ITEM 18410.10XX M - MICRO-SURFACING

DESCRIPTION. This work shall consist of the construction of a bituminous surfacing system consisting of a mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water and other additives, properly proportioned, mixed and spread on a paved surface in accordance with these specifications and in substantial conformance with the limits shown on the plans or established by the Engineer.

MATERIAL REQUIREMENTS

Bituminous Materials. The bituminous material shall be obtained from a primary source/supplier that has been approved by the Director, Materials Bureau within the current calendar year, prior to the start of work. The bituminous material shall be a quick-set polymer modified CSS-1h emulsion (Item 702-4501). The cement mixing test will be waived for this emulsion. The polymer material shall be milled or blended into the asphalt or blended into the emulsifier solution prior to the emulsification process.

Aggregates. The mineral aggregate material shall be obtained from a source approved by the Director, Materials Bureau. The mineral aggregate used shall be of the type and gradation specified for the particular use of the Micro-Surfacing. Mineral aggregates shall consist of material conforming to the requirements of Section 703-01, Fine Aggregates. In addition, the plus No. 600µm sized material used in these mixes shall meet one of the following frictional requirements:

Aggregates for use in pavements having lane AADTs of less than 4000:

1. Plus No. 600µm sized aggregates shall be crushed limestone having an acid insoluble residue content of not less than 20%, excluding particles of chert and similar siliceous rocks unless otherwise approved by the Director, Materials Bureau.

2. Plus No. 600µm sized aggregates shall be crushed sandstone, granite, chert, traprock, ore tailings or other similar non-carbonate materials.

3. Plus No. 600µm sized aggregates shall be crushed dolomite.

4. Plus No. 600µm sized aggregates shall be crushed gravel or blends of two or more of the following material; crushed limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, or other similar materials. These aggregates shall meet the following requirements:

   Not less than 40% (by weight with adjustments to equivalent volumes for materials of different specific gravities) of the total plus No. 600µm sized material shall be non-carbonate. Non-carbonate particles are defined as those having an acid insoluble residue content not less than 80%.

5. Blends of siliceous and non-siliceous limestones will not be permitted.

Aggregates for use in pavements having lane AADTs of 4000 or more:

1. Plus No. 600µm sized aggregates shall be crushed limestone having an acid insoluble residue content of not less than 20%, excluding particles of chert and similar siliceous rocks unless otherwise approved by the Director, Materials Bureau.

2. Plus No. 600µm sized aggregates shall be crushed sandstone, granite, chert, traprock, ore tailings or other similar non-carbonate materials.

3. Plus No. 600µm sized aggregates shall be crushed dolomite (excluding Wappinger Dolomite as defined by the Department) having an acid insoluble residue content of not less than 17%, excluding particles of chert and similar siliceous rocks unless otherwise approved by the Director, Materials Bureau.

4. Plus No. 600µm sized aggregates shall be crushed gravel or blends of two or more of the following material; crushed limestone, dolomite (including Wappinger Dolomite as defined by the Department), sandstone, granite, chert, traprock, ore tailings, or other similar materials. These aggregates shall meet the following requirements:

   Not less than 40% (by weight with adjustments to equivalent volumes for materials of different specific gravities) of the total plus No. 600µm sized material shall be non-carbonate. Non-carbonate particles are defined as those having an acid insoluble residue content not less than 80%.

5. Blends of siliceous and non-siliceous carbonate rocks will not be permitted.

When aggregates for micro-surfacing are from more than one source, they shall be proportioned and blended using automated proportioning and blending equipment to provide a uniform mixture. The mineral aggregate selected shall have a sand equivalent quality of 65 minimum.

The mineral aggregate shall meet the following gradation requirements:

	Type II General Surfacing	Type III Coarse Resurfacing, Rut Filling	Stockpile Tolerance
Sieve Size	% Passing	% Passing	
9.5mm	100	100	
4.75mm	90-100	70-90	±5%
2.36mm	65-90	45-70	±5%
1.18mm	45-70	28-50	±5%
600µm	30-50	19-34	±5%
300µm	18-30	12-25	±4%
150µm	10-21	7-18	±3%
75µm	5-15	5-15	±2%

The mix gradation shall be within the gradation band for the desired type. After the Micro-Surfacing mix design is submitted and approved, the percent passing each sieve size shall not vary by more than the stockpile tolerance. The percent passing shall not go from the high end to the low end of the range for any two consecutive screens.

