

**ITEM 04403.195902 M - SUPERPAVE HMA, 19.0 mm**

**ITEM 04403.195912 M - PLANT PRODUCTION QUALITY ADJUSTMENT to 04403.195902 M**

**ITEM 04403.195922 M - PAVEMENT DENSITY QUALITY ADJUSTMENT to 04403.195902 M**

The requirements of Section 403 - Hot Mix Asphalt Concrete Pavement shall apply except as modified and/or revised below.

**DESCRIPTION**

This work shall consist of developing Hot Mix Asphalt pavement courses using the *SUPERPAVE* Mix Design procedure detailed in Materials Method 5.16, “*SUPERPAVE* Hot Mix Asphalt Mixture Design and Mixture Verification Procedures,” in accordance with these specifications and in reasonable close conformity with the required lines, grades, thicknesses, and typical sections shown on the plans or established by the Engineer. This is a performance based specification in which the Contractor is responsible for compacting the pavement within a specified density range. Written instructions for determining pavement density and density Quality Adjustment Factors (QAFs) are available from the Regional Materials Engineer or the Director, Materials Bureau.

**MATERIALS**

The materials and composition for these mixtures shall meet the requirements specified in Subsection 403-2 Materials, except as noted herein. The specific Performance Graded Binder and the Design Estimated Traffic in 80 kN ESALs will be specified by a special note in the Contract Proposal.

Subsection 401-2.02 Composition of Mixtures shall be deleted and replaced with the following:

“Formulate and submit to the Regional Materials Engineer, a *SUPERPAVE* Mix Design that satisfies the design control points listed in Table 2 - Design Control Points and does not pass through the restricted zone listed in Table 3 - Restricted Zone of Materials Method 5.16, based on the specified nominal maximum aggregate size.

If for any reason, a change in gradation or materials occurs, prepare a separate job mix formula and *SUPERPAVE* mixture design to fit each change in material or gradation. Changes in Performance Graded Binder content can be made by the Regional Director or his representative providing the resultant mixture has properties within the specified mechanical and volumetric properties.

The mixtures shall be produced, delivered to the work site, and incorporated into the work within 10°C of the temperature specified by the Contractor but within the mixing and compaction range of 120°C and 165°C. Additionally, the Performance Graded Binder shall be introduced into the pugmill at a temperature compatible with that of the aggregate as determined by the Regional Director or his representative, between the limits of 110°C and 175°C.

The aggregates shall be those approved for use by the approved job mix formula and will be accepted at the plant site. The Performance Graded Binder will be conditionally accepted at the supplier’s source and at the plant on the basis of certification. Samples taken at the plant will be tested by the Department to determine specification compliance.

Subsection 401-2.05 Bituminous Materials shall be deleted and replaced with the following:

“The Performance Graded Binder (PGB) used in the production of these mixes shall be defined by

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AASHTO Provisional Standard MP1 - Standard Specification for Performance Graded Asphalt Binder.

Acceptance of the PGB is based on the primary source appearing on the Department's Approved List for Bituminous Material Primary Sources, A. Performance Graded Binders for Paving. Acceptance of the PGB is contingent upon satisfactory test results from samples taken, as required by the Department's procedural directives, at the location where the material is incorporated into the work. A primary source is defined as a firm that samples, tests, and certifies by Production Lot that the PGB is in conformance with the specifications. The procedural directives for sampling, testing, and certifying the PGB, and for achieving and maintaining approved list status, are available from the Materials Bureau.

The PGB shall not be delivered to the HMA Production Facility at a temperature in excess of 175°C."

**CONSTRUCTION DETAILS**

The details of §401-3 Construction Details shall apply except as modified below:

Add the following to the end of Subsection 401-3.02 Bituminous Mixing Plant A, Requirements for All Plants No. 11:

