STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
JACK MARKELL
GOVERNOR
PO BOX 778
DOVER, DELAWARE 19903
SHAILEN BHATT
SECRETARY

VIA WEBSITE POSTING

(302) 760-2030
FAX (302) 739-2254

October 22, 2013

Contract No. T201206803.01
Federal Aid Project No. ESTP-2013(09)
Microsurfacing Central South, FY 2014
Kent and Sussex Counties

Ladies and Gentlemen:

Enclosed is Addendum No. 2 for the referenced contract consisting of the following:

1. Six (6) pages, Special Provisions, 403512 - Polymer-Modified Emulsion Micro-Surfacing, pages 69 through 74, revised, to be substituted for the same page in the Proposal.

2. One (1) sheet, Construction Plans, sheet 17, revised, to be substituted for the same sheet in the Plan Set.

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

Sincerely,

signature on file

James H. Hoagland
Contract Services Administrator

:jhh
Enclosures

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

Description:

Furnish and construct a polymer-modified emulsion paving system on a prepared foundation as shown on the Plans and as directed by the Engineer.

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

Materials:

A. Provide materials as specified:

Bituminous Materials	AASHTO M208 CSS 1hP, with the following modifications:
AASHTO Test	Specifications
T49	@ 77 degree F; 40-90
T59	62 % (minimum)
T53	140 degree F (minimum)
Mineral Filler	AASHTO M 17, hydrated lime, or non-air-entrained portland cement Type I meeting AASHTO M 85
Field Control Additive	liquid additive compatible with the Bituminous emulsion used to control the set time of the microsurface mix in order to meet return to traffic time requirements
Tack Coat	Bituminous materials conforming to this specification that may be diluted in accordance with manufacturer recommendations at the rates in section C.8 of this specification
Water	Section 803

Aggregate. Use mineral aggregate that is the type specified for the particular application requirements of the micro surfacing. The aggregate shall be a crushed stone such as granite, slag, limestone, chat, or other high-quality aggregate, or combination thereof. To assure the material is 100 percent crushed, the parent aggregate will be larger than the largest stone in the gradation used. The use of gravel or crushed gravel will not be permitted.

All aggregate should meet these minimum requirements:

TEST	AAHSTO TEST	SPECIFICATION
Sand Equivalent Value of Soils and Fine Aggregate	T 176	65 Minimum
Soundness of Aggregates by Use of Sodium Sulfate of Magnesium Sulfate	T 104	15% Maximum w/NA2SO4 25% Maximum w/MgSO4
Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine*	T 96	~~30~~ 25% Maximum

*The abrasion test is run on the parent aggregate.

B. *Mix Design*. Prepare and submit a job mix formula (JMF) including all materials, methods and proportions to the Engineer for approval prior to the start of work. Submit test results for review a minimum of 10 days

before application. Include aggregate type and gradation and percentages of polymer-modified emulsion, water, cement by dry aggregate weight (mass), and the design cure time.

1. JMF acceptance is subject to satisfactory field performance;
2. Unsatisfactory field performance requires re-design and re-submittal of the JMF design for approval.
3. Formulate with a minimum polymer content, based on asphalt weight, of 3 percent;
4. Formulate so a 1 in (25 mm) thick application, at a maximum 50 percent humidity and 75°F (25°C) minimum ambient air temperature, supports rolling traffic without surface damage after a 1-hour cure
5. Submit a revised JMF design when changes occur in the source or the qualities of the component materials.
6. The exact proportions used in the preparation of the micro-surfacing shall be determined by a testing laboratory, experienced in micro-surfacing JMF design procedures. Identify the proportions and gradations of all component materials for the JMF design with a single percentage.

