

**SECTION 02641**

**BITUMINOUS CONCRETE PAVEMENT**

**02641.01 GENERAL**

**A. Description**

Bituminous concrete pavement shall include, but not necessarily be limited to, furnishing and installing aggregate and asphalt mixes in accordance with the Contract Documents.

**B. Related Work Included Elsewhere**

1. Aggregate base and subbase course; Section 02621.
2. Sand asphalt base; Section 02642.
3. Plant mixed seal; Section 02643.
4. Asphalt support fabric; Section 02645.
5. Field Test Reports, GP-6.11

**C. Quality Assurance**

1. Plant Control

- a. Job Mix

When possible, plant control hot bin gradations will be determined in accordance with AASHTO T 27. The following tolerances shall apply:

Fraction passing No. 4 and larger sieves, %	+7
Fraction passing No. 8 through No. 100 sieves, %	+4
Fraction passing No. 200 sieve, %	+2
Asphalt Content, %	+0.4
Ratio of dust to binder material, maximum	1.2
Deviation of Plant maximum specific gravity per lot versus design maximum specific gravity	+0.030
Temperature of Mix leaving plant versus design mix temperature	+25°F

The job mix formula tolerance may fall outside the specified gradation limits.

- b. Sand Asphalt

In evaluating plant control, Marshall specimens will be molded; and the

specific gravity of these specimens shall be 95 to 97 percent of the maximum specific gravity. In addition, the bitumen content shall not vary by more than  $\pm 0.4$  percent and the temperature of the mix leaving the plant shall not differ by more than  $\pm 25^{\circ}\text{F}$  from the design mix temperature.

2. Production Plant Requirements

For specifications applicable to all batching and proportioning plants, please refer to the "MSHA Standard Specifications for Construction and Materials (1993), Section 915".

3. Sampling and Tests

For detailed requirements please refer to the "MSHA Standard Specifications for Construction and Materials (1993), Section 504.03.09".

The Contractor shall retain a Geotechnical Engineer, a Professional Engineer, registered in the State of Maryland for all sampling and testing. Cores samples are to be taken and measured for thickness. If the value obtained by averaging all cores thicknesses falls below 100 percent of the specified thickness, corrective action must be taken as directed by the County Engineer. All test results on base course shall be submitted to the County Engineer prior to placement of surface course.

A minimum of two core samples per each lift are to be taken every 250 linear feet per lane and measured for thickness.

4. Control Strip

For detailed requirements please refer to the "MSHA Standard Specifications for Construction and Materials (1993), Section 504.03.10".

5. Surface Tolerances

After final compaction of each course, the surface of the pavement course shall be true to the established crown and grade and shall be sufficiently smooth so that when tested with a 10 foot straightedge placed upon the surface parallel with the center line, the surface shall not vary more than 1/8-inch within the 10 foot straightedge length from a true surface. The transverse slope of the finished surface of each course shall be uniform to such a degree that when tested with a 10 foot straightedge placed perpendicular to the center line, the surface shall not vary greater than 3/16-inch from a true surface. Transverse joints on each course shall be checked with a 10 foot straightedge immediately after the initial rolling. Should the surface of each course vary more than 1/8-inch from true, the Contractor shall make immediate corrections suitable to the County Engineer so that the finished joint surface shall not vary more than 1/8-inch from a true surface. The material in all other aspects shall meet these specifications.

The Contractor shall have available on site at all times an approved 10 foot straightedge.

**D. Submittals**

**1. Mix Design****a. Bituminous Concrete**

The Contractor shall submit a written document containing the data from the laboratory study required by Paragraph 02641.02 B and the specific job mix design for each mix designation to be used on the Project to the County Engineer. This job mix design shall be submitted at least 3 weeks before the paving operation is to begin and contain the following information:

- 1) Mix designation;
- 2) Source of each component aggregate, asphalt, heat stable anti-stripping additive and; asphalt release agent;
- 3) Anticipated gradation and proportion of each aggregate component;
- 4) Combined gradation, extracted gradation, if used, and a single percentage of bituminous material to be added;
- 5) Percentage of heat stable anti-stripping additive;
- 6) Plant from which the material will be produced;
- 7) Plant target mixing temperature based on the viscosity of 220 centistokes;
- 8) Specific gravity of the mixture at the intended asphalt content;
- 9) Worksheets and graphs depicting the Marshall properties;
- 10) Number of compaction blow per face;
- 11) Maximum specific gravity at the target asphalt content;
- 12) Ratio of dust to binder material;
- 13) Percent passing No. 200 sieve removal by dust collecting system.

If the County Engineer's previous experience has indicated the proposed design mix to be unworkable or otherwise unsatisfactory, the County Engineer may require the Contractor to submit a more suitable mix design.

Supplementary tests of Laboratory mixed blends of asphalt from the plant and aggregate materials from the actual production shall be performed by the Geotechnical Engineer within five working days after production has begun. The aggregate material shall be sampled from the hot bins.