- "Y. Gyrotory Compactor - A power driven gyrotory compactor capable of maintaining an angle of gyration of  $1.25^\circ \pm 0.02^\circ$ , a speed of gyration of 30.0 rpm  $\pm 0.5$  rpm, and a consolidation pressure of 600 k Pa  $\pm 10\%$  for gyrations zero to five and  $\pm 3\%$  for gyrations six and greater. The make and model of the gyrotory compactor supplied must be approved by the Director, Materials Bureau.
- Z. Gyrotory Specimen Mold Assembly - The specimen mold assembly consisting of the mold 150.00 mm + 0.00 mm and - 0.01 mm, base plate and top plate (if required). The minimum height of the mold is 250.00 mm. A minimum of 4 mold assemblies and an adequate supply of 150.00 mm paper discs shall be provided.
- AA. Gyrotory Specimen Extractor - A simple means of specimen extraction from the gyrotory molds shall be supplied.
- BB. Oven - A thermostatically controlled convection type oven having a minimum capacity of 0.15 cubic meters shall be supplied to preheat the *SUPERPAVE* Gyrotory Compactor mold assemblies and asphalt mix samples. The oven shall have a controlled temperature range up to 190°C with a  $\pm 3^\circ\text{C}$  accuracy throughout the range.
- CC. Kraft Paper - 23 kg medium weight, 915 mm width.
- DD. Sheet Rock Taping Knives (min. 2) - 254 mm length.
- EE. Aging Pans (minimum 4) - 457 mm x 457 mm x 38 mm H galvanized iron pans.
- FF. Miscellaneous Pans (minimum 4) - 394 mm x 280 mm x 51 mm H aluminum pans.
- GG. Screen trays (1 each) - 457 mm x 660 mm to include the following: 2.36 mm, 1.18 mm, 0.60 mm, 0.30 mm, 0.15 mm, 0.075 mm"

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Add the following to the end of §401-3 Construction Details:

On the first day of mainline paving, select one of the following options:

**OPTION A: Test Section.** Prior to paving operations for this item, construct a test section on the project site at a location approved by the Engineer. The test section will be at least 50 m, the full width of the pavement, and the same depth specified for the construction of the course which it represents. The maximum test section length is 500 centerline-meters on the mainline. There is no maximum length if the test section is not on the mainline. Use equipment that is of the same type and weight to be used on the remainder of the course represented by the test section. The test section will be paid for at 1.5 times the actual quantity paved, up to 200 actual metric tons per test section. A maximum of two test sections per item will be paid at the 1.5 Test Section Adjustment and pavement density Quality Adjustment Factors (QAFs) will not apply to the first two test sections. If more than two test sections are required, the pavement density QAF will apply when the additional test sections are located on the mainline. Only one test section per item per day may be placed.

Paving operations for this item will not be permitted until a test section obtains a minimum pavement density QAF of 1.00. When the pavement density QAF is less than 1.00 construct another test section in accordance with Option A.

**OPTION B: Routine Paving.** Begin paving operations. The Test Section Adjustment will not apply. All material placed will be subject to a pavement density QAF in accordance with this specification. If the pavement density QAF on the first day of paving is less than 1.00, construct a test section in accordance with Option A.

**Loose Mix Samples.** On each paving day, take four loose mix samples in accordance with AASHTO T168-91, Standard Test Method for Sampling Bituminous Paving Mixtures. Take these samples periodically throughout the day so as to represent the entire days production. When a low production day is anticipated it is recommended that a minimum of three loose mix samples be obtained before production is terminated. When operational conditions cause production to be terminated before the specified number of samples have been taken the following procedures will be used:

- 1) If only three samples are taken, the loose mix MADMTD will be based on the average of the three samples taken.
- 2) If only one or two samples are taken, the days production will be added to the next days production and sublots determined based on the total quantity placed during the two days. Therefore a maximum of six loose mix samples will be used to determine the loose mix MADMTD.

**Coring Locations.** The Engineer will select one pavement core location for each subplot in accordance with Materials Procedure 96-4M, Asphalt Concrete Statistical Pavement Density Determination to represent each paving subplot. The Engineer will define a total of four 150 mm diameter coring locations using an appropriate method. The pavement core samples must come from within the 150 mm diameter circles outlined. Under no circumstances will the Engineer designate the coring locations before the rolling operation is complete. The rolling operation will be considered complete when all compaction

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equipment has moved off the lane to be cored. Obtain the 150 mm diameter pavement core samples no later than the day following the lot's placement. If coring is performed the same day as the placement, cool the pavement so that the core sample is not damaged during coring. Backfill the core holes, with a similar HMA material as soon as possible after coring, using a procedure approved by the Engineer.

