

## SECTION 403 - OPEN-GRADED PLANT MIX SEAL

**403.01 Description.** This work includes constructing an open-graded plant mix seal according to the contract or ordered by the Engineer.

**403.02 Materials.** Materials shall conform to the following:

Bituminous Material (Asphalt Cement Grade AR 60)	702.01
Aggregate for Open-Graded Plant Mix Seal	703.10
Filler	703.15

Bituminous material shall be asphalt cement. The Engineer may change the grade of the bituminous material one (1) step at no change in unit price.

**(A) Composition of Open-Graded Plant Mix Seal (Job-Mix Formula).** The open-graded plant mix seal is a mixture of aggregate and bituminous material. The percentage range by weight, based on dry weight of aggregate, of bituminous material shall be six (6) to nine (9) percent. When porous aggregate is used, the Engineer may order that the bitumen content be increased as much as two (2) percent.

Before producing open-graded plant mix seal mixtures the Contractor shall submit, in writing, a job-mix formula to the Engineer for acceptance. The job-mix formula submitted shall propose definite single values for:

- (1) The percentage of aggregate passing each specified sieve, based on the dry weight of aggregate. These percentages shall be within the ranges shown in Subsection 703.10.
- (2) The percentage of bituminous material based on the dry weight of aggregate.
- (3) The temperature of the mixture leaving the mixer.
- (4) The Contractor shall add silicone to the asphalt cement at a rate of one (1) ounce per five thousand (5,000) gallons. The silicone is subject to acceptance by the Engineer.
- (5) The Contractor shall select the antistripping agent, if required, subject to acceptance by the Engineer. The Contractor shall state the percent of antistripping agent added to the bituminous material, based on the weight of bituminous material.

The job-mix formula mixture as submitted by the Contractor shall have an index of retained strength of not less than fifty (50) when tested by AASHTO T 165 or shall have a minimum coated area of ninety-five (95) percent when tested by AASHTO T 182.

403.02

If the Contractor proposes a change in source of material or if a job-mix formula prove unsatisfactory, the Contractor shall establish a new job-mix formula. \*| \*| \*|

The Contractor shall furnish samples of the individual material required for testing. The Contractor shall submit the samples three (3) weeks before production. The Engineer will observe and supervise the sampling. \*| \*| \*| \*|

The Engineer will make the initial tests for materials necessary to determine compliance with requirements specified herein at no cost to the Contractor. Testing additional sources shall be at no cost to the State. \*| \*|

The Contractor shall submit the job-mix formula for acceptance by the Engineer, in writing, before production. \*| \*|

403.03 Construction Requirements.

(A) Bituminous Mixing Plant. Plants used for the preparation of open-graded plant mix seals shall conform to Subsection 401.03(B)(1) - Bituminous Mixing Plant, except as modified herein. |

When the Contractor elects to use a drier drum mixing plant equipped with cold-feed control and if acceptable by the Engineer, the Contractor may separate the aggregate for the open-graded plant mix seal into two (2) sizes. \*| \*| \*|

(B) Hauling Equipment. Vehicles used for hauling open-graded plant mix seals shall have clean and smooth metal beds. The Contractor shall coat the vehicles thinly with an acceptable material to prevent the mixture from adhering to the beds. Each vehicle shall have a cover of canvas or other suitable material of such size as to protect the mixture from the weather. The Contractor shall insulate the vehicle beds and fasten the vehicle beds securely with covers so that the Contractor delivers the mixture on the road at the specified temperature. \*| \*| \*| \*|

(C) Bituminous Pavers. Bituminous pavers shall be self-contained and power-propelled units. The Contractor shall provide the bituminous pavers with an adjustable activated screed or strike off assembly and heater unit. The bituminous pavers shall spread and finish the material in widths applicable to the specified typical section and thicknesses shown in the contract. \*| \*| \*| \*| \*| \*|

The Contractor shall equip the pavers with a control system to automatically maintain the screed elevation as specified herein. The Contractor shall actuate the control system automatically from a ski or shoe riding on the pavement surface through system of mechanical sensors or sensor directed mechanisms or devices. When ordered, the Contractor shall make the transverse slope control system inoperative and the Contractor shall control the screed by sensor directed automatic mechanisms. \*| \*| \*| \*| \*| \*|

If the automatic control system become inoperative during the day's work, the Engineer will permit the Contractor to finish the day's work using manual controls. The Contractor shall not resume the work thereafter until the Contractor has made the automatic control system operative.

**(D) Rollers.** Rollers shall be in good condition and capable of reversing without backlash. The Engineer will not permit the use of equipment which results in crushing of the aggregate. Rollers shall be steel-wheel and capable of exerting a force of not less than two hundred fifty (250) pounds per inch of width of compression roll or rolls.

**(E) Weather Limitations.** The surface temperature shall be at least seventy (70) degrees Fahrenheit. The surface shall be dry.

**(F) Preparation of Existing Surface.** When the surface of the existing pavement or base is irregular, the Contractor shall bring the surface to uniform grade and cross section by using Asphalt Concrete Mix No. V.

The Contractor shall apply tack coat to portland cement concrete surfaces and existing pavements. The tack coat shall conform to the requirements of Section 407 - Bituminous Tack Coat.

**(G) Preparation of Bituminous Material.** The supplier shall heat the bituminous material to the required temperature to avoid local overheating. The supplier shall provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of asphalt cement delivered to the mixer shall not be more than thirty-five (35) degrees Fahrenheit above the temperature as specified in Subsection 403.03(H) - Preparation for Aggregate. The Supplier shall not use asphalt cement while the asphalt cement is foaming nor heat the asphalt cement above three hundred fifty (350) degrees Fahrenheit after delivery to the plant.