**b. Plant Mixed Seal**

The Contractor shall submit a written document containing the data from the laboratory study required by Paragraph 02641.02.C.5 and specific job mix

design to the County Engineer. This mix design shall be submitted at least 3 weeks before the paving operation is to begin and contain the information indicated in Paragraph a. above except that items 8 and 9 are not required and the viscosity in item 7 shall be 800 centistokes.

c. Sand Asphalt

- 1) The Contractor shall submit a written document containing the data from the laboratory study required by Paragraph 02641.02.C.6. and specific job mix design to the County Engineer. This mix design shall be submitted at least 3 weeks before the paving operation is to begin and contain the information indicated in Paragraph a. above.

2. Certificates of Compliance

Certificates of Compliance shall be submitted in accordance with the "General Provisions" for all bituminous materials. The certificates shall state that the bituminous material meets the requirements specified herein.

3. Resubmittals

Should the Contractor at any time propose to change the source of aggregate used in the mix, a revised job mix formula shall be submitted. If a change of asphalt source is requested, a stripping test shall be conducted prior to approval of the sources. Resubmittal shall meet all conditions of the initial submittal.

**02641.02 MATERIALS****A. Materials Furnished by the County**

The County will not furnish any materials for bituminous concrete pavement.

**B. Contractor's Options**

1. General

Unless otherwise stipulated on the Plans or in the Special Provisions, the Contractor shall propose the bands the Contractor intends to employ in the several bituminous concrete layers within the payment structure.

2. Recycled Material

The Contractor may elect to use crushed recycled asphalt pavement material. The allowable percentage and suitability for use shall be determined in accordance with MSMT 412.

**C. Detailed Material Requirements**

1. Aggregates

For detailed requirements please refer to the "MSHA Standard Specifications for Construction and Materials (1993), Section 901.01".

One bulk sample shall be obtained each date at the time of placement for both the asphalt base and surface course materials for gradation and asphalt content. Separate samples are required.

2. Bituminous Material

Asphalt cements shall meet the requirements of AASHTO M 226, Grade AC-20, Table 2, except that the requirements for solubility in trichloroethylene and the percent loss on heating are deleted. If use of a heat stable anti-stripping additive is required, it shall be added at the bituminous concrete mixing plant. Asphalt cements used for mixes containing recycled asphalt pavement materials shall conform to M226, Table 2, Grade AC-10 or AC-20, except that the requirements for solubility in trichloroethylene and the percent loss on heating are deleted. The viscosity of the asphalt recovered from the final plant mixed material shall not exceed 8000 poises at 140°F.

One bulk sample shall be obtained each date.

3. Heat Stable Anti-Stripping Additive

Where an additive is used, it will be introduced at the plant and the minimum dosage rate shall be 0.20 percent of the total weight of asphalt. This addition shall be accomplished by line blending, metering, or otherwise measuring to insure accurate proportioning and thorough mixing.

4. Bituminous Concrete Mixtures

Bituminous concrete mixtures shall be plant mixed materials manufactured in a plant meeting the requirements of Section 02641.01.

a. Aggregate

Aggregates shall meet the physical requirements of Paragraph 1 above.

b. Bituminous Material

Bituminous material shall meet the requirements of Paragraph 2 above.

c. Mix Design

A design mix shall be developed by the Contractor in accordance with AASHTO T 245 as modified by MSMT 405. If recycled bituminous pavement material is utilized, the allowable percentage and suitability for use shall be determined in accordance with MSMT 412. Recycled asphalt pavement shall not be used in SC types A or B. The target asphalt content shall be determined in accordance with the "MSHA Standard Specifications for Construction and Materials (1993), Section 904.06.02".

5. Plant Mixed Seal (Open Graded Friction Course)

Plant mixed seal shall be manufactured in a plant meeting the requirements of

## Section 02641.01.

## a. Aggregates

Aggregates shall meet the physical requirements of Paragraph 1 above.

## b. Bituminous Material

Bituminous material shall meet the requirements of Paragraph 2 above.

## c. Mix Design

A laboratory study shall be conducted by the Contractor in accordance with MSMT 409, and an appropriate asphalt content selected. Crushed glass and recycled asphalt pavement shall not be used.

## d. Stable Anti-Stripping Additive

Plant mix seal will require an anti-stripping additive with a minimum dosage of 0.20 percent of the total weight of the asphalt.

## e. Hot Bins

At least two hot bins shall be used, and their gradations shall meet the requirements of Section 02641.01 for evaluating plant control.

## 6. Sand Asphalt

Sand asphalt shall be manufactured in a plant meeting the requirements of Section 02641.01.

## a. Aggregate

Aggregate shall be a natural or manufactured sand to which the Contractor may add other fine aggregate.

## b. Bituminous Material

Bituminous material shall meet the requirements of Paragraph 2 above.

## c. Laboratory Study

A laboratory study shall be conducted by the Contractor in accordance with AASHTO T 245, as modified by MSMT 405. An appropriate asphalt content shall be selected using the asphalt content associated with the maximum stability value as a guide. The Marshall stability of the mixture at the selected asphalt content shall not be less than 250 pounds.