**Security Procedure.** After procuring the pavement cores, secure them in accordance with Materials Procedure 96-4M, Asphalt Concrete Statistical Pavement Density Determination. Cores arriving at the Regional Laboratory for testing with a damaged or missing security seal will not be tested and new cores will be required from the same locations as the original cores. Take care to insure that the loose mix samples and cores are in acceptable test condition. Damaged cores will require resampling. The Engineer will select the core locations in the same general vicinity,  $\pm 0.3$  meter of the damaged core. Do not intentionally separate the pavement core course from the underlying material if the course does not debond during coring. The Department will separate the pavement core course, required for testing from the remainder of the core by sawing if necessary. Deliver the pavement core samples and the loose mix samples to the Department Regional Laboratory no later than the end of the following day's placement. If, for any reason, a delay occurs in the delivery of the lot samples for three consecutive lots, paving operations for this item will not be permitted to continue until the samples are delivered and tested.

**Core Testing Option.** The Contractor may elect to test the cores procured under this specification. The testing will be performed under provisions of Materials Procedure NY 98-01M, "Procedure for Testing Cores Taken from All Hot Mix Asphalt (HMA) Performance-Related Specifications". If the Contractor elects to test the cores, the Engineer will define one additional core from two of the sublots within 0.3 m from the original core location, at the same offset, and secure them using the "Security Procedure".

**Paving Lot.** A paving lot is defined as a days production providing a minimum of 200 metric tons. When paving is continuous within a 24 hour period a new lot will result when a change occurs in the paving crew. If less than 200 metric tons is placed in any day no pavement cores will be taken and density QAFs will not apply. Each paving lot will be equally divided into four sublots in accordance with Materials Procedure 96-4M, Asphalt Concrete Statistical Pavement Density Determination."

Add the following to the end of Subsection 401-3.06 Rollers.

"The compaction equipment shall conform to the requirements of this Subsection. Control the operation of the rollers during the placement of these items including the speed, the amplitude settings, the vibration frequency, and the weight of the rollers."

Subsection 401-3.12 Compaction shall be deleted and replaced with the following:

"Immediately after the HMA mixture has been spread, struck off and surface irregularities adjusted, thoroughly and uniformly compact by rolling. Roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking or shoving. Initially roll the pavement with the roller traveling parallel to the centerline of the pavement beginning at each edge and working toward the super-elevated edge.

Compact the pavement sufficiently to achieve densities, expressed as a percentage of the mixtures average daily maximum theoretical density (%MADMTD), in a range of 92% to 97%. Pavement cores and mix samples will be tested and analyzed by the Department in accordance with Materials Procedure 96-4M, Asphalt Concrete Statistical Pavement Density Determination to determine the loose mix sample

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MADMTD, pavement core bulk density, and the resultant pavement core percent of the MADMTD.

If consecutive lots are found to have a density QAF equal to or below 0.85, paving operations for this item will be stopped and a new test section constructed in accordance with Option A, described previously in this section.

The density QAF will not be applied to material placed on ramps with a uniform full width section of less than 400 m in length, shoulders, maintenance widenings and crossovers, and bridges. Payment for these areas will be based on satisfactory placement and compaction as determined by the Engineer. Placement and compaction procedures will be deemed satisfactory by the Engineer when the procedures used in these areas are the same or similar to those used on the mainline pavement sections. If the shoulder shows signs of distress at this level of compaction decrease the compactive effort until no damage occurs to the shoulder or subbase. Also, if a nuclear gauge(s), or an equivalent density monitoring device subject to the approval of the Director, Materials Bureau, is used to monitor the main-line paving then the same gauge(s) should be used to monitor the above referenced areas to insure that the pavement density is between 92% to 97% of the MADMTD if the shoulder subbase is structurally sufficient to sustain this level of compaction.

When the rolling operation is complete there should be no visible shallow ruts, ridges, other irregularities, or roller marks in the pavement. If these imperfections are present, correct the imperfections or relay the pavement at no additional cost to the Department as ordered by the Engineer.

Correct at once any displacement occurring as a result of reversing the direction of the roller, or from other causes, by the use of rakes and addition of fresh mixture as required. Exercise care in rolling not to displace the line and grade of the edges of the bituminous mixture. To prevent adhesion of the mixture to the drum(s) of the roller, properly moisten the drum(s) with water, or water mixed with small quantities of detergent or other Department approved asphalt release compounds. If a pneumatic tire roller is used, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar materials to prevent pneumatic tire pickup. In all instances, protect the surface of the pavement from drippings of fuel oil or any other solvents used in paving, compaction or cleaning operations.

