SECTION 406

ASPHALT SURFACE TREATMENT - SINGLE TREATMENT

406.1 Description

1 This section contains specifications for the materials, equipment, construction, measurement, and payment for a wearing surface composed of an application of a modified cationic emulsion (CRS-2P) and an application of aggregate, constructed on a prepared base course, existing base or surface course, or the existing road surface, and in conformance with the typical cross-section shown on the Plans and to the lines and grades set by the RCE.

406.2 Materials

406.2.1 Asphalt Materials

406.2.1.1 Modified Emulsified Asphalt (Cationic)

1 Use a cationic emulsified asphalt of the grade designated as CRS-2P conforming to the requirements in AASHTO M 316 with the exclusion of Force Ratio and with the addition of the following:

Add either natural latex, a styrene-butadine-styrene (SBS) polymer, or an unvulcanized styrene-butadine rubber (SBR) in an emulsified latex form to a PG58-22 base asphalt at the necessary proportions to result in 3% polymer by weight of the asphalt residue. Do not perform any post blending or acid modification of the CRS-2P. The RCE will sample the asphalt at a frequency of not less than one sample per 25,000 gallons and will submit the sample to the OMR within 7 days of sampling.

406.2.2 Aggregate

1 Use aggregates consisting of clean, washed, tough, dry, durable particles of crushed stone, crushed gravel, or crushed slag; free from soft, thin, elongated or laminated pieces, disintegrated particles, vegetation, or other deleterious substances; and from a source listed on ***SCDOT Qualified Product List 1*** *or* ***SCDOT Qualified Product List 2****, as applicable*. Do not use marine limestone.

2 Make certain that aggregates are within the required gradation limits provided in the Appendix of these specifications.

3 Ensure that crushed stone or gravel has an abrasion loss of not more than 60.0% when subjected to the Los Angeles Abrasion Test (AASHTO T 96). Ensure that slag has an abrasion loss of not more than 45.0% when subjected to the Los Angeles Abrasion Test.

4 When slag is used, ensure that it has a dry weight of 75 pounds per cubic foot or greater.

5 When specified, lightweight aggregates may be used in surface treatment provided the aggregate comes from a source listed on *SCDOT Qualified*

Product List 2 and meets the requirements of AASHTO M 195, Lightweight Aggregates for Structural Concrete (with the exception of any references to concrete samples or concrete strength).

6 Conform lightweight aggregate to also meet the physical properties in the following table.

Physical Properties of Lightweight Aggregate		
Property	**Test Procedure**	**Specification (Max.)**
Dry Loose Weight	AASHTO T 19	60 lbs./ft^3 *
Sodium Sulfate Soundness	AASHTO T 104 (Loss at 5 cycles)	15.0%
Los Angeles Abrasion Resistance	AASHTO T 96	45.0%
Absorption	AASHTO T 19	6.0%
* This value supersedes the value given in AASHTO M 195		

7 Use lightweight aggregate that is non-corrosive and meets the gradation requirements within the ranges shown in the following table.

Gradation Range of Lightweight Aggregate	
Sieve	**Percent Passing, %**
½-inch	100.0
⅜-inch	80.0 – 100.0
No. 4	5.0 – 40.0
No. 8	0.0 – 20.0
No. 16	0.0 – 10.0

8 The pounds of aggregate in this specification are based upon an apparent specific gravity of 2.65. If the apparent specific gravity of the aggregate used is other than 2.65, make appropriate adjustments in the number of pounds required per square yard to ensure a uniform coverage.

9 When slag is used as the aggregate, increase the amount of emulsion used in the mat and seal applications to 15% over that herein specified without additional compensation.

10 When other aggregates with high absorption characteristics are used, the RCE may increase the quantity of emulsion specified for each application to compensate for the absorbed material without additional compensation.

11 No tolerance below the specified minimum quantity per square yard of emulsion or aggregate is allowed, except if a satisfactory uniform cover with material applied at a rate less than that required by these specifications is

actually obtained. If for any reason the RCE should decide to raise the minimum limit, appropriate notice will be given in writing. Any increase in the minimum limit carries a corresponding increase in the maximum limit. The upper limit specified is intended to give some leeway in carrying on the work.