## d. Mix Design

The gradations of the material shall be tested in accordance with AASHTO T 27 and shall meet the following gradation:

<b><u>Sieve Sizes</u> <u>U.S. Standard</u></b>	<b><u>Mass Percent</u> <u>Passing</u></b>
2 inch	100
No. 200	0-12

The job mix formula shall not fall outside the specified gradation limits.

**7. Cutback Asphalt**

Cutback asphalt shall meet the requirements of AASHTO M81 or M82 except that the penetration limits shall be 50 to 120 for M81 and 90 to 250 for M82.

**8. Tack Coat**

Emulsified asphalt meet the requirements of AASHTO M 140 or M 208 with the following exceptions:

- a. Not more than 3.0 percent oil distillate by volume of emulsion will apply.
- b. The sieve test requirement for field samples shall be a maximum of 0.4 percent.
- c. Cement mixing tests are waived.
- d. Grade SS-1 viscosity shall be 50 to 400 seconds at 77°F.

**02641.03 EXECUTION**

**A. Weather Restrictions**

The following ambient air and surface temperature restrictions shall apply at the time of placement of bituminous concrete: at the time of placement for both the asphalt base and of bituminous concrete:

<b><u>Mixes</u></b>	<b>Minimum Temperatures</b>	
	<b><u>Air</u> <u>Degrees F &amp; Rising</u></b>	<b><u>Surface</u> <u>Degrees F &amp; Rising</u></b>
<b>Plant Mix Seal</b>	60	60
<b>Surface</b>	40	40
<b>Base</b>	32	32

Note: When the surface temperature or ambient air temperature falls below these limits, material in route may be placed at the Contractor's risk.

**B. Preparation**

## 1. Surface Condition

## a. Existing Paving

The surface of the existing paving shall be clean and dry. All excess crack filling or patch material shall be removed, all spalls and potholes shall be cleaned, tack coated, filled and tamped with hot mix asphalt before placement.

## b. New Construction

On new construction, the surface to receive the bituminous concrete pavement shall be prepared in accordance with the applicable section of the specifications.

## 2. Tack Coat

Tack coat shall be applied where and as directed by the County Engineer so that the resulting coating shall be residual asphalt uniformly spread at a rate of between 0.01 and 0.05 gallons per square yard of surface area. Due regard must be observed for safety and convenience of the public in the application and maintenance of tack coat. Where conditions permit, hauling trucks shall not track tack coat on newly completed surface courses.

## 3. Utility Castings

a. Manholes, valve boxes, inlets, and other structures within the area to be surfaced shall be adjusted to grade and cross slope before placing of surface course.

b. Manhole and utility box covers shall have pick holes plugged or covered and inlets shall be covered to prevent the entry of paving materials.

c. After the surfacing operation has been completed, the Contractor shall uncover all utility castings and open all pick holes. The Contractor shall promptly clean-out and remove any paving materials which enter manholes, inlets, vaults, or other structures as a result of the Contractor's activities.

**C. Transporting Mixture**

The mixtures shall be transported from the paving plant to the work site in vehicles having tight bodies previously cleaned of foreign material, and the contents of each load shall be completely covered with canvas or other suitable material of sufficient size to protect it from the weather. Each truck hauling paving mixtures from the plant shall have a hole in the side of its body to permit the insertion of a thermometer. The hole shall be at least 1/4 inch and not more than 1/2 inch in diameter and located from 6 inches to 12 inches above the bed of the truck. The inside surfaces of all truck bodies used to haul paving mixtures shall be treated with an approved coating that will prevent adherence of the mixtures to the body. Material received too late to be placed during daylight hours shall be rejected unless artificial light satisfactory to the County Engineer is available.



**D. Mix Temperature**

The temperature of the mixture shall not be less than 225°F at the time of placement. In-place compaction shall be completed before the mixture cools to a temperature below 185°F as determined by a probe type surface thermometer supplied by the Contractor and approved by the County Engineer.

**E. Pavers**

Unless otherwise permitted by the County Engineer, mixtures shall be spread by means of a mechanical self-powered paver capable of spreading the mixture true to line, grade and cross slope in accordance with the approved plans.

Bituminous pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of bituminous plant mixed material in lane widths applicable to the specified typical section and thicknesses shown on the Plans. Pavers used for shoulders and similar construction shall be capable of spreading and finishing courses of bituminous plant mixed material in widths shown on the Plans.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

**1. Screeding**

The screed or strike-off assembly shall effectively produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture. The use of automatic screed controls, in areas that are not practical such as cul-de-sacs, adjacent to curb and gutter and where there are manholes and water valves present, shall be left to the discretion of the County Engineer.

When laying mixtures, the paver shall be capable of being operated at forward speeds consistent with satisfactory laying of the mixture.

Reference lines or other suitable markings for the control of horizontal alignment shall be provided by the Contractor subject to approval of the County Engineer.

For all projects involving 5000 tons or more of bituminous mixture, the paver shall be equipped with automatic screed controls with sensors for either or both sides of the paver, capable of sensing grade from outside reference lines, sensing the transverse slope of the screed and providing the automatic signals which operate the screed to maintain the desired grade and transverse slope. The sensor shall be so constructed that it will operate from a reference line or a ski-like arrangement.