**(H) Preparation of Aggregates.** The supplier shall dry and heat the aggregates for the mixture to the required temperature. The supplier shall adjust the flames used for drying and heating properly to avoid damage to the aggregate and to avoid soot on the aggregate.

The temperature of the aggregate as introduced into the mixture shall not exceed two hundred and sixty (260) degrees Fahrenheit or a temperature which causes segregation of the asphalt and aggregate during transportation. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

**(I) Mixing.** The supplier shall measure of gage and introduce the dried aggregates and the bituminous material into the mixer in the proportions specified by the job-mix formula.

After the supplier introduces the required amounts of aggregate and bituminous material into the mixer, the supplier shall mix the materials until a complete and uniform coating of the particles and a thorough distribution of the bituminous material throughout the aggregate is secured.

**(J) Control of Bituminous Mixture.** After the job-mix formula is established, mixtures furnished for the project shall conform thereto within the following ranges of tolerances in Table 403-I:

TABLE 403-I - RANGE OF TOLERANCES FOR JOB-MIX FORMULA	
Passing No. 4 and larger sieves (percent)	+ 7.0
Passing No. 8 to No. 100 sieves (inclusive) (percent)	+ 4.0
Passing No. 200 sieve (percent)	+ 2.0
Bitumen (percent)	+ 0.4
Temperature of mixture (degrees Fahrenheit)	+ 20

**(K) Transporting, Spreading, and Finishing.** The Contractor shall transport the mixture from the mixing plant to the point of use in vehicles conforming to Subsection 403.03(B).

The Contractor shall spread and strike off the mixture to the grade and elevation established. The Contractor shall use the bituminous pavers to distribute the mixture over the entire width or over such partial width as may be practicable. The Contractor shall heat the paver immediately before beginning of lay down operation. The temperature of the heated screed shall not exceed two hundred and fifty (250) degrees Fahrenheit.

If the roadway consists of two (2) lanes of width, the longitudinal joint shall be at the centerline of the pavement. If the roadway is more than two (2) lanes in width, the longitudinal joints shall be at the lane lines.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the Contractor may spread, rake, and lute the mixture by hand tools.

The Contractor shall place the mixture at a temperature between two hundred (200) degrees Fahrenheit and two hundred fifty (250) degrees Fahrenheit as measured in the truck just before dumping into the spreader.

**(L) Compaction.** After the Contractor have spread, strike off, and adjust the surface irregularities, the Contractor shall compact the open-graded plant mix seal thoroughly and uniformly by rolling.

The Contractor shall roll the open-graded plant mix seal in a longitudinal direction, commencing at the outside edge and progressing towards the center. The Contractor shall roll with a steel-wheel roller. The Contractor shall conduct the rolling so that shoving, distortion, or stripping will not develop beneath the roller. On superelevated curves, the rolling shall commence on the low side and progress to the high side. The Contractor shall confine the amount of rolling to only that necessary for consolidating the open-graded plant mix seal and bonding the open-graded plant mix seal to the underlying surface. The Contractor shall avoid excessive rolling.

The Contractor shall protect the completed open-graded plant mix seal from traffic until the open-graded plant mix seal has cooled sufficiently to resist abrasion.

**(M) Joints, Trimming Edges, and Cleanup.** Placing of the open-graded plant mix seal shall be as continuous as possible. Rollers shall not pass over the unprotected end of a freshly laid mixture. The Contractor shall form the transverse joints by cutting back on the previous run to expose the full depth of the course. When ordered by the Engineer, the Contractor shall use a brush coat of bituminous material on contact surfaces of transverse joints just before the Contractor lays additional open-graded plant mix seal against the previously rolled material.

The Contractor shall cut off the exposed edges of the completed mat true to the required lines. The Contractor shall remove the material trimmed from the edges and other discarded bituminous mixtures from the roadway. The Contractor shall dispose them in an acceptable area out of sight of the road.

**(N) Finished Work Samples.** The Engineer may sample the pavement for testing. The Contractor shall cut the pavement neatly for samples by a saw or core drill. The Contractor shall supply and finish new material to backfill voids left by sampling.

**(O) Acceptance Sampling and Testing of Open-Graded Plant Mix Seal (Surface Tolerance).** The provisions of Subsection 401.03(I) - Surface Tolerances shall apply.

**(P) Acceptance Sampling and Testing of Bituminous Materials.** Acceptance of bituminous materials will be according to Subsection 106.03 - Samples, Tests, Cited Specification.

**403.04 Method of Measurement.** The Engineer will measure open-graded plant mix seal by the ton according to Section 109 - Measurement and Payment. The Engineer will not permit batch weights as a method of measurement, unless the alternative provisions of Subsection 401.03(B)(1)(a)1. - Plant Scales are met, in which case the Engineer will use the cumulative weight of batches for payment. The tonnage will be the weight used in the accepted pavement. The Engineer will not make deduction for the weight of bituminous material in the mixture.

403.04

The Engineer will measure preparation of existing surface on a force account basis when provided for in the Proposal. \*|  
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403.05 Basis of Payment. The Engineer will pay for the accepted quantities of open-graded plant mix seal at the contract price per ton, complete in place. \*|  
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If the contract provides payment for preparation of existing pavement surface, the Engineer will pay for the repair or leveling course from an allowance for Surface Preparation. The Engineer will compute for the actual amount paid as set forth in Subsection 109.04 - Extra and Force Account Work, whether this amount is more or less than the estimated amount in the proposal. \*|  
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The Engineer will make payment under: \*|

Pay Item	Pay Unit
Open-Graded Plant Mix Seal	Ton
Surface Preparation	Force Account

The Engineer will not pay for bituminous tack coat separately. The Engineer will consider them incidental to open-graded plant mix seal. The Engineer will not make compensation. \*|  
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