406.3 Equipment

406.3.1 Distributors

1 Make certain that all distributors are mounted on pneumatic tires of sufficient width to prevent cutting or breaking the surface bond when the tank is fully loaded. Ensure that the distributor is designed, equipped, maintained, and operated so that the emulsion is uniformly applied (without streaking) at the required constant temperature and pressure and at the specified rate. Ensure that the distributor equipment includes a tachometer, pressure gauges, and accurate volume measuring devices or calibrated tank, and a thermometer for determining the temperature of the contents. Make certain the distributor is equipped with a hose and nozzle attachment for spotting areas inaccessible to the distributor spray bars. Ensure that the distributor spray bars are adjustable both laterally and vertically. In order to prevent lapping at the junction of two applications, ensure that the distributor is equipped with a positive shut-off control. Calibrate distributors in accordance with **Subsection 406.4.3.1** immediately before use on the project.

406.3.2 Aggregate Spreaders

1 Use aggregate spreaders that are approved self-propelled aggregate spreaders, mechanical type spreaders hooked onto the supply truck, or tailgate spreaders. Make certain the spreaders are constructed so that they are accurately controlled to distribute the aggregate uniformly and at the required rate. Calibrate the spreaders in accordance with **Subsection 406.4.3.2** immediately before use on the project.

406.3.3 Rollers

406.3.3.1 Steel Wheel Rollers

1 Use steel wheel rollers weighing a minimum of 8 tons and are in good working condition. Ensure that they are equipped with smooth tires to prevent tracking, adjustable scrapers to keep the rollers clean, and an efficient means of keeping the wheels wet to prevent mixes from sticking to the rollers.

406.3.3.2 Pneumatic-Tire Rollers

1 Use pneumatic-tire rollers that are self-propelled, have an effective rolling width of not less than 60 inches, and are equipped with pneumatic tires of equal size and diameter. Ensure that the minimum tire pressure is 90 pounds per square inch, not varying more than 5 pounds per square inch between tires. Make certain the wheels of the rollers are placed so that one pass will accomplish complete coverage equal to the rolling width of the machine. Ensure that there is a minimum of ¼-inch overlap of the tracking wheels. Make certain that the wheels do not wobble, and the contact pressure is uniform for all wheels. Ensure that the pneumatic-tire roller has enough ballast space to

provide a minimum gross weight of 5 tons. Use enough pneumatic-tire rollers to complete uniform coverage.

406.3.4 Determination of Truck Weights

1 If the truckloads of aggregates are not delivered to the work with weight tickets for each load, the RCE may require one round of trucks to be weighed on approved scales in order to determine the application rate. Weigh the trucks both loaded and empty. After the work begins, load the trucks with a similar load as when weighed. At any time, the RCE may require the aggregates in the truck-bed to be leveled in order that the volume of the aggregate may be determined. When the unit weight of the aggregates is known, the RCE may use this method for determining truck weights instead of weighing them. The cost of this work is considered included in the contract unit price for surface treatment.

406.3.5 Equipment on Site

1 Ensure that the equipment necessary for the proper construction of the work is on site, in acceptable working condition, and approved by the RCE as to both type and condition before the start of work under this section. Provide sufficient equipment to enable prosecution of the work in accordance with the project schedule and completion of the work in the specified time.

406.4 Construction

406.4.1 Weather and Seasonal Limitations

1 Do not perform surface treatment work between October 15 and March 15 inclusive, except with the written permission of the RCE.

2 Do not apply surface treatment on a wet surface, when rain is imminent, when the ambient temperature is below 60ºF, or when weather conditions are anticipated not to meet the above mentioned requirements within a 12-hour period.

406.4.2 Cleaning of Surface

1 Ensure that the surface of the roadbed to be treated is dry and clean of all dust, dirt, clay, and all deleterious matter at the time the surface treatment is applied. Clean the roadbed surface with power sweepers, hand brooms, mechanical brooms, or other equipment acceptable to the RCE.

