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DEPARTMENT OF TRANSPORTATION  
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**VIA OVERNIGHT DELIVERY**

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November 15, 2012

Contract No. T201206802.01  
MICROSURFACING CENTRAL AND SOUTH, FY 2012  
Kent County

Ladies and Gentlemen:

Enclosed is Addendum No. 1 for the referenced contract consisting of the following:

1. Four (4) pages, Special Provisions, 403511 - Polymer Modified Emulsion Micro-Surfacing (Ton) pages 13 through 16, revised, to be substituted for the same pages in the Proposal and one (1) page, page 16A, new to be added to the Proposal.

Please note the revisions listed above and submit your bid based upon this information.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott S. Gottfried".

Scott S. Gottfried  
Competitively Bid Contracts Coordinator  
:ssg  
Enclosures

**403510 - POLYMER-MODIFIED EMULSION MICRO-SURFACING (SQUARE YARDS)**  
**403511 - POLYMER-MODIFIED EMULSION MICRO-SURFACING (TON)**  
**403512 - POLYMER-MODIFIED EMULSION MICRO-SURFACING, ROLLED (SQUARE YARDS)**

**Description:**

This work consists of furnishing and constructing a polymer-modified emulsion paving system on a properly prepared foundation to create a durable, smooth-riding, skid-resistant, free-draining roadway surface.

In general, item 403511 is used where a variable thickness of material is required such as a leveling course; and item 403510 and 403512 is used where a uniform thickness of material is to be placed.

**Materials:**

**Coarse Aggregate.** Coarse aggregate shall conform to Section 805. The use of gravel or crushed gravel will not be permitted.

**Fine Aggregate.** Fine aggregate shall conform to Section 804 except for the gradation requirements.

**Mineral Filler.** Mineral filler shall be used by the Contractor. It shall be non-air-entrained Portland cement or hydrated lime conforming to AASHTO M17, Mineral Filler for Bituminous Paving Mixtures.

**Bituminous Material.** Bituminous material shall be polymer-modified, cationic, emulsified asphalt. The polymer modifier shall be milled into the asphalt or blended into the emulsifier prior to the emulsification process. The type and percentage of modifier shall be identified (such as natural latex rubber, styrene-butadiene rubber, styrene-butadiene-styrene, or ethylene-butadiene-styrene) on the certificate of analysis. The modifier shall make an emulsion mix which accelerates curing in order to allow traffic to be placed on the material within one hour, without damage occurring to the surface.

The minimum amount and type of polymer modifier shall be determined by the laboratory performing the mix design. The minimum amount required will be based on asphalt weight content and will be certified by the emulsion supplier. In general, a three percent (3%) polymer solids, based on asphalt weight, is considered minimum.

The emulsion modifier shall be adjusted at the emulsion manufacturer's facility.

The Contractor shall certify that the bituminous material (with the polymer) conforms to AASHTO M208 CSS-1h, with the following modifications:

AASHTO Test Specifications

T49	@ 77N F; 40-90
T59	62 % (minimum)
T53	140N F (minimum)

Each shipment of emulsified asphalt shall be accompanied with a certificate of analysis/ compliance from the manufacturer.

The emulsified asphalt shall be homogeneous, show no signs of separation, and at no time shall the temperature of the material exceed 120EF.

The specific gravity of each shipment of bituminous material shall be determined by the Contractor and provided with each shipment.

**Field Control Additive.** At the option of the Contractor, an additive may be added to the mixture in order to provide an altered set time. The additive must be identified (such as the emulsifier type) and be included as

part of the mix design submission. The Contractor shall certify that the additive was tested and demonstrated compatibility with all the other components of the mixture.

Water. Water shall conform to Section 803 of the Standard Specifications.

### Mixture Properties:

Each Contractor-proposed mix design (percentages of each aggregate type, mineral filler, emulsion, water, and field control additive; target combination gradations; and the design cure time) shall be approved by the Engineer prior to placement. The exact proportions used in the preparation of the micro-surfacing shall be determined by a testing laboratory, experienced in micro-surfacing mix design procedures, and approved by the Engineer. The proportions and gradations of all component materials for the target mix design shall be identified with a single percentage. When tested in accordance with AASHTO T27 (ASTM C136) and AASHTO T11 (ASTM C117), the target (mix design) aggregate gradation (including the mineral filler) shall be within one of the following bands:

Sieve	Type II	Type III	STOCKPILE TOLERANCE
3/8"	100	100	
#4	90 - 100	70 - 90	± 5%
#8	65 - 90	45 - 70	± 5%
#16	45 - 70	28 - 50	± 5%
#30	30 - 50	19 - 34	± 5%
#50	18 - 30	12 - 25	± 4%
#100	10 - 21	7 - 18	± 3%
#200	5 - 15	5 - 15	± 2%

The job mix (target) gradation shall be within the gradation band for the desired type. After the target gradation has been submitted (this should be the gradation that the mix design is based on), then the percent passing each sieve shall not vary by more than the stockpile tolerance shown in the above table for each individual sieve, and still remain within the gradation band. It is recommended that the percent passing shall not go from the high end to the low end of the range for any two consecutive screens.