The Contractor shall furnish and install all pins, brackets, tensioning devices, wire and accessories necessary for satisfactory operation of the automatic control equipment.

The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1% of the required slope percentage. The paver shall be equipped with automatic feeder controls, properly adjusted to

maintain a uniform depth of material ahead of the screed.

## 2. Manual Operation

Manual operation will be permitted for the construction of irregularly shaped and minor areas, on plant mixed seal courses, or where otherwise directed.

Whenever a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for the remainder of the normal working day on which the breakdown or malfunction occurred provided this method of operation will produce results otherwise meeting specifications.

## F. Joints

Longitudinal and transverse joints shall be made in a careful manner. Well bonded and sealed joints are required. If necessary, in order to obtain this result, joints shall be painted with asphalt. Both longitudinal and transverse joints in successive courses shall be staggered so as not to be one above the other. Longitudinal joints shall be staggered a minimum of 6 inches and shall be arranged so that the longitudinal joint in the top course being constructed shall be at the location of the line dividing the traffic lanes. Transverse joints shall be staggered by the length of the paver.

Joints between old and new pavements, or between successive days' work, shall be carefully made to insure a thorough and continuous bond between the old and new surfaces. In the case of surface course, the edge of the old surface course shall be cut back for its full depth so as to expose a fresh surface and the surface shall be coated with tack coat material, after which the hot surface mixture shall be placed in contact with it and raked to a proper depth and grade. Before placing the mixture against curbs, gutters, headers, manholes, etc. all contact surfaces shall be coated with tack coat material.

In making the joint along any adjoining edge, such as curb, gutter or an adjoining pavement, and after the hot mixture is placed by the finishing machine, just enough of the hot material shall be carried back to fill any space left open. This joint shall be properly set up with the back of a rake at proper height and level to receive the maximum compaction under rolling.

## G. Screeded Surface

Immediately after any course is screeded and before roller compaction is started, the surface shall be checked, any inequalities adjusted, all fat, sandy accumulation from the screed removed by rake or hoe, and all fat spots in any course removed and replaced with satisfactory material. Irregularities in alignment and grade along the outside edge shall also be corrected by the addition or removal of mixture before the edge is rolled. Porous or honeycombed spots shall be corrected. Broadcasting at the discretion of the County Engineer may be used prior to rolling, to correct critical problems. Broadcasting of loose mixture over the new surface after rolling will not be permitted.

Mixtures may be spread by hand only at locations inaccessible to machine spreading. Mixtures shall then be handled and spread by means of shovels and rakes. Mixtures shall not be applied faster than they can be properly handled and spread.

**1. Raking**

The raking shall be carefully and skillfully done so that after the first passage of the roller over the raked mixture a minimum amount of back patching will be required. The surface course mixture, after spreading and raking, shall be carefully luted from the sides before compaction. The width of the lute shall be not less than 2 feet, and the handle shall be sufficiently long to reach from the edge to midway of the width under construction.

**2. Delivery and Placement**

Delivery and placement of mixtures shall be as continuous as possible to keep time between loads at a minimum. Plant production, transporting and placement of the mix shall be closely coordinated. The roller shall pass over the unprotected edge of the freshly laid mixtures only when the laying of this course is to be discontinued for a length of time as to permit the mixture to become chilled.

**3. Heeling-In**

Where tapering of the bituminous concrete material from specified thicknesses to tie in with an existing bituminous concrete pavement or structure, heeling-in to the existing bituminous pavement or structure may be required. The heeling-in operation shall include the removal of a transverse portion of the existing bituminous road material in areas which will be indicated by the County Engineer.

In case of base widening, the surfacing adjacent to the bituminous material being placed shall be cleaned of all loose and foreign material.

**H. Compaction**

Immediately following placement of bituminous concrete pavement, the mixture shall be compacted by rolling to an in-place density of 92.0 to 97.0 percent of the maximum density. In-place compaction shall be completed before the mixture cools below 185°F. In-place asphalt density tests shall be performed every 150 linear feet, or fraction thereof. Rollers used for the compaction shall be self-propelled, reversible and in good condition. They shall be equipped and operated in a way to prevent the picking up of hot mixed material by the tires or roller faces.

**1. Steel Wheel Rollers**

Steel wheel rollers may be two axle tandem, three axle tandem, three wheeled or vibratory.

**2. Pneumatic Tired Rollers**

Pneumatic tired rollers shall have not less than seven wheels with pneumatic tires of equal size. If satisfactory results are not obtained from the treaded tire, the County Engineer reserves the right to require smooth tires. No combination of smooth and treaded tires will be allowed. Tires shall be kept uniformly inflated so that the difference in pressure in any two tires shall not exceed 5 psi. On the axle having an even number of wheels, the wheels shall be arranged to oscillate in pairs; or they may be individually sprung. The roller shall be equipped with power steering

and some type of fluid drive or torque converter.