406.4.3 Calibration of Equipment

406.4.3.1 Distributor

1 Within the first 1000 feet of the project and then once per week, calibrate the distributor by obtaining a dry weight of a 1 square yard piece of building paper or metal pan, placing it in the middle of the lane to be treated, passing the distributor over the test area, and obtaining a final weight. Use the following equation to calculate the application rate:

$$R = w/D$$

where:

R = asphalt emulsion application rate, (gal/sy)

w = weight of emulsion on paper, (lbs/sy)

D = density of emulsion at 60ºF (lbs/gal)

2 Determine the rate at the spraying temperature by dividing R by the temperature-volume correction factor from *Temperature-Volume Corrections For Emulsified Asphalt* table in **SC-T-86**.

406.4.3.2 Aggregate Spreader

1 Within the first 1000 feet of the project and then once per week, calibrate the spreader by obtaining a dry weight of a 1 square yard metal pan, placing it in the middle of the lane to be treated, passing the spreader over the test area, and obtaining a final weight. Use the following equation to calculate the application rate:

$$R = w/A$$

where:

R = aggregate application rate, (lbs/sy)

w = weight of aggregate in pan, (lbs)

A = Area of pan (sy)

406.4.4 Sequence of Operations

1 Apply the surface treatment using quantities and sequence of operations as outlined in the following table.

Asphalt Surface Treatment - Single Treatment	
Sequence Of Operations	**Quantities Per Square Yard**
1. Clean surface	
2. Apply CRS-2P (gal.)	0.28 – 0.35
3. Immediately spread Aggregate No. 789 (lbs.)	15 – 20
OR immediately spread Aggregate No. 89M (lbs.)	12 – 15
OR immediately spread Lightweight Aggregate (lbs.)	6 – 12
4. Roll with pneumatic rollers in tandem	
5. Continue rolling with pneumatic rollers until aggregate is firmly seated.	
6. Remove excess aggregate.	

406.4.5 Application of Asphalt Materials

1 Do not apply the asphalt material until the base or surface on which the material is to be placed is properly cured, firm, intact, clean, dry, and compacted to the satisfaction of the RCE and conforms to the typical cross-section shown on the Plans and to the lines and grades established by the RCE.

2 Apply the asphalt material uniformly by means of a distributor at the rate specified and within the temperature limits stated herein. Apply the asphalt material for the full width to be treated in one application unless the RCE directs or permits otherwise. If the material is applied to a partial width at a time, provide suitable and adequate joints between adjacent treatments to ensure complete and uniform coverage. At the beginning and end of the distribution of each load, use building paper or other suitable paper to ensure a clean, straight line where the treatment begins and terminates. Take special precaution to have the distributing machine adjusted and operated so that an even and uniform distribution of the asphalt material is obtained. If streaking develops, stop the distributor immediately and correct the problem before proceeding. Immediately remove excessive deposits of asphalt material on the road surface and correct in a satisfactory manner. In applying the asphalt material, use effective means of protecting adjacent structures from discoloration. Determine the speed of the application of asphalt material in accordance with the number of rollers and the speed at which they are permitted to operate. Provide a means to verify the distributor's calibration.

2 Spray binder at a temperature between 300ºF and 350ºF, MC-30 at a temperature between 50ºF and 120ºF, and MC-70 at a temperature between 120ºF and 180ºF. Spray all emulsions at a temperature between 50ºF and 160ºF, except for CRS-2P, which is sprayed at a temperature between 140ºF and 185ºF. At the time of application, the RCE will set the exact temperature to satisfy current conditions.

406.4.6 Spreading of Aggregate

1 Ensure that the aggregate is available at the site of the work loaded in trucks or is delivered in manner so that the emulsion is immediately covered in a continuous operation. Make certain that the spreading of the aggregate takes place within 200 feet of the application of the emulsion. Shorten this distance due to low temperatures or high humidity. Uniformly spread the required amount of aggregate with approved spreaders. Operate trucks or spreaders so that the emulsion is covered with aggregate before the wheels pass over it. Use hand brooms as necessary. Ensure that the quantity of mat aggregate in place, after the completion of drag brooming and rolling, is no more and no less than that needed to give a complete cover. If determined necessary by RCE, have a spotter truck available to follow the spreader to fill in any non-covered areas.