Unless otherwise directed by the Engineer, compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two (2) passes with the drum operating static, when vibratory rollers having pneumatic drive wheels are used. If dual vibrating drum rollers are used, compact the joint by overlapping the joints in two (2) passes with both drums operating static.

Along forms, curbs, headers, walls and other areas not accessible to the rollers, compact the mix thoroughly with mechanical tampers as directed by the Engineer. On depressed areas, a trench roller or small vibratory roller approved by the Engineer may be used. Cleated compression strips also may be used under the roller to transmit compression to the depressed area.

Remove any mixture that becomes loose and broken, mixed with dirt, or is in any way defective and replace with fresh hot mixture and compact to conform with the surrounding area. Correct any area showing an excess or deficiency of bituminous materials to the satisfaction of the Engineer.

If vibratory compaction equipment is used, the Contractor assumes full responsibility for the cost repairing all damage which may occur to highway components and adjacent property including buried utility and service facilities.

Multiple plant production shall not be allowed unless each plant supplies material to a separate paving operation. When multiple paving operations are utilized with material production from a single plant each paving operation will be evaluated as individual paving lots.”

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**METHOD OF MEASUREMENT**

The provisions of §401-4, §402-4 and §403-4, Method of Measurement shall apply including the following used to calculate the pavement density QAF:

“The Department will determine the paving lot’s Percent Within Limits (PWL) in accordance with Materials Procedure 96-4, Asphalt Concrete Statistical Pavement Density Determination. This PWL will be used to determine the density QAF as shown in Table 1 - Quality Schedule. The quantity of the lot subject to possible adjustment will be determined based on an estimate of tonnage placed, determined from the typical sections shown in the plans.

**Table 1 - Quality Schedule**

Percent Within Limits (PWL)	Quality Adjustment Factor (QAF)
PWL > 93	1.05
PWL ≤ 93	$\sum (PWL_{DensityRange} * PayFactor_{DensityRange})^{1,2}$

1. Where each  $PWL_{DensityRange}$  will be calculated for the nine Density Ranges, in Table 2, in accordance with Materials Procedure 96-4, for each lot.

**Table 2 - Range Pay Factors**

Density Range (DR)	Pay Factor
DR ≤ 88.0	0.00
88.0 < DR ≤ 89.0	0.60
89.0 < DR ≤ 90.0	0.70
90.0 < DR ≤ 91.0	0.80
91.0 < DR ≤ 92.0	0.90
92.0 < DR ≤ 93.0	1.00
93.0 < DR ≤ 96.0	1.05
96.0 < DR ≤ 97.0	1.00
97.0 < DR ≤ 98.0	0.90
98.0 < DR ≤ 99.0	0.80
99.0 < DR	0.00

2. If the QAF is determined to be 0.60 or less then the lot shall be evaluated by the Department to determine if it may remain in-place. The type of material produced (i.e. binder, top), the layer in which it was used, and the location of use (i.e., mainline or a non-critical area) will be primary considerations in the determination of whether the HMA can be left in-place. If the HMA cannot be left in-place it will be removed at no cost to the Department. However, if the Department determines that the HMA can be left in-place, the Quality Payment Adjustment will be 0.60.

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The pavement density QAF from Table 1 will be applied to each paving lot to determine the Quality Payment Adjustment. The pavement density QAF will not be applied to material placed on ramps with a uniform full width section of less than 400 meters in length, shoulders, maintenance widenings and crossovers, and bridges. Payment in these areas will be based on satisfactory placement and compaction as determined by the Engineer.”

**BASIS OF PAYMENT**

The provisions of subsection 403-5 Basis of Payment shall apply including the following:

“The unit bid price also includes the cost of all necessary equipment, labor and materials required in obtaining the pavement cores, filling all core holes with HMA and compacting these core holes to the satisfaction of the Engineer.

Payment will be made under:

<b>ITEM NO.</b>	<b>ITEM</b>	<b>PAY UNIT</b>
04403.195902 M	<i>SUPERPAVE</i> HMA, 19.0 mm	Metric Ton
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