### 3. Rolling

Rolling shall be accomplished by using any of the above types of rollers or combinations of them except that vibratory rollers may not be operated as vibrators on any surface course if, in the opinion of the County Engineer, unsatisfactory surface texture or roughness will result from the use of a vibrator. Rollers cannot be used in a vibratory mode on bridge decks. Any damage through rolling shall be corrected at once with rakes and fresh mixture where required. Delays in rolling freshly raked mixture will not be tolerated.

Rolling shall consist of six separate operations in the following sequence: transverse joint; longitudinal joint, edges, initial breakdown rolling; second or intermediate rolling; finishing rolling. The first rolling of all joints and edges, the initial or breakdown rolling, and the final or finish rolling shall be done with the steel wheel tandem rollers. Transverse joints shall be checked with a straightedge immediately following the initial rolling.

Rolling shall follow the placement as closely as possible.

Rollers shall start longitudinally at the sides and proceed towards the center of the pavement except that on superelevated curves, rolling shall begin at the low side and progress toward the high side. Successive trips of the roller shall overlap by at least one-half of the width of the roller, and alternate trips shall not terminate at the same point. In base widening which is too narrow to permit the use of the aforementioned rollers, an approved power driven trench roller shall be used. If the trench has to be excavated wider than the proposed width of the widening, then an earth berm or shoulder shall be formed against the loose bituminous concrete as soon as it is placed. The two materials shall be rolled and compacted simultaneously. Rolling shall be conducted so that all roller marks are eliminated, and all parts of the pavement shall receive substantially equal compaction.

#### I. Traffic

No traffic will be permitted on bituminous concrete pavement until it has set sufficiently to prevent marking and the pavement has cooled below 140°F. When it is necessary to allow traffic onto freshly laid pavement, the material may be cooled by the use of a water wagon immediately following final rolling and before traffic use.

#### J. Curbs, Gutters, Etc.

Where permanent curbs, gutters, edge and other supports are specified, they shall be constructed before placing of the bituminous concrete, which shall then be placed and compacted against them.

#### K. Shoulders

Shoulders abutting the bituminous concrete surface course of any two lane pavement which is being used by traffic shall be completed as soon as possible after completion of the surface course on that lane.

**BITUMINOUS CONCRETE PAVEMENT**

**02641-13**

**02641.04 METHOD OF MEASUREMENT**

RESERVED FOR FUTURE USE

**02641.05 BASIS OF PAYMENT**

**A. Bituminous Concrete Pavement**

RESERVED FOR FUTURE USE

**B. Bid Price Adjustments**

RESERVED FOR FUTURE USE

**C. Heat Stable Anti-Stripping Additive**

RESERVED FOR FUTURE USE

## **SECTION 02642**

### **SAND ASPHALT BASE**

#### **02642.01 GENERAL**

##### **A. Description**

Sand asphalt base shall include, but not necessarily be limited to, natural and/or manufactured aggregates and asphalt cement mixed in accordance with Section 02641 and the Contract Documents.

##### **B. Related Work Included Elsewhere**

Bituminous concrete pavement; Section 02641.

##### **C. Quality Assurance**

Quality assurance for sand asphalt base materials and installation shall be as specified in Section 02641.01, Article C.

##### **D. Submittals**

Submittals for sand asphalt base materials shall be as specified in Section 02641.01, Article D.

#### **02642.02 MATERIALS**

##### **A. Materials Furnished by the County**

The County will not furnish any materials for sand asphalt base.

##### **B. Contractor's Options**

Not applicable.

##### **C. Detailed Material Requirements**

Sand asphalt base shall be as specified in Section 02641.02.

#### **02642.03 EXECUTION**

The operation shall be carried out in accordance with the provisions of Section 02641 except as modified herein:

1. Sand asphalt shall not be placed on frozen or excessively moist subbase.

2. The subbase shall be within the specified grade tolerance and sufficiently stable to support the hauling and placement equipment without undue displacement.
3. Transporting the mix shall be in accordance with Section 02641.03, Article C, except the temperature of the mix shall not be less than 175<sup>o</sup>F at the time of placement.
4. Manual screed control may be used.
5. In-place density shall be determined as described in Section 02641.01, Article C, except that if the value obtained by averaging the densities of three or more cores falls below 92%, or if more than one core in four is found to be below 90%, corrective action shall be taken to obtain the specified density.

**02642.04 METHOD OF MEASUREMENT**

RESERVED FOR FUTURE USE

**02642.05 BASIS OF PAYMENT**

**A. General**

RESERVED FOR FUTURE USE

**B. Sand Asphalt Base**

RESERVED FOR FUTURE USE

**C. Bid Price Adjustments**

RESERVED FOR FUTURE USE

**SECTION 02643**  
**PLANT MIXED SEAL**

**02643.01 GENERAL**

**A. Description**

Plant mixed seal shall include, but not necessarily be limited to, aggregate and asphalt cement, including a heat-stable anti-strip additive if required, mixed in accordance with Section 02641 and the Contract Documents.

**B. Related work Included Elsewhere**

Bituminous concrete pavement; Section 02641.

