

## SECTION 406 - PENETRATION MACADAM PAVEMENT

**406.01 Description.** This work includes constructing crushed rock pavement penetrated, bound and sealed with hot asphalt cement according to the contract.

The sequence of construction and quantities of materials for the type of construction is outlined in Table 406-I.

**406.02 Materials.**

**(A) Bituminous Material.** Bituminous material shall be asphalt cement Grade AR 60 conforming to Section 702 - Bituminous Materials.

**(B) Aggregate.** Aggregates shall conform to Subsection 703.12 - Aggregate for Highway Construction. (See Table 406-I for required sizes.)

**406.03 Construction Requirements.**

**(A) Weather Limitations.** The Contractor shall not place the penetration macadam on wet surface, when the air temperature is below sixty (60) degrees Fahrenheit, or when weather conditions prevents the proper construction of the pavement.

**(B) Equipment.** The equipment shall include a power broom or a power blower, acceptable broom dragging equipment, rollers, a self-propelled mechanical spreader for spreading coarse aggregate, a mechanical revolving cylinder-type aggregate spreader or mechanical roller-type hopper spreader for spreading fine aggregate that the Contractor can adjust to spread accurately the required quantity of material per square yard, a bituminous distributor and equipment for heating bituminous material. The Contractor may use other types of aggregate spreaders equivalent to the types described herein upon acceptance.

Rolling equipment includes a twelve (12) ton, three (3) wheel, steel-tired roller with a compression of the rear wheels being not less than three hundred twenty-five (325) pounds per linear inch of tire width. The bituminous distributor shall conform to Subsection 405.03(B) - Equipment.

**(C) Surface Preparation.** Before starting macadam pavement construction, the Contractor shall prepare the surface under the applicable sections of the contract. If the prepared surface is damaged or unsatisfactory, the Contractor shall repair and sweep the prepared surface clean at no cost to the State before the Contractor lays the coarse aggregate.

If side forms are not used, the Contractor shall place the shoulder material to a height such that the Contractor can compact the shoulder material with and provide support for the pavement edges.

(D) **Placing and Compacting Coarse Aggregate.** The Contractor shall place \*|  
 the coarse aggregate of the required size by an acceptable spreader, or \*|  
 by other acceptable mechanical methods in the quantities required such \*|  
 that the thoroughly compacted layer shall be of the dimensions required. \*|  
 The Contractor shall replace the areas of non-uniformly graded aggregate \*|  
 with suitable material before rolling begins. The Contractor shall make \*|  
 these corrections by hand picking where necessary and continued after \*|  
 initial rolling until the aggregate is uniform in appearance and texture \*|  
 and irregularities are corrected. |

The Contractor shall dry-roll the coarse aggregate until the \*|  
 aggregate is compacted and keyed. Rolling shall be parallel to the road \*|  
 centerline and shall start at the outer edges of the road, overlap equal \*|  
 portions of aggregate and shoulder, and progress toward the center, \*|  
 overlapping on successive passes by at least half (1/2) the width of the \*|  
 roller, except that on superelevated curves, rolling shall progress from \*|  
 the lower to the upper edge. Rolling shall continue until the aggregate \*|  
 does not creep or wave ahead of the roller.

The Contractor shall replace the material that crushes excessively \*|  
 under the roller or becomes segregated as such to prevent free and \*|  
 uniform penetration of the bituminous material with suitable aggregate. \*|  
 The compacted coarse aggregate shall have a firm, even surface.

Along curbs, headers and walls, and at other places not accessible \*|  
 to the roller, the Contractor shall tamp the aggregate thoroughly with \*|  
 mechanical or hand tampers. Each hand tamper shall weigh not less than \*|  
 fifty (50) pounds and have a face area not exceeding one hundred (100) \*|  
 square inches.

The Contractor shall replace the aggregate in courses that becomes \*|  
 coated or mixed with unsuitable matter before the application of the \*|  
 bituminous material with clean aggregate. The Contractor shall reroll the \*|  
 area. \*|

Dry rolling shall cease when the surface of the coarse aggregate \*|  
 becomes firmly locked and true to grade and before the voids are closed \*|  
 as to prevent the free uniform penetration of the bituminous material.