406.4.7 Rolling

1 Use two pneumatic-tired rollers in tandem to ensure full coverage is completed before the emulsion "breaks." Complete a minimum of three passes within 30 minutes of the aggregate application. Stagger rollers and do not allow rollers to exceed 7 mph. Have the rolling speed determine the production speed. If necessary, use additional rollers to increase productivity. Ensure that rolling produces an even surface with thorough keying of the aggregate into the asphalt and is performed in a longitudinal direction, beginning at the outer edges of the treatment and working toward the center. If it is determined during the first calibration test section that a single pass of a steel wheel roller is needed to assist in the seating of the stone, one may be added if the rolling operation is completed within 30 minutes.

406.4.8 Sweeping and Cleaning

1 Do not sweep the loose aggregate until the emulsion is set. Determine the time frame for sweeping by the cure time of the emulsion, the temperature, the humidity, and other variables. Remove from the surface all loose aggregate that may be injurious to the finished road by means of a pick-up sweeper. Remove and dispose of this material away from the project. If material is clean and free of deleterious material and meets gradation limits, the Contractor may opt to reuse this material.

406.4.9 Opening to Traffic

1 After the surface treatment has been rolled, the emulsion has cured sufficiently to hold the aggregate, and the loose aggregate has been swept and removed, allow traffic on the road. Maintain "Loose Stone" and "25 MPH" signs until a pilot vehicle can test the surface treatment for loose aggregate. If it is determined by the RCE that loose stone is present, sweep and clean the area until no loose stone is detected. Once this is completed, allow traffic to resume normal operating speeds.

2 On sections where it is impracticable to close to traffic, the RCE may direct the Contractor to split the seal stone into two applications and allow traffic to use these sections.

406.4.10 Maintenance

1 In addition to the maintenance required as specified in **Subsection 104.7**, repair all spotty or bleeding places or any defects that occur during or after the surface treatment operations until no loss of stone is detected and traffic has resumed normal operating speeds. Make the necessary repairs in a manner that restores a uniform surface and ensures the durability of the portion repaired.

406.5 Measurement

1 The quantity for the pay item Asphalt Surface Treatment (Single Treatment) is the surface area of the road with asphalt surface treatment and is measured by the square yard (SY), complete in-place, and accepted. Material

placed outside of the designated treatment area is disregarded in computing the quantity.

2 For the purpose of verifying rates of application and measuring materials authorized to be applied at a rate greater or lesser than that required by these specifications, the following rules apply:

A. Measurement in all cases is based on material actually and properly incorporated into the surface treatment and excludes loss due to the negligence of the Contractor or other circumstances as determined by the RCE.

B. The quantities of emulsion are based on the volume of the material at the temperature of 60ºF. Correct volumes measured at higher or lower temperatures to the volume of the material at 60ºF using the table entitled *Temperature-Volume Corrections for Emulsified Asphalt* in **SC-T-86**.

406.6 Payment

1 Payment for the accepted quantity for Asphalt Surface Treatment (Single Treatment), measured in accordance with **Subsection 406.5** is paid for at the contract unit bid price for the pay item. Payment is full compensation for constructing the asphalt surface treatment as specified or directed and includes furnishing, hauling, applying, spreading, and rolling the asphalt surface treatment; applying a prime coat when specified; surface preparation; removal of excess aggregate; and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, the Specifications, and other terms of the Contract.

2 Payment for this item includes all direct and indirect costs and expenses required to complete the work.

3 Pay items under this section include the following:

Item No.	Pay Item	Unit
4060010	Asphalt Surface Treatment (Single Treatment)	SY

SECTION 407

ASPHALT SURFACE TREATMENT - DOUBLE TREATMENT

407.1 Description

1 This section contains specifications for the materials, equipment, construction, measurement, and payment for providing a wearing surface composed of a asphalt prime coat (when specified herein), an application of asphalt material and aggregate, covered with one or more applications of asphalt material and seal aggregate, constructed on a prepared base, and in conformance with the typical cross-section shown on the Plans and to the lines and grades set by the RCE.