**C. Quality Assurance**

Quality assurance for plant mixed seal materials and installation shall be as specified in Section 02641.01, Article C.

**D. Submittals**

Submittals for plant mixed seal materials shall be as specified in Section 02641.01, Article D.

**02643.02 MATERIALS**

**A. Materials Furnished by the County**

The County will not furnished any materials for plant mixed seal.

**B. Contractor's Options**

Not applicable.

**C. Detailed Material Requirements**

Plant mixed seal materials shall be as specified in Section 02641.02.

**02643.03 EXECUTION**

The operation shall be carried out in accordance with the provisions of Bituminous Concrete Pavement, Section 02641 except as modified below.

- A.** Tack coat shall be uniformly applied to the underlying surface at a rate of 0.05 to 0.10 gallon per square yard.



**PLANT MIX SEAL**

**02643-2**

- B.** Automatic screed controls are waived.
- C.** Normal density requirements are waived. Minimal rolling is required. Rolling shall be performed immediately behind the paver. Normally, one or two passes with a medium weight roller will compact the mix. Continued rolling will not be allowed, as this may cause crushing of the aggregate. Longitudinal joints shall be butted not lapped.

**02643.04 METHOD OF MEASUREMENT**

RESERVED FOR FUTURE USE

**02643.05 BASIS OF PAYMENT**

**A. General**

RESERVED FOR FUTURE USE

**B. Plant Mixed Seal**

RESERVED FOR FUTURE USE

**C. Bid Price Adjustments**

RESERVED FOR FUTURE USE

## SECTION 02644

### BITUMINOUS SURFACE TREATMENT

#### 02644.01 GENERAL

##### A. Description

Bituminous surface treatment shall include, but not necessarily be limited to, the application of one or more seal coats or the application of a prime coat followed by the application of one or more seal coats in accordance with the Contract Documents.

The prime coat, when required, shall consist of preparing and treating an existing surface with bituminous material.

A seal coat shall consist of an application of bituminous material followed by an application of cover coat aggregate.

##### B. Related Sections

Bituminous concrete pavement; Section 02641.

The materials in this section may be accepted based on the manufacturer's certification.

##### C. Quality Assurance

###### 1. Manufacturer's Certification

The manufacturer's certification shall contain the following information:

- a. Date, time, tank or blending system, and identification of the hauling unit.
- b. Type, grade, temperature, and quantity of material being loaded.
- c. Complete certified analysis.
- d. Lot number, if applicable.

###### 2. Hauler's Certification

The hauler's certification shall include the following information:

- a. Identification of the hauling unit and owner.
- b. Type, grade, source, and date of the last previous delivery made using this hauling tank.

- c. The volume of residual material remaining in the tank at the time of loading.

**D. Submittals**

Submittals for bituminous surface treatment materials shall be as specified in Section 02641.01, Article D.

**02644.02 MATERIALS**

**A. Materials Furnished by the County**

The County will not furnish any materials for bituminous surface treatment.

**B. Contractor's Options**

Not applicable.

**C. Detailed Material Requirements**

1. Aggregate

Aggregate for cover coat shall meet the applicable requirements of Section 02641.02, except that the grading shall be in accordance with AASHTO M 43. The gradation of the aggregate will be tested in accordance with AASHTO T 27 omitting AASHTO T 11. Samples of aggregate taken at the point of production and immediately before shipment shall have a maximum of 1.0 percent passing the No. 200 sieve when tested in accordance with AASHTO T-11. Samples taken at any point after shipment shall not have more than 1.5 percent passing the No. 200 sieve. Gradation shall be as follows:

<b>Sieve Sizes</b> <b><u>U. S. Standard</u></b>	<b><u>Mass Percent Passing</u></b> <b><u>AASHTO M 43</u></b>	
	<b><u>No. 7</u></b>	<b><u>No. 8</u></b>
3/4 inch	100	-
1/2 inch	90-100	100
3/8 inch	40-70	85-100
No. 4	0-15	10-30
No. 8	0-5	0- 10
No. 16	-	0- 5

Uncrushed gravel may be used on shoulders.

2. Bituminous Materials

a. Asphalt Cements

Asphalt cements shall meet the requirements of AASHTO M 226, Grade AC-20, Table 2, except the requirements for percent loss on heating is deleted. If the use of a heat stable anti-stripping additive is required, it shall be added at the bituminous plant.

b. Tars

Tars shall meet the requirements of AASHTO M 52.

c. Cutback Asphalts

Cutback asphalts shall meet the requirements of AASHTO M 81 or M 82 except that the penetration on residue at 77°F shall be 50 to 120 for M 81 and 90 to 250 for M 82.

d. Emulsified Asphalts

Emulsified asphalts shall meet the requirements of AASHTO M 140 or M 208. An additional grade referred to as AE-BM may be specified. This material shall meet the requirements of AASHTO M 140, Grade SS-1, except the viscosity at 77°F shall be between 50 and 400 seconds. The cement mixing test will be waived. An additional requirement allowing not more than 3.0% oil distillate by volume of emulsion will apply to all emulsified asphalt grades. The sieve test requirements for field samples will be a maximum of 0.4%.

