latex Modified Emulsion Treatment for leveling course shall consist of an initial application to prepare for the surface course. The minimum application rates shall be 16 pounds per square yard for Type B and 20 pounds per square yard for Type C.

3. Latex Modified Emulsion Treatment (LMET) for surface course shall consist of the final application which serves as the pavement surface. The LMET shall be placed at an application rate of 16 to 20 pounds of mix per square yard for Type B and 18 to 22 pounds for Type C.

   Where neither rutfilling nor leveling is used, the mix application rates shall be 18 to 22 pounds per square yard for Type B and 20 to 24 pounds per square yard for Type C.

   The Contractor shall provide to the Engineer aggregate weight tickets, a daily delivery summary, and an estimate of aggregate lost and otherwise not used in the work for each stockpile location (rutfilling aggregate shall be stockpiled and inventoried separately). When disagreements occur, the Engineer will make the final determination of such loss.

D. **Application**

The mixture shall be spread to fill minor cracks and shallow potholes and leave a high-skid resistant surface uniform in texture and appearance. Longitudinal joints shall not overlap more than four inches, except on irregular roadway widths when approved by the Engineer, however the joints shall be neat in appearance. Pavement edges shall be reasonably straight and shall be tapered to tie in neatly at gutters, entrances, and connections. When possible, longitudinal joints shall be placed on lane lines.

During night paving operations sufficient lighting shall be provided by the Contractor to insure proper application of micro-surfacing.

Rutfilling must be compacted by traffic or by a minimum of three passes with a pneumatic tire roller not in excess of 5 mph prior to application of the

surface course and must be cured such that applied material is totally free of detectable water. Rutfilling or scratch courses placed at night shall not be overlaid the same night or until such time that the materials totally free of detectable water.

Any oversized aggregate or foreign materials shall be screened from the aggregate stockpile prior to delivery to the mixing machine. A mixing aid additive shall be used to accommodate spreading due to slow placements or high temperatures. Additionally, water in a very limited quantity may be sprayed into the sprayed box to prevent build-up on the blades. All excess material shall be removed immediately from the ends of each run. Loose aggregate that is determined to be objectionable buy the Engineer shall be immediately removed without damaging the surface.

Based upon a visual examination or test results the Engineer may reject any work due to poor workmanship, loss of texture, raveling or apparent instability.

The entire area specified shall be treated and the contract quantity shall not be exceeded.

E. **Test Requirements**

Samples representing a maximum of 250 tons will be taken from material produced by each mixing unit for asphalt content determination. The residual asphalt content of such samples shall be within plus or minus 1.5 percent of the approved job mix. When successive tests from a mixing unit fail or one test fails by morre than two percent, that unit shall be removed from service until approved by the Engineer.

F. **Price Adjustment**

Emulsified asphalt certified weight tickets showing the residual asphalt content shall be provided to the Engineer. Asphalt not used shall be documented and considered in determining the percent of asphalt used on the total project. Upon completion of the project, the percent of asphalt shall be determined by dividing the calculated weight of residual asphalt by the delivery ticket weight of aggregate used in the work. A one percent reduction in the unit price per ton will be applied for each 1/10 percent the residual asphalt content is more than one percent below the approved job mix formula.

The price adjustment will be applied to the total tons for which payment is made.

G. **Weather Limitations**

Micro-surfacing shall not be applied on surfaces containing puddle water and on surfaces less than 50°F, except that in the early morning the minimum surface temperature may be 40°F provided the ambient temperature is expected to be above 60°F and there is no forecast of ambient temperature below 32°F within 24 hours from the time the material is applied.

H. **Personnel**

The Contractor shall have a Department certified Micro-surfacing technician on the job site to control the work.

VI. MEASUREMENT AND PAYMENT

The quantity of Latex Modified Emulsion Treatment used in the accepted portions of the work will be measured by net ticket weight of aggregate, latex modified emulsion and mineral filler delivered and incorporated in the accepted work. No deduction will be made for moisture naturally occurring in the aggregate and mineral filler.

The accepted quantity of Latex Modified Emulsion Treatment will be paid for at the contract unit bid price per ton for the type material specified.

The Contractor will be paid at a rate of $15.00 per hour for the removal of vegetation, when required. The contract price shall include each operator and the equipment necessary to remove and dispose of vegetation.

Payment will be made under:

Pay Item	Pay Unit
Latex Modified Emulsion Rutfilling	Ton
*Latex Modified Emulsion Treatment, (Type)	Ton

*(Leveling and surfacing courses to be shown as separate line items in the schedule but combine into one bid item)