407.2 Materials

407.2.1 Cut-back Asphalt (Rapid Curing Type)

1 Use Grade RC-30 material from suppliers listed on the most recent edition of *SCDOT Qualified Product List 38* and conforming to the properties in the following tables.

Property	Min.	Max.
Water, percent	--	0.2
Viscosity, Saybolt-Furol @77ºF, seconds	75.0	150.0

Distillation Test		
Distillate as percent by volume of total distillate to 680ºF	**Min.**	**Max.**
to 374ºF	15	--
to 437ºF	55	--
to 500ºF	75	--
to 600ºF	90	--

Residue from Distillation to 680ºF:	Min.	Max.
Volume percentage of sample by difference	50	--

Tests on Residue from Distillation:	Min.	Max.
Penetration, 100 g, 5 sec, @77ºF	60	120
Ductility, 5 cm/min @77ºF, cm	100	--
Percent Solubility in Trichloroethylene	99	--

2 Saybolt-Furol viscosity applies.

407.2.2 Cut-Back Asphalt (Medium Curing Type)

1 Use Grade MC-30 or MC-70 material from suppliers listed on the most recent edition of *SCDOT Qualified Product List 38* and conforming to the requirements of AASHTO M 82, except the penetration of the residue must be in the range of 80 to 250. Saybolt-Furol viscosity applies.

407.2.3 Binder

1 Use binder conforming to the requirements of AASHTO M 320 for the grade of PG58-22 unless otherwise specified. Use material from suppliers listed on the most recent edition of *SCDOT Qualified Product List 37*.

407.2.4 Anionic Emulsified Asphalt

1 Use anionic emulsified asphalt of the grade designated meeting the requirements of AASHTO M 140 (with the exception of EA-P Special). Use emulsion from suppliers listed on the most recent edition of *SCDOT Qualified Product List 38*.

2 If grade EA-P Special is requested and approved, use emulsified asphalt meeting the requirements in the following table.

EA-P Special		
Test	**Min.**	**Max.**
Viscosity, Saybolt-Furol @77ºF, sec	10.0	50.0
Sieve test @140ºF, %	--	0.10
Oil Distillate, % by volume of emulsion	--	8.0
Binder as percentage by weight	40.0	--

407.2.5 Cationic Emulsified Asphalt

1 Use cationic emulsified asphalt of the grade designated conforming to the requirements of AASHTO M 208. When CRS-2P is specified in the Contract, use material conforming to AASHTO M 316, except omit the force ratio requirement. Use material from suppliers listed on the most recent edition of ***SCDOT Qualified Product List 38***.

407.2.6 Aggregates

1 Use aggregates meeting the requirements specified in **Subsection 406.2.2**.

407.3 Equipment

1 Use equipment conforming to the requirements in **Subsection 406.3**.

2 Ensure that the equipment necessary for the proper construction of the work is on site, in acceptable working condition, and approved by the RCE as

to both type and condition before the start of work under this section. Provide sufficient equipment to enable prosecution of the work in accordance with the project schedule and completion of the work in the specified time.

407.4 Construction

407.4.1 Weather and Seasonal Limitations

1 Adhere to the weather and seasonal limitations specified in **Subsection 406.4.1**.

407.4.2 Cleaning of Surface

1 Perform cleaning of the surface in accordance with the requirements of **Subsection 406.4.2**.

407.4.3 Calibration of Equipment

1 Ensure that all equipment is calibrated in accordance with the requirements of **Subsection 406.4.3**.

407.4.4 Sequence of Operations

1 Apply Double Treatment using the quantities and sequence of operations outlined in the table entitled Asphalt Surface Treatment – Double Treatment, located in the **Appendix** of these specifications.

