SECTION 32 01 13.61

SLURRY SEAL
(Latex Modified-MicroSurfacing)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall consist of a micro-surfacing system which shall be a mixture of cationic modified asphalt emulsion, mineral aggregate, mineral filler, water and other additives mixed and spread on the paved surface in accordance with these specifications and to the dimensions as shown on the plans.

1.2 MEASUREMENT AND PAYMENT

A. Slurry Seal (Latex Modified) will be measured by the ton of 2,000 pounds of the composite "Slurry Seal (Latex Modified)" of the grade actually used in the completed and accepted work in accordance with the plans and specifications for the project. The composite Slurry Seal (Latex Modified) mixture is hereby defined as the asphalt, aggregate and additives.

B. All material shall be weighed on certified public scales or the contractor shall place a set of standard platform truck scales at a location approved by the Engineer. Scales shall conform to the requirements of the Item, "Weighing and Measurement Equipment."

C. The work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Slurry Seal (Latex Modified)," of the grade specified, which price shall be full compensation for furnishing all materials and performing all operations necessary to complete the work.

1.3 WEATHER LIMITATIONS

A. The material shall be spread only when the atmospheric temperature is at least fifty (50) degrees Fahrenheit and rising and the weather is not foggy or rainy.

1.4 STOCKPILING AND STORAGE

A. AGGREGATE STORAGE: If the mineral aggregates are stored or stockpiled, they shall be handled in such a manner as to prevent segregation, mixing of the various materials or sizes, and contamination with foreign materials. The grading of aggregates proposed for use and as supplied to the mixing plant shall be uniform. Suitable equipment of acceptable size shall be furnished by the contractor to work the stockpiles and prevent segregation of the aggregates.

B. STORAGE AND HEATING OF ASPHALTIC MATERIALS: The asphaltic material storage shall be ample to meet the requirements of the plant. CSS-1P asphalt emulsion shall not be heated to a temperature in excess of that specified for Grade CSS-H. All equipment used in the storage and handling of asphaltic material shall be kept in a clean condition at all times and shall be operated in such manner that there will be no contamination with foreign matter.

PART 2 – PRODUCTS

2.1 ASPHALTIC MATERIALS

A. The asphalt emulsion used shall be a cationic slow setting type, designated as CSS-1P. The emulsion shall be modified with an approved polymer. The distillation residue of the modified emulsion shall contain a minimum of 2.0 percent rubber solids by weight, as determined by an analytical method approved by the weight, as determined by an analytical method approved by the Department. The emulsion supplier shall furnish the Department samples of the base asphalt and polymer used in the finished emulsion.

B. The modified emulsified asphalt shall be so formulated that when the paving mixture is applied with the relative humidity at not more than 50% and ambient air temperature of at least 75°F, it will cure sufficiently that rolling traffic can be allowed in one hour with no damage to the surface.

In addition, the emulsion shall comply with the following requirements:

	MIN.	**MAX.**
Viscosity, Saybolt Furol at 77 F. Sec.	20	10
Storage Stability test, one day, percent	-	1
Particle charge test	Positive	-
Sieve test, percent	-	0.1
*Distillation:		
Oil distillate, by volume of emulsion, percent	-	1/2
Residue, percent	60	-
Tests on Residue from Distillation:		
Penetration, 77 F., 100 g, 5 seconds	55	90
Ductility, 77 F., 5 cm/min, cm	70	-
Solubility in trichlorethylene, percent	97	-

*The standard distillation procedure shall be modified as follows:

C. The temperature on the lower thermometer shall be brought slowly to 350°F, plus or minus 10°F, and maintained at this point for 20 minutes. Complete the total distillation in 60 minutes, plus or minus 5 minutes, from the first application of heat.

2.2 MINERAL AGGREGATE

A. DESCRIPTION: The mineral aggregate used shall be of the type and grade specified for micro-surfacing. The aggregate shall be manufactured crushed stone such as granite, slag, limestone, chat or other high quality aggregate or combination thereof. A sand equivalent of 65 or higher is required. The aggregate shall have a weighted loss of not more than 25% when subjected to the four-cycle soundness test using magnesium sulfate in accordance with ASTM C88.

The aggregate shall have a resistance to abrasion resulting in a maximum loss of 35% when tested to ASTM C131.

B. GRADES: When tested by Test Method Tex-200-F, Part I, the gradation requirements shall be as follows:

GRADE 2 (Coarse Graded Surface Course)	**Percentage Aggregate By Weight**
Passing 1/2" sieve	100
Passing 3/8" sieve	99-100
Passing No. 4 sieve	86-94
Passing No. 8 sieve	45-65
Passing No. 16 sieve	25-46
Passing No. 30 sieve	15-35
Passing No. 50 sieve	10-25
Passing No. 200 sieve	05-15

C. MINERAL FILLER: Mineral filler shall be non-air-entrained Portland cement which is free of lumps or foreign matter.

2.3 WATER

The water shall be potable and shall be free of harmful soluble salts.

2.4 OTHER ADDITIVES

Additives supplied by the emulsion manufacturer may be added to the emulsion mix or to any of the component materials to provide control of the set time in the field.

2.5 PAVING MIXTURE

A. MIX DESIGN: Before work commences, the Contractor shall submit a signed mix design covering the specific materials to be used on the project. This design shall be performed by a qualified laboratory. Once the materials are approved, no substitution will be permitted, unless first tested and approved by the laboratory preparing the mix design.

