

SECTION 406

BITUMINOUS SURFACING (DOUBLE TREATMENT), TYPES 1, 2, AND 3 AND CLASS A SPECIAL

406.01 Description. This work shall consist of a wearing surface composed of a bituminous prime coat (when specified herein), an application of bituminous material and aggregate, covered with one or more applications of bituminous material and seal aggregate, constructed on a prepared base, all in accordance with the typical cross-section shown on the plans and to the lines and grades set by the Engineer.

Bituminous surfacing, double treatment, will consist of Types 1, 2, and 3 and Class A Special. The composition, preparation, and methods of construction of each type shall be as provided hereinafter.

MATERIALS

406.02 Cut-back Asphalt (Rapid Curing Type). This material shall conform to the requirements of Grade RC-30 as follows:

	Min.	Max.
Water, percent	--	0.2
Viscosity, Saybolt-Furol @77°F, seconds	75	150

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

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

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

The Saybolt-Furol viscosity shall apply.

406.03 Cut-Back Asphalt (Medium Curing Type). This material shall be Grade MC-30 and shall conform to the requirements of AASHTO M 82, except that the penetration of the residue shall be 80 to 250. Saybolt-Furol viscosity shall apply.

406.04 Asphalt Binder. Asphalt binder shall conform to the requirements of AASHTO MP 1 and shall be PG 58-22 unless otherwise specified.

406.05 Emulsified Asphalt (Anionic). Anionic emulsified asphalt of the grade designated as EA-P Special shall conform to the following requirements:

EA-P Special		
Test:	Min.	Max.
Viscosity, Saybolt-Furol @77°F, sec	15	75
Sieve test @140°F, %	--	0.10
Oil Distillate, % by volume of emulsion	--	8
Asphalt as percentage by weight	40	--

406.06 Cationic Emulsified Asphalt. Cationic emulsified asphalt of the grade designated shall conform to the requirements of AASHTO M 208.

406.07 Spraying Temperatures for Asphalt Binder. Asphalt binder shall be sprayed at a temperature between 300°F and 350°F, and MC-30 shall be sprayed at a tem-

perature between 50°F and 120°F. All emulsions shall be sprayed at a temperature between 50°F and 160°F. The exact temperature to satisfy conditions will be set by the Engineer at the time of application.

406.08 Aggregates. The aggregates shall consist of clean, tough, durable particles of crushed stone, crushed or uncrushed gravel, or crushed slag and shall be reasonably free from soft, thin, elongated or laminated pieces, disintegrated particles, vegetable, or other deleterious substances. The use of marine (fossiliferous) limestone will not be allowed.

Crushed stone or gravel shall have an abrasion loss of not more than 60% when subjected to the Los Angeles Abrasion Test (AASHTO T 96). Slag shall have an abrasion loss of not more than 45% when subjected to the Los Angeles Abrasion Test.

Dry slag shall have a weight of not less than 75 pounds per cubic foot.

Aggregates No. 5 and No. 789 shall be graded within the required gradation limits.

406.09 Variation in Materials. The pounds of aggregate specified in Subsection **406.15** are based upon an apparent specific gravity of 2.65. If the apparent specific gravity of the aggregate used by the Contractor is found to be other than 2.65, appropriate adjustments will be made in the number of pounds required per square yard to insure a constant volume of coarse and fine aggregate per square yard of bituminous surfacing.

When slag is used as the aggregate, the amount of bituminous material used in the mat and seal applications shall be increased 15% over that herein specified without additional compensation to the Contractor.

When other aggregates with high absorption characteris-

tics are used, the Engineer may increase the quantity of bituminous material specified for each application to compensate for the absorbed material without additional compensation to the Contractor.

No tolerance below the specified minimum quantity per square yard of bituminous material or aggregate will be allowed, except when the Contractor actually obtains a satisfactory uniform cover with material applied at a rate less than that required by these specifications. If for any reason the Engineer should decide to raise the minimum limit, appropriate notice will be given the Contractor in writing. Any increase in the minimum limit will carry a corresponding increase in the maximum limit. The upper limit specified is intended to give the Contractor some leeway in carrying on the work.

EQUIPMENT

406.10 Distributors. All distributors shall be mounted on pneumatic tires of sufficient width to prevent cutting or breaking the surface bond when the tank is fully loaded. The distributor shall be so designed, equipped, maintained and operated that bituminous material at the required constant temperature and pressure may be uniformly applied (without streaking) at the specified rate. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or calibrated tank, and a thermometer for determining the temperature of the contents. If the yield on the asphalt material should appear to be in error after beginning work, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding further with the work. The distributor shall be equipped with a hose and nozzle attachment to be used for spotting areas inaccessible to the distributor spray bars. Distributor spray bars shall be adjustable both laterally and vertically. In order to prevent lapping at the junction of two applications, the distributor shall be equipped with a positive shut-off control.