407.4.5 Application of Asphalt Materials

407.4.5.1 General

1 Apply asphalt material as specified in **Subsection 406.4.5**.

407.4.5.2 Prime Coat

1 Do not permit any traffic on the primed base until, in the opinion of the RCE, the asphalt material has penetrated and dried sufficiently so that it does not pick-up under traffic. On sections where it is impractical to detour traffic and if directed by the RCE, furnish and spread, without additional compensation, a minimum quantity of sandy material to avoid pick-up and then, allow traffic on these sections.

2 Maintain the prime coat and surface of the base course intact until it has been covered by superimposed construction. Place the asphalt surface treatment within 7 days of the base course being primed.

3 When directed to do so by the RCE, roll the primed base until the loose material is bonded.

407.4.6 Spreading of Aggregate

1 When binder is used as the asphalt material, ensure that sufficient aggregate to cover the application of binder is available before the application of binder. Ensure that the aggregate is available at the site of the work and loaded in trucks or is delivered in such a manner that the binder will be immediately covered in a continuous operation. Uniformly spread the required amount of aggregate with approved spreaders. Operate trucks or spreaders

so that the asphalt material is covered with aggregate before the wheels pass over it. The RCE may delay the application of mat stone when emulsion is used as the asphalt material. Ensure that any delay after application of the emulsion is only the time necessary for the emulsion to set sufficiently to prevent the aggregate from turning over under the wheels of the vehicles. After the aggregate has been spread, smooth it uniformly by light brooming with drag or rotary brooms along with the rolling operations. Use hand brooms as necessary.

2 Ensure that the quantity of mat aggregate in place, after the completion of brooming and rolling, is no more and no less than that needed to give a complete cover.

407.4.7 Rolling

1 Roll the aggregate applications for their entire width as specified in the table entitled Asphalt Surface Treatment – Double Treatment, located in the Appendix of these specifications. Repeat rolling and light brooming as often as, in the opinion of the RCE, is necessary to obtain smooth, even surface and to ensure thorough keying of the aggregate into the asphalt. Perform the rolling in a longitudinal direction, beginning at the outer edges of the treatment and working toward the center. On each trip of the roller, overlap the prior one by 1/2 the width of the roller. Permit traffic to use the road as soon as the mat aggregate is rolled.

2 When in the judgment of the RCE, the aggregate is sufficiently embedded in the asphalt material, remove all loose excess cover material from the surface.

407.4.8 Opening to Traffic

1 After the seal has been rolled and the asphalt material has cured sufficiently to hold the seal aggregate, open the surface to traffic. On sections that are impracticable to close to traffic, the RCE may direct that the seal stone be split into 2 applications and traffic allowed to use these sections.

2 Where the RCE directs the seal to be split, apply the seal aggregate specified herein for Asphalt Surface Treatment - Double Treatment - Types 1 and 2 as follows:

A. Immediately after the first application of asphalt material for the seal coat, uniformly spread 13 to 18 pounds of No. 789 aggregate per square yard.

B. Apply the second application of asphalt material.

C. Spread 6 to 9 pounds of No. 789 aggregate per square yard.

D. Roll as soon as possible with both the steel wheel and pneumatic roller.

3 Ensure that the total weight of both seal aggregate applications is 22 pounds per square yard or greater. Perform the additional work involved in placing the split seal without additional compensation.

407.4.9 Maintenance

1 Conform the maintenance to the requirements specified in **Subsection 406.4.10**.

407.4.10 Substitution of HMA Surface Courses for Asphalt Surface Treatment - Double Treatment

1 When requested in writing, the RCE may allow the substitution of 150 pounds (average) per square yard of HMA Surface Course Type C or D conforming to the requirements set forth in **Section 403** instead of the asphalt surface treatment specified herein at the same unit price for asphalt surface treatment. There is no substitution permitted when asphalt surface treatment is used on paved shoulders as a safety measure.