e. Crackfiller

This material shall be a mixture of asphalt and mineral flour of such fineness that no appreciable separation will occur while being maintained in a liquid condition. The mixture shall meet the following requirements when evaluated by test methods noted in AASHTO M 115:

Penetration at 25° C, 100 g, 5 sec.	5.5 - 7.5 mm
Ductility at 25° C, mm, min.	300
Insoluble in trichloroethylene, %	15 - 26
Evaporation loss, % weight, 50 g, 5 hr, 163° C, max.	2

**02644.03 EXECUTION**

**A. Traffic Control**

The County Engineer will, whenever traffic conditions make it possible, permit existing and new roads to be closed to traffic during the application of the prime and/or seal coats. Traffic shall be detoured as described in Sections 01410 through 01470.

At locations where traffic, including construction equipment, is allowed to use a surface which is to be treated, the application shall be made to one-half the width of the roadway surface; and the remaining portion of the roadway shall be kept free of obstructions and open to traffic. The Contractor shall provide for the passage of traffic through the work area; and when directed by the County Engineer, traffic shall be routed under one-way control. The erection of suitable barricades and posting of watchpersons and flaggers for the maintenance of traffic shall be as stipulated in the Contract Documents.

**B. Weather Conditions**

This work shall not be scheduled if the surface or air temperature in the shade and away from artificial heat is below 50°F. Construction shall not be started during rain, the threat of rain, fog, or if the surface to be treated is wet.

**C. Utility Castings**

Utility casting shall be protected as specified in Section 02641.03, Article B.

**D. Tar or Asphaltic Materials**

Tar or asphaltic materials may be used within the ranges set forth elsewhere in these Specifications. The grade, temperature, and rate of application of these materials as well as the rate of application of any aggregate for cover coat will be established by the County Engineer.

**E. Equipment**

Pressure distributing equipment shall be capable of uniformly applying the specified bituminous material on variable widths of surface at rates of 0.1 to 1.0 gallons per square yard and with variations from any specified rate not to exceed 0.02 gallons per square yard. In addition, this equipment shall include the following features:

1. a fifth wheel tachometer for maintaining uniform speed; (Ordinary speedometers will not be acceptable.)
2. a thermometer graduated to 2°F having sufficient range to determine the actual temperature of the material to be used
3. heaters for uniformly heating the materials to the proper temperatures
4. full circulation spray bars that are laterally and vertically adjustable and provide for a hand spray
5. a calibrated tank to check the quantity of asphalt in each load and the amount used
6. a sampling device built into the tank itself or into a recirculating or discharge line in a way to allow a sample to be drawn during circulation or discharge; (It shall have an inside diameter not less than ½ inch nor greater than 1 inch. It must be provided with a gate type valve or petcock.)
7. a motor driven pump with pressure gages to deliver the bituminous material to the spray bars. (When a variable speed pump and metering system is used, the Contractor shall have available charts prepared by the manufacturer for selecting the proper pump speed for each application rate.)

**F. Spreaders**

The specified sizes and application rates of aggregates shall be applied from approved spreaders. These spreaders may be the mechanical type or the vane type attached to a truck tailgate.

**G. Surface Maintenance**

Rotary brooms or other approved equipment will be required for removing all loose and foreign materials from the surface to be treated.

**H. Rollers**

Steel wheel power rollers weighing not less than 6 tons nor more than 8 tons and/or smooth-tread pneumatic tired rollers, having a total compacting width of not less than 60 inches and a minimum contact pressure of 40 psi, shall be used to force the aggregate firmly into the bituminous material. Tires shall be uniformly inflated at the operating pressure specified by the County Engineer, so the difference between the pressure in any two tires shall never be greater than 5 psi. The Contractor shall provide means of checking the tire pressure on the job at any time. In addition, the Contractor shall have available a copy of the tire manufacturer's compaction specifications for each size and type of tire used.

**I. Prime Coat**

When specified, the surface to be primed shall be shaped to the required grade and section. It shall be free from ruts, corrugations or other irregularities and shall be uniformly compacted.

Immediately before application of the bituminous material, the base shall be swept for its full width and then sprayed with the specified type of material at the rate of 0.1 to 0.5 gallon per square yard at the following spraying temperatures:

<u>Bituminous Material</u>		<u>Spraying Temperature Range</u>
<u>Type</u>	<u>Grade</u>	<u>°F</u>
MC	30	75-100
MC	70	105-175
RT	2	60-125

The bituminous prime coat shall be allowed to thoroughly penetrate the base and cure for at least 24 hours before receiving any additional applications. Any pools of excess bitumen remaining on the surface at this time shall be removed. To prevent overlap of material when additional applications are made, building paper shall be spread over the end of a previous application; and spraying of the second application shall be started on the building paper.