The qualified laboratory shall develop the job mix design and present certified test results for the Engineer's approval. Compatibility of the aggregate and modified CSS-1H shall be verified by the mix design. The job mix formula shall provide a minimum Marshall stability of 1,800 pounds and a flow of 6 to 16 units when tested according to the modified ASTM 1559 or AASHTO 2450 procedure. All component materials used in the mix design shall be representative of the material proposed by the Contractor for use on the project.

B. COMPOSITION OF MIXTURE: The Engineer shall approve the design mix and all micro-surfacing materials and methods prior to use and shall designate the proportions to be used within the following limits.

Residual Asphalt	- 6 to 9 percent by weight of dry aggregate or 13.5 to 23 percent by volume of the aggregate
Mineral Filler	- 1.5% to 3.0% by dry weight of aggregate
Modifier	- As required to provide the specified properties (Minimum of 2.0% solids based on bitumen weight content)
Water	- As required to provide proper consistency

C. TYPE: The paving mixture shall consist of a uniform mixture of coarse aggregate, fine aggregate and asphaltic material. Mineral filler, and/or additives may also be required.

The mixture shall be designed so that the mineral aggregate will produce a gradation which conforms to the limitations for the master grading for the type specified herein. The gradation will be determined in accordance with ASTM C136 (Dry Sieve Analysis) and shall be based upon aggregate only. The amount of asphaltic material shall conform to the limitation for the type specified.

D. TOLERANCE: The aggregate portion of the paving mixture produced shall not vary from the design gradation by more than the tolerances which follow. The material passing the No. 200 sieve is further restricted to conform to the limitations for the master grading for the type specified. The asphaltic material portion of the paving mixture shall not vary from the design amount by more than the allowed tolerance and is also restricted to conform to the master limits.

	Percent by Weight or Volume as Applicable
Passing 3/8" sieve, retained on No. 4 sieve	Plus or minus 5
Passing No. 4 sieve, retained on No. 8 sieve	Plus or minus 5
Total retained on No. 8 sieve	Plus or minus 5
Passing No. 8 sieve, retained on No. 16 sieve	Plus or minus 3
Passing No. 16 sieve, retained on No. 30 sieve	Plus or minus 3
Passing No. 30 sieve, retained on No. 50 sieve	Plus or minus 3
Passing No. 50 sieve, retained on No. 200 sieve	Plus or minus 3
Passing No. 200 sieve	Plus or minus 2
Asphaltic Material	Plus or minus 0.5 by wt. or 1.2 by vol.

2.6 EQUIPMENT

A. All equipment for the handling of all materials and mixing and placing of the mixture shall be maintained in good repair and operating condition and subject to the approval of the Engineer. Any equipment found to be defective and potentially affecting the quality of the paving mixture will be replaced.

B. The material shall be mixed by a self-propelled micro-surfacing mixing machine which shall be a continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler and water to a revolving multi-blade mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler and water to maintain an adequate supply to the proportioning controls. Self-loading devices which provide for the loading of all materials while continuing to lay micro-surfacing, thereby minimizing construction joints, may be used. Other methods may also be used by the Contractor if requested in writing and approved by the Engineer.

C. 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.

D. 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.

E. The emulsion pump shall be 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.

F. 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. Other methods for accomplishing this task will be considered if requested in writing to the Engineer.

G. The mixing machine shall be equipped with an approved fines feeder that shall provide a uniform, positive, accurately metered, predetermined amount of the specified mineral filler.

PART 3 – EXECUTION

3.1 CONSTRUCTION:

A. GENERAL: It shall be the responsibility of the Contractor to produce, transport, and place the specified paving mixture in accordance with these specifications and as approved by the Engineer.

B. SURFACE PREPARATION: The area to be sealed shall be thoroughly cleaned of all vegetation, loose aggregate and soil. Water used in pre-wetting the surface ahead of and outside the spreader box shall be applied at a rate to dampen the entire surface without any free flowing water ahead of the spreader box.

C. SPREADING EQUIPMENT: The paving mixture shall be spread uniformly by means of a mechanical type squeegee box attached to the mixer, equipped with paddles to agitate and spread the materials throughout the box. A front seal shall be provided to ensure no loss of the mixture at the road contact surface. The rear seal shall act as a final strike-off and shall be adjustable. The mixture shall be spread to fill cracks and minor surface irregularities and leave a uniform skid resistant application of aggregate and asphalt on the surface. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The seam where two spreads join shall be neat appearing and uniform.

D. WORKMANSHIP: No excessive buildup, uncovered areas or unsightly appearance will be permitted on longitudinal or transverse joints.

1. Longitudinal joints shall be placed on lane lines. Excessive overlap will not be permitted. Care shall be taken to ensure straight lines along the roadway centerline, lane lines, and shoulder or curb lines. Lines at intersections will be kept straight to provide a good appearance.

2. Care shall be exercised in areas that require handwork so that the finished surface is uniform in texture, dense and of overall good appearance comparable to that produced by the spreader box.

E. RATE OF APPLICATION: The Slurry Seal (Latex Modified) mixture shall be applied at an application rate to achieve a coverage of 20 to 25 lbs. per square yard base on dry aggregate weight.

END OF SECTION