2 In computing the average rate in pounds per square yard, the total weight placed on each road is used to compute the average pounds per square yard for the road. Adhere to a tolerance range of minus 3% from the specified average rate. However, ensure that the depth of the HMA surface course is at least 0.8 inch at any point in the roadway. Correct any deficiencies without additional compensation. The RCE will set the amount of binder to be placed in the mix without separate or additional payment for this material.

3 Perform priming as required in **Subsection 401.4.18**.

407.5 Measurement

1 The quantity for the pay item Asphalt Surface Treatment (Double Treatment Type (*1, 2, 3, 4, or 5*)) the surface area of the roadway with double treatment asphalt surfacing and is measured by the square yard (SY), complete in-place, and accepted. Material placed outside of the area designated for treatment is disregarded when computing the quantity.

2 If the average rate per square yard of HMA surface course is less than the 3% tolerance allowed in **Subsection** 407.4.10, the quantity of square yards is reduced by the percentage that the actual average rate varies from 150 pounds per square yard. The actual rate per square yard is determined from field measurements and approved weight tickets.

3 Verify rates of applications as specified in **Subsection 406.5**.

407.6 Payment

1 Payment for the accepted quantity for Asphalt Surface Treatment (Double Treatment Type (*1, 2, 3, 4, or 5*)), measured in accordance with **Subsection 407.5**, is determined using the contract unit bid price per square yard for the applicable pay item. Payment is full compensation for constructing the asphalt surface treatment as specified or directed and includes furnishing, hauling, applying, spreading, and rolling the asphalt surface treatment; cleaning the existing surface; calibrating equipment; maintaining the surfacing; and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with

the Plans, the Specifications, and other terms of the Contract.

2 Payment for each item includes all direct and indirect costs and expenses required to complete the work.

3 Pay items under this section include the following:

Item No.	Pay Item	Unit
4070101	Asphalt Surface Treatment (Double Treatment Type 1)	SY
4070102	Asphalt Surface Treatment (Double Treatment Type 2)	SY
4070103	Asphalt Surface Treatment (Double Treatment Type 3)	SY
4070104	Asphalt Surface Treatment (Double Treatment Type 4)	SY
40750105	Asphalt Surface Treatment (Double Treatment Type 5)	SY

SECTION 408

ASPHALT SURFACE TREATMENT - TRIPLE TREATMENT

408.1 Description

1 This section contains specifications for the materials, equipment, construction, measurement, and payment for providing a wearing surface composed of an asphalt prime coat (when specified) and applications of asphalt material and spreading of aggregate, constructed on a prepared base, and in conformance with the typical cross-section shown on the Plans and to the lines and grades set by the RCE.

408.2 Materials

408.2.1 Asphalt Materials

408.2.1.1 Emulsified Asphalt

1 When used, use emulsified asphalt of grade CRS-2 conforming to the requirements specified in **Subsection 407.2.5**. If specified in the Contract, use CRS-2P conforming to the requirements of **Subsection 406.2.1.1**.

408.2.1.2 Prime Coat

1 When priming materials are required, use RC-70, MC-30, MC-70, or EA-P Special meeting the requirements specified in **Subsections 407.2.1**, **407.2.2**, and **407.2.4**.

408.2.2 Aggregate

1 Use Aggregate Nos. 5, No. 6M, No. 89M, and No. 789 conforming to the requirements specified in **Subsection 406.2.2**, including the provision concerning marine limestone.

2 Use Aggregate No. FA-13 consisting of crushed stone, crushed or uncrushed gravel, or sand. Ensure that the aggregate is free from clay balls and adherent films of clay.

3 Washed screenings may be used in lieu of Aggregate No.FA-13 in Asphalt Surface Treatment - Triple Treatment - Type 2, if they meet the gradation in the following table.

Washed Screenings	
Sieve Designation	**Percentage by Weight Passing, %**
⅜-inch	100.0
No. 4	90.0 – 100.0
No. 8	80.0 – 100.0

(table continued on the next page)

(table continued from the previous page)

Washed Screenings	
Sieve Designation	**Percentage by Weight Passing, %**
No. 30	25.0 – 55.0
No. 100	0.0 – 10.0
No. 200	0.00 – 4.00

408.2.3 Variation in Materials

1 Conform the variation in materials to the requirements specified in **Subsection 406.2.2**.

408.3 Equipment

1 Use equipment conforming to the requirements specified in **Subsection 406.3** and to the following:

When Aggregate No. FA-13 or washed screenings are used; utilize a spreader equipped with a mechanical device that spreads the Aggregate No. FA-13 or washed screenings at a uniform rate.