406.11 Aggregate Spreaders. Aggregate spreaders may

be approved self-propelled aggregate spreaders, mechanical type spreaders that are hooked onto the supply truck, or tail-gate spreaders. The spreaders shall be so constructed that they may be accurately controlled to distribute the aggregate uniformly and at the required rate.

406.12 Rollers. Tandem rollers specified for use under this Section shall be self-propelled steel-wheel tandem rollers exerting a pressure of from 150 to 225 pounds per inch of roller width in the compression wheel.

Pneumatic-tired rollers of approved design shall be capable of being loaded to a gross weight of at least 8 tons. The pneumatic roller shall be loaded as directed by the Engineer.

CONSTRUCTION REQUIREMENTS

406.13 Weather and Seasonal Limitations. No bituminous surfacing work shall be performed between October 15 and March 15 inclusive except with the written permission of the Engineer.

Bituminous material shall not be applied on a wet surface or when the temperature is below 60°F in the shade and falling, or below 55°F in the shade and rising, or when weather conditions are otherwise unfavorable.

406.14 Cleaning of Surface. The surface of the roadbed to be treated shall be reasonably dry and shall be clean of all dust, dirt, clay, and all deleterious matter at the time the bituminous material is applied. In performing this work, the Contractor shall use rotary sweepers, hand brooms, mechanical brooms, or other equipment acceptable to the Engineer.

406.15 Sequence of Operations. Bituminous surface treatment shall be applied using quantities and sequence of operations as outlined in the table entitled *Sequence of Operations and Quantities per Square Yard for Bituminous Surfacing (Double Treatment)* located in the Appendix of these specifications.

406.16 Application of Bituminous Materials.

A. General. Bituminous material shall not be applied 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 Engineer and conforms to the typical cross-section shown on the plans and to the lines and grades established by the Engineer.

Bituminous materials shall be applied uniformly by means of a distributor at the rate specified, and within the temperature limits stated herein for the particular material being used. Bituminous material shall be applied for the full width to be treated in one application unless the Engineer directs or permits otherwise. If the material is applied to a partial width at a time, suitable and adequate joints shall be provided between adjacent treatments to insure complete and uniform coverage. At the beginning and end of the distribution of each load, care shall be exercised to insure a neat junction. At all starting and stopping places, building paper or other suitable paper, when directed by the Engineer, shall be spread to permit the operation of the distributor nozzles at full force when the bituminous application begins or ends. This paper shall be

removed immediately after the application and destroyed. Special precaution shall be observed to have the distributing machine so adjusted and operated that an even and uniform distribution of the bituminous material will be obtained. If streaking develops, the distributor shall be stopped immediately and the problem corrected before proceeding. Excessive deposits of bituminous materials upon the road surface shall be immediately removed and corrected in a satisfactory manner. The Contractor, in applying bituminous material, shall use effective means of protecting adjacent structures from discoloration.

B. Prime Coat. The Contractor shall not permit any traffic on the primed base until, in the opinion of the Engineer, the bituminous material has penetrated and dried suffi-

ciently that it does not pick-up under traffic. On sections where it is impracticable to detour traffic, the Engineer may direct the Contractor to furnish and spread, without additional compensation, a minimum quantity of sandy material to avoid pick-up, and traffic shall be allowed on these sections.

The Contractor shall maintain the prime coat and surface of the base course intact until it has been covered by superimposed construction. The bituminous surfacing shall be placed within seven (7) days after the base course has been primed.

When the Engineer so directs, the Contractor shall roll the primed base until the loose material is bonded.

406.17 Determination of Truck Weights. If the truckloads of aggregates are not delivered to the work with weight tickets for each load, in order to determine the application rate, the Engineer may require the Contractor to weigh one round of trucks on approved scales. The trucks shall be weighed both loaded and empty. After the work begins, the trucks shall be loaded in the amount as near as possible as when weighed. The Engineer may require the Contractor at any time to level the aggregates in the truck-bed in order that the volume of the aggregate may be determined. When the unit weight of the aggregates is known, the Engineer may use this method for determining truck weights instead of weighing if he so elects. The cost of this work shall be considered as being included in the contract unit price for bituminous surfacing.

406.18 Spreading of Aggregate. When asphalt binder is used as the bituminous material, sufficient aggregate to cover the application of asphalt shall be available before the application of asphalt binder. The aggregate shall be available at the site of the work loaded in trucks or shall be delivered in such manner that the asphalt binder will be immediately covered in a continuous operation. The required amount of aggregate shall be uniformly spread with approved spreaders. Trucks or spreaders shall be so operated that the bituminous

material will be covered with aggregate before the wheels pass over it. The Engineer may delay the application of mat stone when emulsion is used as the bituminous material. The delay after application of the emulsion shall be 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, it shall be uniformed by light brooming with drag or rotary brooms along with the rolling operations. Hand brooms shall be used as necessary.