Screening shall be required at the stockpile prior to delivery to the paving machine if there are any problems created by having oversize material in the mix. Type II gradations shall be screened through a 3/8-inch screen. Type III gradation shall be screened through a 1/2-inch screen.

The target mix design quantity of the bituminous material shall be identified with a single percentage value which shall be within the range of 6.5 to 8.0 percent of the total weight of the aggregate. The allowable production tolerance for the bituminous material asphalt residue shall be 0.4 percent of the total weight of the aggregate.

The amount of field control additive, when used, shall be identified with a single percentage value. If the amount is expected to change to another value for specific conditions anticipated on the project site, the mix proportions and the auxiliary value shall be considered a separate mix design. The specific conditions that will cause a change to the auxiliary mix design shall be identified with the submission of the proposed mix design. The allowable production tolerance for the amount of field control additive shall be based on acceptable performance in the field.

Water shall be added during the material mixing to produce the needed mix consistency. The optimum amount of water can be determined during mix design, however, it is understood that this value may be changed in the field due to ambient humidity, wind, air temperature, moisture absorbed by the pavement, etc. The mixture shall be homogeneous, free of excess water or emulsion, free of segregation of emulsion, and free of segregation of aggregate sizes.

Laboratory test results shall be provided by the Contractor that show that the proposed mixture conforms to the following requirements when testing according to the following referenced International Slurry Surfacing Association standard test methods:

Test Method	Property	Requirements
TB100	Wet Track Abrasion Loss - 1 hour soak	50 g/ft <sup>5</sup> max
	Wet Track Abrasion Loss - 6 day soak	75 g/ft <sup>5</sup> max
TB102	Mixing, Setting, and Water Resistance	10 minute, maximum, clear water set time
TB113	Mix Time 77EF (25EC)	Controllable to 120 seconds, minimum
TB114	Wet Stripping	Pass, 90% minimum
TB139	Wet Cohesion - 30 Minutes	12 kg-cm, minimum
	Wet Cohesion - 60 Minutes	20 kg-cm, minimum
TB144	Classification Compatibility	11 grade points, minimum
TB147A	Loaded Wheel Test	5% lateral displacement, maximum
		2.10 compacted specific gravity

The mixture shall also have satisfactory workability and performance when placed in a test strip. Requirements for the test strip construction are in the Preparations and Limitations section of this specification. If a change occurs in the source or the qualities of the component materials, a revised target mix design shall be submitted. When unsatisfactory results or other conditions make it necessary, a revised mix design shall be developed and submitted by the Contractor.

### Equipment:

The mixing and placement equipment must be approved prior to use. The material shall be mixed by an automatically sequenced, self-propelled machine; it shall be capable of accurately proportioning and delivering all component materials to a revolving multi-blade twin shaft pug mill type mixer; thoroughly mixing the component materials; and it shall be capable of discharging the mixture on a continuous flow basis.

The rate of water and field control additive shall be easily adjusted. Sufficient storage capacity shall be provided on the equipment for aggregates, bituminous material, mineral filler, field control additive, and water of adequate supply to the proportioning devices to maintain a continuous operation.

The mixing equipment shall also have an attached spreader box which is equipped with augers that agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact point. A rear seal shall act as final strike-off and shall be height-adjustable. The spreader box and rear strike-off shall be designed so that a uniform pavement surface consistency is achieved; these shall be clean and not excessively worn. The spreader box shall be kept clean and buildup of asphalt and aggregate on the box shall not be permitted.

A secondary strike-off shall be provided to improve surface texture. The secondary strike-off shall have the same adjustments as the spreader box.

### Preparations and Limitations:

The mixing machine shall be calibrated, at a DelDOT approved location; to the job mix proportion targets in the presence and to the satisfaction of the Engineer prior to the start of the work, and shall be checked whenever there is a question about the accuracy of the proportioning. Documentation is to be generated for the Engineer, including individual calibrations of each material at various settings. A minimum of 3 runs for each material shall be performed. During calibration of the aggregate and the asphalt emulsion a minimum of 250 pounds of each material shall be dispensed continuously for each of the calibration runs. The controls for proportioning the mixture, including the components of water and field control additive, shall be readily visible to the Engineer in order evaluate whether a change to the calibrated settings has occurred.

For each combination of equipment and mixture design, prior to performing work measured for payment, an approved test strip shall be constructed. To be approved the test strip shall be of minimum size and shall demonstrate the required performance. The minimum size of the test strip for each combination must be of 100N long, and 12N wide. It shall be placed in the same number of passes and at a minimum spread rate specified for each location. The test section shall be placed using the same equipment, methods, and mixes as scheduled for use on the Contract. If a test section proves to be unsatisfactory, the necessary adjustments to the mix design, equipment, and placement methods shall be made. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. The maximum clear

water set time shall be 10 minutes. Traffic shall be able to be on it, without material pickup, within one hour after its placement.