408.4 Construction

408.4.1 Weather and Seasonal Limitations

1 Adhere to the weather and seasonal limitations specified in **Subsection 406.4.1**.

408.4.2 Cleaning of Surface

1 Perform cleaning of the surface conforming to the requirements of **Subsection 406.4.2**.

408.4.3 Sequence of Operations

1 Apply Asphalt Surface Treatment using quantities and a sequence of operations as outlined in the table entitled Asphalt Surface Treatment - Triple Treatment, located in the **Appendix** of these specifications.

408.4.4 Applications of Asphalt Materials

1 Apply the asphalt material as specified in **Subsection 406.4.5** or **407.4.5**.

408.4.5 Weight of Aggregate

1 Determine truck weights as provided in **Subsection 407.4.5**.

408.4.6 Spreading of Aggregate

1 Conform the spreading of aggregate to the requirements specified in Subsection 407.4.6. Spread the Aggregate No. FA-13 using equipment specified in **Subsection 408.3**.

408.4.7 Brooming and Rolling

1 Except for the spreading of Aggregate Nos. 789 and No. 89M applied for second layer, roll each layer of aggregate following spreading as directed by the RCE. Perform rolling with a steel wheel tandem and pneumatic roller. Repeat rolling and light brooming with drag or rotary brooms as often as, in the opinion of the RCE, is necessary to obtain a smooth, even surface and to ensure thorough keying of the aggregate into the asphalt. Delay broom operations until the asphalt has set sufficiently to hold the stone and prevent the broom from turning the stone over. Permit traffic to use the road as soon as the mat aggregate is spread. When in the judgment of the RCE, the aggregate is sufficiently embedded in the asphalt, remove all loose excess material from the surface.

2 Start the rolling of the final layer as soon as sufficient aggregate is spread to prevent pickup and continue until the aggregate is worked into the surface. Perform the initial rolling of the final layer with the steel wheel roller. Begin light brooming with drag or a rotary broom as soon as possible after the rolling has started and the surface has set sufficiently to prevent excessive marking of the seal surface. Perform further light brooming as often as necessary to keep the cover aggregate uniformly distributed over the surface. Continue brooming, rolling and back-spotting until the top surface is compacted, bonded and cured to the satisfaction of the RCE. Sweep surplus aggregate off the surface before final acceptance.

408.4.8 Maintenance

1 Conform maintenance to the requirements specified in **Subsection 406.4.10**.

408.5 Measurement

1 The quantity for the pay item Asphalt Surface Treatment (Triple Treatment Type (*1 or 2*)) the surface area of the road with a triple treatment asphalt surface and is measured by the square yard (SY), complete in-place, and accepted. Material placed outside of the area designated for treatment is disregarded when computing the quantity

2 Rates of application are verified as provided in **Subsection 406.5**.

408.6 Payment

1 Payment for the accepted quantity for Asphalt Surface Treatment (Triple Treatment Type *(1 or 2)*), measured in accordance with **Subsection 408.5**, is determined using the contract unit bid price for the applicable pay item. Payment is full compensation for the constructing the asphalt surface treatment as specified or directed and includes furnishing, hauling, applying, spreading, rooming, and rolling the asphalt surface treatment; cleaning existing surface; maintaining the new surface; applying prime coat when required; and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the

Plans, the Specifications, and other terms of the Contract.

2 Payment for each item includes all direct and indirect costs and expenses required to complete the work.

3 Pay items under this section include the following:

Item No.	Pay Item	Unit
4080101	Asphalt Surface Treatment (Triple Treatment Type 1)	SY
4080102	Asphalt Surface Treatment (Triple Treatment Type 2)	SY