The mineral aggregate shall be placed in a stockpile at the job location or at some other location approved my the Engineer. Three samples of the stockpile shall be tested for gradation by the Contractor in accordance with NYSDOT Materials Bureau M.M. 5 and the results supplied to the Engineer. If the tests show the material to be out of gradation the Contractor will be given the choice to either remove the material or blend other approved aggregate with the stockpile material to bring it into specification. Materials used in blending must meet the quality tests before blending and must be blended in a manner to produce a consistent gradation. This may require a new mix design. Screening shall be required at the stockpile prior to the delivery of the mineral aggregate to the paving machine.

Water. The requirements of Section 712-01, Water, shall apply.

Mineral Filler. Mineral Filler shall be non-air entrained Portland Cement or hydrated lime meeting the requirements of Section 703-08, Mineral Filler. The type and amount of mineral filler needed shall be determined by a laboratory mix design**.** An increase or decrease of less than one percent may be permitted by the Engineer as the Micro-Surfacing is being paved, for better consistency or set times.

Polymer Modifier. The minimum amount and type of polymer modifier shall be based on the bitumen content and shall be determined by the laboratory performing the mix designs. The minimum polymer modifier content shall be 3% polymer solids, based on bitumen weight. Any deviations shall be approved by the Engineer.

Additives. Additives may be added to the asphalt emulsion mix or any of the component materials to provide the control of the quick-set properties and increase adhesion. These additive(s) must be part of the mix design and be compatible with other components of the mix.

CONSTRUCTION DETAILS

Equipment. The Contractor shall use a micro-surfacer and micro-surfacing equipment appearing on the Materials Bureau Approved List. Requests for approval of micro-surfacers or equipment should be made to the Director, Materials Bureau, prior to the start of any work. All other equipment and tools used in the performance of this work shall be approved by the Engineer. All equipment and tools shall be maintained in satisfactory working conditions at all times.

Calibration. Each mixing unit to be used in performance of the work shall be calibrated by the Micro-Surfacer in accordance with Department written instructions. This calibration shall be verified in the presence of a Department representative. At least two weeks advance notice is required when scheduling the verification with the Regional Materials Engineer. If the equipment is found to be accurate and in good working order the Micro-Surfacer will receive a letter from the Department with the date of the verification. At intervals of no more than 90 days the Micro-Surfacer shall verify the accuracy of the equipment. A copy of the forms used for these verifications shall be sent to the Regional Materials Engineer. If all is in order the Micro-Surfacer will receive a letter from the Department with the date of this verification. A copy of the most recent verification letter shall be supplied to the Engineer prior to the start of work. No equipment will be allowed to work on the project until the calibration has been completed and verified.

Mix Design. Before any work commences, the Contractor shall submit an approved mix design to the Engineer signed by the Director, Materials Bureau. Requests for mix design approval shall be made to the Director, Materials Bureau seven days prior to the start of work. The mix design should be performed by properly trained personnel in a laboratory approved by the Department.

The mix design must clearly show the proportions of mineral aggregate, mineral filler, water, additive(s) and the percentage of polymer modified asphalt emulsion and residual asphalt based on the dry weight of the aggregate. Where applicable, a working range for each component material shall be listed. All the component materials used in the mix design shall be representative of the materials proposed by the Contractor to be used on the project. Adjustments may be required during construction based on field conditions with the approval of the Engineer.

The Department shall approve all mix designs, all Micro-Surfacing materials, and design methods prior to use. The component materials shall be within the following limits:

Residual Asphalt:	Type II	6.5% to 9.0% by dry weight of aggregate

ITEM 18410.10XX M - MICRO-SURFACING

	Type III 5.5% to 7.5% by dry weight of aggregate Ring and Ball Softening Point shall be 58°C minimum
Mineral Filler:	0% to 3% by dry weight of aggregate
Polymer Based Modifier:	Minimum of 3% solids based on bitumen weight
Additive:	As needed
Water:	As required to produce proper mix consistency

Minimum acceptable values for the trial mixes are as follows:

Property	Test Method	Requirements
Wet Cohesion:	ISSA TB 139 30 minutes ISSA TB 139 60 minutes	12 kg-cm minimum 20 kg-cm minimum
Wet Track Abrasion Loss:	ISSA TB 100 1 hour soak ISSA TB 100 6 day soak	538g/m² max. 807g/m² max.
Mix Time:	ISSA TB 113	Controllable to 120 seconds minimum
Classification Compatibility	ISSA TB 144	11 grade points minimum
Wet Stripping	ISSA TB 114	Pass (90% min.)
Excess Asphalt by LWT Sand Adhesion	ISSA TB 109	538g/m² max.
Lateral Displacement	ISSA TB 147A	5% max.
Specific Gravity after 1000 cycles of 57 kgs.	ISSA TB 147A	2.10 max.