The surface shall be cleared of vegetation, dirt, mud, free water, and any other loose or detrimental materials prior to placing the mixture. Vegetation and debris shall also be cleared from the edges of the road. Areas impregnated with grease, oil, or fuel shall be cleaned by grinding. Traffic paint not tightly bonded to the surface or has excessive build up, and any thermoplastic markings shall be removed by grinding or other method approved by the Engineer.

Paving shall not be performed if either the pavement or air temperature is below 50EF, if rain is imminent within 12 hours, or if the temperature is expected to drop below 40EF within 24 hours after application. If the temperature is expected to be over 95 F the contractor must inform the Engineer of their methods to control set times and must obtain approval from the Engineer prior to placing material.

The bituminous material shall be less than 120EF and gently agitated before use.

### **Construction Methods:**

The mixture shall be uniformly spread at a final total mix application rate of a minimum of 30 lbs/yd<sup>5</sup>. This may be accomplished by placing two separate layers of material with each layer being placed on the same or successive days at the sole discretion of the Engineer. When necessary, the materials shall be spread in variable thick cross sections, to fill in ruts and minor deformations, and to create a smooth-riding, high skid-resistant, roadway surface having a well-draining cross-slope.

Any area of the constructed surface which has a deviation, higher or lower, that is greater than 3/160 from a 10N straightedge placed on the surface is unacceptable. No streaks, scratch marks, drag marks, tears, rippling, streaks, lumps, segregation, or other surface irregularities will be acceptable.

Handwork will be permitted only for those areas that cannot be reached with the mixing machine. Handwork must produce a surface finish and appearance similar to that produced by the spreader box.

Longitudinal joints shall be tight without gaps or excessive buildups. Transverse joints shall appear neat and uniform. The edge lines shall be straight, no more than 2 inch variance in any 100N length.

The mix shall be placed to allow traffic on the constructed pavement surface within one hour without any pick up of material by the traffic. At intersections, or other points requiring earlier opening, the Contractor shall shorten the road closure time to a maximum of 15 minutes; a different amount of field control additive in the mixture may be used by the Contractor to meet this requirement.

The Contractor shall submit the following signed, written reports to the Engineer for each staging location:

1. A report indicating the amount of aggregate and emulsion delivered, aggregate and emulsion used on the project, and the amount of area in square yards completed.
2. A report indicating the percentage of emulsion used to aggregate used and the application rate in pounds of aggregate applied per square yard of area covered. This report will verify compliance with the mixture of materials to the mix design and the specified aggregate application rate.

The Contractor shall submit to the Engineer from the aggregate and emulsion suppliers an original copy of the bill of lading weekly for each delivery of material to be used on the project. The Contractor shall submit with each emulsion bill of lading a certificate of analysis from the emulsion supplier verifying that each delivery of emulsion is in compliance with the contract requirements. Micro-surfacing placed using item 403512 - Polymer-Modified Micro-Surfacing, Rolled shall be compacted with a smooth pneumatic tire roller with a minimum weight of 4 tons. Rolling shall start when the micro-surfacing has set sufficiently to prevent any pickup of material and rolled a minimum of 3 coverages by the roller or until a uniform surface is obtained.

**Method of Measurement:**

The quantity of item 403510 - Polymer-Modified Emulsion Micro-Surfacing and 403512 - Polymer-Modified Emulsion Micro-Surfacing, Rolled will be measured as the actual number of square yards of polymer-modified emulsion micro-surfacing placed and accepted. The quantity will be determined by computations based on field measurements taken on and along the completed finished surfaces and verified by items 1 and 2 in the construction methods section. Multiple layers will not be measured separately.

The quantity of item 403511 - Polymer-Modified Emulsion Micro-Surfacing will be measured as the actual number of tons of polymer-modified emulsion micro-surfacing placed and accepted. The quantity will be based on the combined tonnage of aggregate, mineral filler, and emulsion used and accepted in place. The quantities will be computed as follows:

1. Aggregate. Measure the quantity of aggregate using the calibrated, dry weight of aggregate control device.
2. Mineral Filler. Compute this quantity from a count off the calibrated metering device for mineral filler.
3. Emulsion. Compute the quantity of polymer-modified asphalt emulsion by weight used, as determined by the calibrated metering device.

The amount of field control additive will not be measured separately. Materials and work for the test strip will not be measured for payment. Required repairs will not be measured for payment.

**Basis of Payment:**

The quantity of item 403510 - Polymer-Modified Emulsion Micro-Surfacing and 403512 - Polymer-Modified Emulsion Micro-Surfacing, Rolled will be paid for at the Contract unit price per square yard. The quantity of item 403511 - Polymer-Modified Emulsion Micro-Surfacing will be paid for at the Contract unit price per ton. Price and payment will constitute full compensation for designing the mixture; mobilizing and furnishing all equipment, materials, and labor; preparing the foundation (removing traffic striping, cleaning the roadway surface, and clearing the debris from the edge of the road); placing the materials; protecting and repairing damage to the surface; and for all labor, equipment, tools and incidentals necessary to complete the work.

**NOTE:**

The Asphalt Cement Cost Adjustment for this item will be applied when the total emulsified asphalt used exceeds 15,850 gal. This note supersedes the Note with item 401502 - Asphalt Cement Cost Adjustment.

11/1/12

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