(E) **Application of Bituminous Material.** The Contractor shall apply the \*|  
 hot bituminous material uniformly on the aggregate surface by a pressure \*|  
 distributor as ordered by the Engineer. The sequence of construction and \*|  
 application rates are outlined in Table 406-I. |

(F) **Spreading Key Aggregate.** After the first application of bituminous \*|  
 material and before the asphalt stiffens, the Contractor shall cover the \*|  
 surface uniformly with a light sprinkle of dry key aggregate to keep the \*|  
 bituminous material from adhering to the roller wheels. While the \*|  
 Contractor is rolling the surface, the Contractor shall spread additional \*|  
 key aggregate and broom lightly over the surface. This procedure shall \*|  
 continue until the Contractor have filled the surface interstices between \*|

coarse aggregate but not covering the coarse aggregate. The Contractor shall spread the aggregate mechanically, in quantities sufficient to fill the voids or as ordered by the Engineer. The Engineer will not permit the use of excessive quantities. The Engineer will not allow additional payment.

(G) **Spreading Chips.** In the construction of three-application macadam, the Contractor shall spread a uniform layer of chips by a mechanical spreader immediately following the second application of bituminous material. The Contractor shall then reroll and broom the surface as specified for key aggregate. If ordered by the Engineer, the Contractor shall keep the chip-covered surface under traffic for a period not to exceed ten (10) days before the seal coat is applied.

TABLE 406-I - APPROXIMATE QUANTITIES PER SQUARE YARD			
OPERATION		2-Application	3-Application
Spreading Coarse Aggregate	Size	No. 1	No. 3
	Quantity	As required to build up section	As required to build up section
	Application of Bituminous Material	1.90 gallon	1.25 gallon
Spreading Key Aggregate	Size	No. 56	No. 6
	Quantity	Sufficient amount to fill voids	0.016 C.Y. or 40 pounds
	Application of Bituminous Material	N O N E	0.40 gallon
Spreading Chips	Size	No. 8	No. 8
	Quantity	0.016 C.Y. or 40 pounds	0.008 C.Y. or 20 pounds
	Application of Bituminous Material	0.60 gallon	0.20 gallon
Spreading Rock Sand	Size	No. 9	No. 9
	Quantity	Sufficient amount to fill voids	0.004 C.Y. or 10 pounds

(H) **Seal Coat.** In two-application macadam construction, the Contractor shall apply the spreading of chips, last application of bituminous material and spreading of sand as a seal coat. The Contractor shall sweep the surface clean of foreign and a uniform layer of chips applied

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over the surface with a mechanical spreader. The Contractor shall broom \*| the surface by hand or drag broomed if necessary to secure uniform \*| distribution. The Contractor shall follow this immediately by the last \*| application of bituminous material and the spreading of rock sand. The spreading rate of rock sand shall be such that the voids are filled and sticking of the roller wheels is prevented.

In three-application macadam construction, the Contractor shall \*| apply the last application of bituminous materials and spreading of rock \*| sand as a seal coat. The Contractor shall sweep the surface clean of \*| foreign matter and the last application of bituminous material applied. \*| The Contractor shall cover the surface immediately by a uniform layer of \*| rock sand with a mechanical spreader. The Contractor shall roll and \*| broom the rock sand as specified for key aggregate until thoroughly \*| bonded. If required, the Contractor shall spread additional rock sand \*| over the surface during rolling, and upon completion, a light covering of loose rock sand shall remain on the surface.

406.04 Method of Measurement. The Engineer will measure the bituminous \*| material by the gallon or ton according to Section 109 - Measurement and \*| Payment. \*

The Engineer will measure the crushed rock by the ton according to \*| Section 109 - Measurement and Payment, except the Engineer will deduct that \*| moisture over the following from the weighed tonnage:

Rock Size	Moisture Content (Based on Dry Aggregate Weight)
Nos. 1, 3, 56 and 6	3 percent
Nos. 8 and 9	5 percent

406.05 Basis of Payment. The Engineer will pay for the accepted quantities \*| of penetration macadam pavement at the contract price per ton for the various \*| sizes of crushed rock and per gallon or ton as specified in the proposal, for \*| the bituminous material complete in place.

The price shall be full compensation for furnishing labors, materials, | tools, equipment, and incidentals necessary to complete the macadam pavement. |

The Engineer will make payment under: |

Pay Item	Pay Unit
Crushed Rock, Size No. _____	Ton
Bituminous Material	Gallon
Bituminous Material	Ton