Weather and Seasonal Limitations. The seasonal limitations of subsection 401-3.01, Weather and Seasonal Limitations, for top courses, shall apply. Micro-Surfacing shall not be placed in the rain, however the pavement surface may be damp. The Micro-Surfacing shall not be applied if either pavement or air temperature is below 10°C and falling, but may be applied when both pavement and air temperature are above 7°C and rising. All temperatures shall be measured in accordance with Department written instructions. No Micro-Surfacing shall be applied if, in the opinion of the Engineer, the air temperature is expected to fall below freezing within 24 hours from the time the material is to be applied.

Cleaning Existing Pavement and/or Shoulder. The requirements of Section 633, Conditioning Existing Pavement, shall apply.

Cleaning, Sealing and Filling Joints and Cracks. The requirements of Section 633, Conditioning Existing Pavement, shall apply.

Tack Coat. If required by the contract documents, the Contractor shall apply Tack Coat as detailed in

Section 407 of the Standard Specification. When specified, the Tack Coat shall be paid for under a separate pay item.

Rate of Application. The Micro-Surfacing mixture shall be of proper consistency at all times to provide the application rate required by the plans.

When Type II Micro-Surfacing is required, the minimum rate of application shall be 13.5 kg per square meter for a double application.

When Type III Micro-Surfacing is required, the minimum rate of application shall be 19kg per square meter for a double application.

When rut filling is required, Type III Micro-Surfacing shall be paved at the rate approved by the Engineer to fill the wheel rut as detailed on the plans.

Application. The surface may be pre-wetted with water by fogging ahead of the spreader box. The rate of application of the fog spray shall be adjusted during the day to suit temperature, surface texture, humidity, and dryness of pavement. The pavement surface shall be damp without any free flowing water ahead of the spreader box.

The Micro-Surfacing shall be of the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader box at all times so that a complete coverage is obtained. Overloading of the spreader box shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted.

No streaks, such as those caused by oversized aggregate, will be left in the finished surface. If excess oversize develops, the job will be stopped until the Contractor proves to the Engineer that the situation has been corrected.

No excess buildup, uncovered areas, or unsightly appearance will be permitted on longitudinal or transverse joints. The Contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the project. When possible, longitudinal joints shall be placed in proximity to lane markings. Half passes and odd width passes will be used only in minimum amounts. If half passes are used, they shall not be the last pass of any paved area.

A differential of not greater than 6mm along the transverse joints will be permitted, when measured with a 3m straight edge centered on the joint parallel to the traffic flow.

The Contractor shall protect and cover all utility structures and catch basins during the application of the micro-surfacing that are within the areas to be paved. These same protective coverings shall be removed upon completion of the project.

The Micro-Surfacing shall possess sufficient stability so that premature breaking of the material in the spreader box does not occur. The mixture shall be homogeneous during and following 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.

Areas which cannot be reached with the mixing machine shall be surfaced using hand squeegees to provide complete and uniform coverage. If necessary the area to be hand worked shall be lightly dampened prior to mix placement. Care shall be exercised to leave no unsightly appearance from hand work. The same type of finish as applied by the spreader box shall be applied. Hand work shall be completed during the machine application process.

Care should be taken to insure straight lines along curbs and shoulders. No run off on these areas will be permitted. Lines at intersections will be kept straight to provide a good appearance.

The Contractor shall remove any excess material in areas such as driveways, gutters and intersections, as specified by the Engineer. The Contractor shall, on a daily basis, remove any debris associated with the performance of work.

Curing. Traffic control shall be provided to protect the Micro-Surfacing until the mixture has cured sufficiently to prevent damage from traffic. Any damage done by traffic to the Micro-Surfacing shall be

repaired by the Contractor, to the satisfaction of the Engineer, at no additional cost to the State.

METHOD OF MEASUREMENT. Type II and Type III Micro-Surfacing shall be measured by the total number of metric tons of aggregate, mineral filler, and asphalt emulsion used in the accepted portion of the work.

Rut filling shall be measured by the total number of metric tons of aggregate, mineral filler, and asphalt emulsion used in the accepted portion of the work.

BASIS OF PAYMENT. The unit price bid per ton shall include the cost of all labor, materials, and equipment necessary to perform the work.

Payment will be made under:

Item No.	Item	Pay Unit
18410.1011 M	Micro-Surfacing Type II	Metric Ton
18410.1012 M	Micro-Surfacing Type III	Metric Ton
18410.1013 M	Micro-Surfacing Rut-Filling	Metric Ton