   a. *Bituminous Material.* Identify the type (such as natural latex rubber, styrene-butadiene rubber, styrene-butadiene-styrene, or ethylene-butadiene-styrene) and percentage of modifier on the certificate of analysis.
      i. Ensure the mixed emulsified asphalt will not separate;
      ii. Do not allow the temperature of the material to exceed 120° F (50°C);
      iii. Accompany each shipment of emulsified asphalt with a certificate of analysis/ compliance from the manufacturer.
      iv. The emulsion modifier shall be adjusted at the emulsion manufacturer's facility.
      v. The specific gravity of each shipment of bituminous material shall be determined by the Contractor and provided with each shipment.

   b. *Field Control Additive*. An additive may be added to the mixture in order to provide an altered set time.
      i. The additive must be identified (such as the emulsifier type) and be included as part of the JMF design submission.
      ii. Ensure with the certification of analysis that the additive was tested and demonstrated compatible with all the other components of the mixture.

   c. *Gradation.* The JMF design aggregate gradation including the mineral filler must be within one of the following bands when tested in accordance with AASHTO T27 and AASHTO T11:

Sieve	Type II	Type III	STOCKPILE TOLERANCE
3/8" (9.5 mm)	100	100	
#4 (4.75 mm)	90 -100	70 - 90	± 5%
#8 (2.36 mm)	65 - 90	45 - 70	± 5%
#16 (1.18 mm)	45 - 70	28 - 50	± 5%
#30 (600 um)	30 - 50	19 - 34	± 5%
#50 (330 um)	18 - 30	12 - 25	± 4%
#100 (150 um)	10 - 21	7 - 18	± 3%
#200 (75 um)	5 - 15	5 - 15	± 2%

The JMF 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 JMF 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.

Screen the stockpile prior to delivery to the paving machine. Screen Type II through a 3/8-inch sieve. Screen Type III gradation shall be screened through a 1/2-inch sieve.

Submit laboratory test results ensuring that the proposed mixture conforms to the requirements of the following referenced International Slurry Surfacing Association standard test methods:

Test Method	Property	Requirements
TB100	Wet Track Abrasion Loss - 1 hour soak	50 g/sq ft max

	Wet Track Abrasion Loss - 6 day soak	75 g/sq ft max
TB102	Mixing, Setting, and Water Resistance	10 minute, maximum, clear water set time
TB113	Mix Time 77EF (25ºC)	Controllable to 120 seconds, minimum
TB114	Wet Stripping	Pass, 90% minimum
TB139	Wet Cohesion - 30 Minutes Wet Cohesion - 60 Minutes	12 kg-cm, minimum 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 target JMF design quantity of the bituminous material shall be identified with a single percentage value which shall be within the range of 7.0 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 specific 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 JMF. The specific conditions that will cause a change to the auxiliary JMF shall be identified with the submission of the proposed JMF. 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.

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

Construction Methods:

A. *Weather Limitations*. Place micro surfacing material when the following conditions apply:
1. Minimum air temperature is 50°F (10°C) and rising;
2. The surface must be dry;
3. 24 hour forecast predicts temperatures above 40°F (4°C) after application;
4. Surface temperature is at least 50°F (10°C); and
5. Rain is not imminent within 24 hours.

If the temperature is expected to be over 95 degree 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.

B. *Aggregate and Asphalt*. Weigh aggregate before delivery to roadway. Proportion emulsified asphalt by weight (mass).

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.

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. 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.