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

406.19 Rolling. The aggregate applications shall be rolled for their entire width as specified in Subsection **406.15**. Rolling and light brooming shall be repeated as often as, in the opinion of the Engineer, is necessary to obtain smooth, even surface and to insure thorough keying of the aggregate into the asphalt. The rolling shall be done in a longitudinal direction, beginning at the outer edges of the treatment and working toward the center. Each trip of the roller shall overlap the prior one by one-half the width of the roller. Traffic shall be permitted to use the road as soon as the mat aggregate is spread.

When, in the judgment of the Engineer, the aggregate is sufficiently imbedded in the bituminous material, the Contractor shall remove from the surface all loose excess cover material that may be injurious to the finished road.

406.20 Opening to Traffic. After the seal has been rolled and the bituminous material has cured sufficiently to hold the seal aggregate, the surface shall be opened to traffic. On sections where it is impracticable to close to traffic, the Engineer may direct the Contractor to split the seal stone in two applications and traffic shall be allowed to use these sections.

Where the Engineer directs the seal to be split, the seal aggregate specified herein for bituminous surfacing Types 1

and 2 shall be applied as follows:

1. Immediately after the first application of bituminous material for the seal coat, spread 13 to 18 pounds of No. 789 aggregate per square yard uniformly.
2. Apply second application of bituminous material.
3. Spread 6 to 9 pounds of No. 789 aggregate per square yard.
4. Roll as soon as possible with both the steel wheel and pneumatic roller.

The total weight of both seal aggregate applications shall be not less than 22 pounds per square yard. The additional work involved in placing the split seal shall be performed without additional compensation.

406.21 Maintenance. In addition to the maintenance required as specified in Subsection **104.07**, the Contractor will be required to repair all spotty or bleeding places or any defects that may occur during or after the bituminous surfacing operations. Necessary repairs shall be made in a manner that will restore a uniform surface and insure durability of the portion repaired.

406.22 Method of Measurement. The quantity measured for payment shall be the number of square yards of bituminous surfacing of the type specified in the contract completed, accepted, and measured in-place along the surface of the road. Material placed outside of the area designated to be treated shall be disregarded in computing the number of square yard.

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 shall apply:

1. Measurement in all cases shall be based on mate-

rial actually and properly incorporated into the bituminous surfacing and shall exclude losses due to the negligence of the Contractor or other circumstances as determined by the Engineer.

2. The quantities of bituminous materials used will be based on the volume of the material at the temperature of 60°F. Volumes measured at higher or lower temperatures will be corrected to the volume of the material at 60°F.

3. The weights of mat and seal aggregates when shipped by railroad will be based on proven railroad weights of this material, with appropriate deductions to cover losses in shipment because of damaged cars, negligence of the Contractor in handling the material, or other circumstances, as determined by the Engineer. Weights of aggregates not shipped by railroad will be based on the truck weight tickets or will be based on proven weight per unit of volume as delivered and properly incorporated into the bituminous surfacing.

406.23 Basis of Payment. The accepted quantity, measured as provided in Subsection **406.22** will be paid for at the contract unit price per square yard for Bituminous Surfacing-Double Treatment, including prime coat when specified, which price and payment shall be full compensation for furnishing, hauling, applying, spreading and rolling all materials and for all labor, equipment, tools, maintenance and incidentals necessary to complete the work.

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

Payment will be made under:

Item No.	Pay Item	Pay Unit
406XXX	Bituminous Surfacing (Double Treatment) Type <i>(1, 2, 3, or Class A Special)</i>	Square Yard

406.24 Substitution of Asphalt Concrete Surface Courses for Bituminous Surfacing (Double Treatment).

When requested in writing, the Engineer may, at his discretion, allow the Contractor to substitute 150 pounds (average) per square yard of Asphalt Concrete Surface Course, Type 1, 3, or 4 conforming to the requirements set forth in Section **403** instead of the bituminous surfacing at the same unit price for bituminous surfacing. This substitution will not be allowed when bituminous surfacing is used on paved shoulders as a safety measure.

In computing the average pounds per square yard, the total weight placed on each road will be used to compute the average pounds per square yard for the road. A tolerance of minus 3% from the specified average pounds per square yard will be permitted. However, the depth of the Asphalt Concrete Surface Course shall be at least 0.8 inch at any point in the roadway. The Contractor shall correct any deficiencies without any additional compensation. The amount of asphalt binder to be placed in the mix shall be set by the Engineer, and no separate or additional payment will be made for this material.

Should the average rate per square yard of surface course be less than the 3% tolerance as allowed above, the amount paid the Contractor shall be reduced. The quantity of square yards shall be reduced by the percentage that the actual average rate varies from 150 pounds per square yard. The actual rate per square yard shall be determined from field measurements and approved weight tickets. Priming shall be performed as required in Subsection **401.28**.