**J. First Seal Coat**

When included in the Contract Documents, but not sooner than 24 hours after application of the prime coat, a seal coat of bituminous material with cover coat aggregate may be applied. Bituminous material of the type specified shall be sprayed at the rate of 0.3 to 0.5 gallon per square yard at the following spraying temperatures:

<u>Bituminous Material</u>		<u>Spraying Temperature Range</u>
<u>Type</u>	<u>Grade</u>	<u>°F</u>
CRS	1	70-140
CRS	2	140-160
RS	1	70-140
RS	2	140-160

**K. Aggregate for Cover Coat**

Immediately following the application of bituminous material, a cover coat aggregate that is dry, dust free, and meeting the requirements of AASHTO M 43, No. 7, shall be uniformly spread by approved spreaders at the rate of 25 to 50 pounds per square yard. The dry and dust free condition of the aggregate will be determined by the County Engineer. Excess aggregate shall be carefully removed, and all areas containing insufficient aggregate shall be corrected by dragging equipment.

**L. Rolling Sequence**

Rolling shall begin immediately after distribution of the cover coat aggregate. Unless otherwise directed, rollers shall begin at the outer edge of the treatment and proceed in a longitudinal direction, working toward the center of the road or the high side in superelevated sections. Each pass shall overlap the previous pass approximately one-half the width of the front wheels. Rolling shall be continued until the aggregate is firmly embedded into the bitumen. Rolling shall be discontinued if cover aggregate begins to crush.

**M. Second Seal Coat**

When specified, but not sooner than 24 hours after the application of the first seal coat, a second seal coat shall be constructed. The previously cured seal coat shall receive an application of bituminous material of the same type and grade used in constructing the first seal coat. The approved bituminous material shall be sprayed at a rate of 0.2 to 0.4 gallons per square yard and at the applicable temperature recommended in Article I above. Immediately following this application, dry, dust free cover coat aggregate meeting the requirements of AASHTO M 43, No. 8, shall be uniformly spread by approved spreaders at the rate of 20 to 35 pounds per square yard. The dry, dust free condition of the aggregate will be determined by the County Engineer. Excess aggregate shall be carefully removed, and all areas containing insufficient aggregate shall be corrected by dragging equipment. Rolling shall be accomplished as described in Article K.

**N. Traffic**

Completed sections shall not be opened to traffic until the final seal coat has completely cured. The Contractor shall maintain the treated surface after it has been opened to traffic until final acceptance. No additional compensation will be allowed for this work.

**02644.04 METHOD OF MEASUREMENT****A. Bituminous Material**

RESERVED FOR FUTURE USE

**B. Aggregate**

RESERVED FOR FUTURE USE

**02644.05 BASIS OF PAYMENT****A. General**

**BITUMINOUS SURFACE TREATMENT**

**02644-7**

RESERVED FOR FUTURE USE

**B. Bituminous Material**

RESERVED FOR FUTURE USE

**C. Aggregate**

RESERVED FOR FUTURE USE



## SECTION 02645

### ASPHALT SUPPORT FABRIC

#### 02645.01 GENERAL

##### A. Description

Asphalt support fabric installation shall include, but not necessarily be limited to, the furnishing and placing of asphalt support fabric over existing paving, to serve as a reinforced waterproof membrane and crack retarder in accordance with the Contract Documents.

##### B. Related Work Included Elsewhere

Bituminous concrete pavement; Section 02641.

##### C. Quality Assurance

The County Engineer will inspect all work performed to ensure compliance with the Contract Documents.

##### D. Submittals

###### 1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all asphalt support fabric furnished. The shop drawings shall include general product information, a tabulation of the fabric's physical properties, and recommended installation procedures.

###### 2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for the asphalt support fabric stating that the asphalt support fabric meets the material requirements specified in Section 02645.02.

#### 02645.02 MATERIALS

##### A. Materials Furnished by the County

The County will not furnish any materials for asphalt support fabric installation.

##### B. Contractor's Options

Asphalt support fabric may be spread mechanically or manually.

**C. Detailed Material Requirements**

1. Asphalt Support Fabric

Asphalt support fabric shall be a nonwoven fabric made of polyester yarn and shall meet the requirements of AASHTO M 288.

2. Bituminous Materials

Bituminous materials shall meet the requirements specified in Section 02644.02 except that emulsion and cutback asphalts shall not be used for tack coats.

**02645.03 EXECUTION**

**A. Surface Preparation**

1. All dirt, water, grease, and other materials that would prevent bonding of the overlay to the existing pavement shall be removed.
2. Large cracks or holes shall be patched as directed by the County Engineer. Cracks narrower than 3/8 inch shall be filled with liquid asphalt.

**B. Tack Coat**

Tack coat type and application rate shall be in accordance with the asphalt support fabric manufacturer's recommendations. The rate of application shall insure good bonding and sufficient residue to impregnate the fabric.

**C. Fabric Installation**

Asphalt support fabric shall be overlapped at least 6 inches. The fabric shall be laid flat and if any wrinkles do occur, the fabric shall be cut and laid flat.

**D. Paving**

Once the asphalt support fabric is in place, paving shall proceed as specified in Section 02641.03.

**02645.04 METHOD OF MEASUREMENT**

RESERVED FOR FUTURE USE

**02645.05 BASIS OF PAYMENT**

RESERVED FOR FUTURE USE