C. *Preparing Existing Surface*.
1. Clean/clear the roadway surface of all loose aggregate, rubber from skid marks, vegetation, dirt, mud, free water, and any other foreign material.
2. Clear vegetation and debris from edges of road.
3. Scrub and remove extensive grease spots or saturated oil from the pavement surface with industrial detergent and/or use acrylic sealers for severe problem areas.
4. Fill/seal cracks greater than 1/4 in. (6 mm).
5. Completely remove thermoplastic markings.
6. Grind all traffic paint lines to remove paint not tightly bonded to the surface or to reduce the thickness of paint lines with excessive build up. Care should be taken to not damage crack sealing.
7. Where necessary use the micro surfacing material to fill potholes, utility cuts, and ruts with the mixture to restore roadway cross section.
   a. Use of a rut-filling box is required to fill ruts/cuts of 0.5 in (12.7 mm), or greater in depth.
   b. Ruts in excess of 1.5 in (38 mm) in depth require multiple applications with the rut-filling box to restore the cross-section.
   c. When rutting or deformation is less than 0.5 in (12.7mm), a full width scratch course may be applied with the spreader box using a metal or stiff rubber strike-off. Apply at a sufficient rate to level the pavement surface.
   d. All rut-filling and level-up material should cure under traffic for at least twenty-four (24) hours before additional material is placed.
8. Apply tack coat on each location to receive microsurfacing. The emulsified asphalt should be the micro surfacing emulsion or CSS type emulsion. Other grades of emulsion may be considered but it is the contractor's responsibility to demonstrate and ensure the tack emulsion is compatible with the micro surfacing emulsion prior to use. The tack coat may consist of one part emulsified asphalt/one part water. Consult with the micro surfacing emulsion supplier to determine dilution stability. Apply tack with a standard distributor capable of applying the dilution evenly at a rate of 0.10 gal/SY minimum. Allow tack to cure sufficiently before the application of micro surfacing.

D. *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.

Calibrate and properly mark proportioning controls for easy verification, at a DelDOT approved location; to the JFM proportion targets in the presence and to the satisfaction of the Engineer prior to the start of the work. Check calibration 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 JMF, prior to performing work measured for payment, an approved test strip shall be constructed. The minimum size of the test strip for each combination must be of 100 ft long and 12 ft wide and demonstrate the required specification conformance. It shall be placed in the same equipment, methods, mixes, and number of passes and spread rate specified for each location. If a test section proves to be unsatisfactory, the necessary adjustments to the mix design, equipment, and placement methods shall be made and a new test strip shall be made to verify conformance.

Proportion emulsified asphalt by weight (mass).

Equip the mixing machine with a pressure water system and nozzle-type spray bars to provide a water spray to the tacked surface immediately ahead of and outside the spreader box.

Add filler at the loading facility or at the roadway. Provide a documented record of filler weight (mass). Add Field Control additives according to the manufacturer's recommendations to meet field conditions and/or return to traffic times.

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 primary 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.

Roller
Pneumatic rollers with all tires inflated to manufacturer recommended pressures. Tires will be clean, smooth, and free of any deformation that would leave marks in the finished surface.

E. *Applying Mixture.* The mixture shall be uniformly spread at a final total mix application rate of a minimum of 30 lbs/SY. 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 3/16 in from a 10 ft 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.

No excess buildup, uncovered areas, or unsightly appearance shall be permitted on longitudinal or transverse joints. Transverse joints shall appear neat and uniform. The contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the project. Partial width passes will only be used when necessary and shall not be the last pass of any paved area. A maximum of 3.0 in shall be allowed for overlap of longitudinal joints. Also, the joint shall have no more than a 0.25 in difference in elevation when measured by placing a 10 ft straight edge over the joint and measuring the elevation difference. The edge lines shall be straight, no more than 2 inch variance in any 100 ft 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.

Micro-surfacing shall be compacted with a smooth pneumatic tire roller with a minimum weight of 10 tons. Allow the micro surfacing to set sufficiently that it does not pick up on the pneumatic tires. Roll all areas a minimum of 3 passes or until a uniform surface profile meeting the requirements of this specification is obtained.

F. *Maintaining Traffic*. Meet traffic control plan.

Protect the micro surfacing material from traffic damage until the mixture cures and will not be damaged by traffic. Repair traffic damage to the micro surfacing application before acceptance and at no cost to the Department.

Method of Measurement:

The quantity of item 403512 - Polymer-Modified Emulsion Micro-Surfacing, 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 part B. of the Construction Methods section of this specification. 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.

Basis of Payment:

The quantity of item 403512 - Polymer-Modified Emulsion Micro-Surfacing, 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, 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.

Unsatisfactory test strips will not be measured for payment.

Required repairs will not be measured for payment.

Grinding of striping is incidental

Tack coat is incidental.

Thermoplastic marking removal will be paid under the respective items.

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.

Microsurfacing will not be placed between September 30th and May 1st without approval from the engineer.

~~08/1/2013~~10/21/2013

NOTES

33. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACTOR HAS CONSIDERED IN HIS BID ALL PERMANENT AND TEMPORARY UTILITY APPURTENANCES IN THEIR PRESENT AND RELOCATED POSITIONS AS SHOWN ON THE PLANS OR DESCRIBED IN THE UTILITY STATEMENT OR ARE READILY DISCERNIBLE AND THAT NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ANY DELAYS, INCONVENIENCE, OR DAMAGE DUE TO ANY INTERFERENCE FROM THE UTILITY FACILITIES AND APPURTENANCES OR THE OPERATION OF MOVING THEM, EXCEPT THAT THE CONTRACTOR MAY BE GRANTED AN EQUITABLE EXTENSION OF TIME.

34. COORDINATION AND COOPERATION AMONG THE UTILITY COMPANIES AND THE STATE'S CONTRACTOR ARE OF PRIME IMPORTANCE. THEREFORE, THE CONTRACTOR IS DIRECTED TO CONTACT THE FOLLOWING UTILITY COMPANY REPRESENTATIVES WITH ANY QUESTIONS REGARDING THIS WORK PRIOR TO SUBMITTING BIDS AND WORK SCHEDULES. PROPOSED WORK SCHEDULES SHOULD REFLECT THE UTILITY COMPANIES' PROPOSED RELOCATIONS. THE UTILITY COMPANIES DO NOT WORK ON WEEKENDS OR LEGAL HOLIDAYS.

35. THE ASPHALT ADJUSTMENT COST ADJUSTMENT IN THE CONTRACT IS FOR REFERENCE ONLY. THE ACTUAL BASE PRICE FOR PAY ITEM 401502 WILL BE THE PRICE AT THE TIME OF THE CONTRACT BID, THEREBY, SUPERSEDING THE CONTRACT PRICE.

36. ONCE CONTRACT WORK BEGINS, THE CONTRACTOR IS REQUIRED TO PERFORM CONTINUAL OPERATIONS, WITHIN SPECIFIED WEATHER LIMITATIONS, REGARDLESS OF REMAINING CONTRACT DURATION UNLESS OTHERWISE APPROVED BY THE ENGINEER. FAILURE TO COMPLY WILL BE CAUSE FOR THE CONTRACTOR TO BE CONSIDERED IN "DEFAULT OF CONTRACT" PURSUANT TO SECTION 108.10 OF THE STANDARD SPECIFICATIONS.

37. THE OVER BAND WIDTH FOR CRACK SEALING ITEM # 406507 SHALL BE LIMITED TO 2 INCHES.

38. THE DEPARTMENT RESERVES THE RIGHT TO ADD OR DELETE LOCATIONS AND/OR QUANTITIES. SUCH LOCATION OR QUANTITY ADDITIONS OR DELETIONS SHALL NOT BE CAUSE FOR AN INCREASE OR DECREASE IN THE UNIT BID PRICE.

△2 39. LIQUIDATED DAMAGES WILL BE ASSESSED IF CONTRACTOR DISCONTINUES WORK WITHOUT DEPARTMENT ENGINEER'S WRITTEN APPROVAL.

△2 40. CONTINUOUS MACHINE SHALL BE USED FOR ROADS LONGER THAN 1.5 MILES.

△2 41. AGGREAGATE SHALL NOT CONTAIN MICA.

ADDENDUM △2 - ADD NOTES 39 THROUGH 41. RDG 10/21/2013