ITEM 06403.067201 M - 6.3 mm F2 Superthin HMA, 70 Series Compaction
ITEM 06403.067211 M - Plant Production Quality Adjustment to 06403.067201 M
ITEM 06407.02 M - Tack Coat

DESCRIPTION

This work shall consist of developing Superthin HMA material using the Superpave Mix Design procedure detailed in Materials Method 5.16, "Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures," except as modified and/or revised below. Superthin HMA is a mixture of Performance Graded Binder (PG Binder), mineral aggregate and mineral filler, if required. Superthin HMA pavement course shall be constructed 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 are available from the Regional Materials Engineer or the Director, Materials Bureau. All necessary pavement repairs, crack sealing, joint sealing, pavement marking removal, tack coats, utility grade adjustments, and milling of rebates will be paid under appropriate items.

MATERIALS

A. **Superthin Mixture**

The materials and composition for Superthin mixtures shall meet the requirements specified in §403-2 Materials, except as noted herein.

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

"Produce Superthin HMA in accordance with the procedures outlined in this specifications and NYSDOT's Material Method 5.16, Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures except as modified/or revised bellow:

Formulate and submit to the Regional Materials Engineer a Superthin HMA design, that satisfies design criteria outlined in this specification. The minimum PG Binder content shall not be less than 6.0%.

Table 1 - Superthin Design Control Points

Standard Sieves (mm)	Percent Passing Criteria	
	Maximum	Minimum
9.5		100
6.30	100	90
4.75	90	
2.36	70	37
0.075	10	2

Table 2 - Superthin Mixture Additional Aggregate Criteria

Coarse Aggregate Angularity	Uncompacted Void Content of Fine	Flat-and-elongated Particles (Percent),	Sand Equivalent (Percent),

(Percent), minimum	Aggregate (Percent), minimum	maximum	minimum
95/90	45	10	45

Table 3 - Superthin Volumetric Design Criteria

% Gmm @ Ninitial	% Voids Filled with Binder		% Voids in the Mineral Aggregate, minimum
	Minimum	Maximum	
< 90.5	70	78	16

Table 4 - Design Number of Gyrations

Compactive Effort	Ninitial	Ndesign	Nmaximum
Number of Gyrations	7	75	115

Table 5 - Production Gradation Tolerances

Sieve Size (mm)	9.5	6.3	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Tolerance	± 4	± 4	± 3	± 3	± 3	± 2	± 2	± 2	± 2

If a test value for 0.075 mm sieve, or any sieve larger than 1.18 mm varies from target value by more than 1.5 times the production tolerance given in Table 5 - Production Gradation Tolerances, the Regional Materials Engineer will evaluate the material represented by that test to determine acceptability. If for any sieve, the average absolute difference of [Test Value - Target Value] for lot exceeds the production tolerance, the Regional Material Engineer will evaluate the material to determine acceptability. 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 will be produced, delivered to the work site, and incorporated into the work within 10ºC of the specified temperature. The specified temperature must be within the mixing and compaction range of 120ºC and 165ºC, or as recommended by the PG Binder manufacturer.

The aggregates shall be those approved for use by the approved job mix formula and will be accepted at the plant site. The PG 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. "

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Subsection 401-2.03A. Coarse Aggregate, 401-2.03B. Blending shall be deleted and replaced with the following:

"A. Aggregates. For Superthin mixtures use crushed aggregate from an approved source, meeting one of the following requirements:

1. Limestone having an acid insoluble residue content of not less than 20.0%, excluding particles of chert and similar siliceous rocks.

2. Dolomite having an acid insoluble residue content of not less than 17.0%, excluding particles of chert and similar siliceous rocks.

3. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

4. Use gravel, or blend two or more of: gravel, limestone, dolomite, sandstone, granite, chert, traprock, ore tailing, or other similar materials to produce a final blend having at least 40% (by weight with adjustments to equivalent volumes for materials of different specific gravities) non-carbonate particles in each size fraction coarser than the 600 μm sieve.

Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

B. Blending. Where aggregates for these mixes are from more than one source or of more than one type of material, they shall be proportioned and blended to provide a uniform mixture."

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

"Use PG64-28 in the production of these mixtures that meets the AASHTO MP1-Standard Specification for Performance Graded Asphalt Binder. The PG 64-28 binder must also meet the following requirement:

TEST ON RESIDUE FROM ROLLING THIN FILM OVEN

Test	Requirement
Elastic Recovery, AASHTO T301-95 100 mm elongation and cut immediately at 25ºC	60% minimum

Initial Acceptance of PG Binder is based on the primary source appearing on the State's Approved List for Bituminous Material Primary Sources, A. Performance-Graded Binders for Paving. Acceptance of the PG Binder is contingent upon satisfactory test results from samples taken, as required by the State's procedural directives, at the location where the material is incorporated into work. A primary source is defined as a firm that samples, tests, and certifies by Production Lot that the PG Binder is in conformance with the specifications. The

procedural directives for sampling, testing, and certifying the PG Binder, and for achieving and maintaining approved list status, are available from the Material Bureau.

The temperature of PG Binder delivered to HMA Production Facility will not exceed 175ºC, unless the PG Binder supplier recommends it."

B. **Tack Coat**

Use an asphalt emulsion as tack coat,meeting the requirements of § 702 - Bituminous Materials, RS-1, Item 702-3001 or CRS-1, Item 702-4001 with the following modifications:

Tests on Asphalt Base for Emulsion

Test on Base Asphalt	Min.	Max
Penetration, 25ºC, 100 g, 5 s	60	100
Ductility, 25ºC, 5 cm/min, cm	50	-

Tests on Residue from Distillation Test

Test on Residue	Min.	Max.
Penetration, 25ºC, 100 g, 5 s	40	90

CONSTRUCTION DETAILS

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

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

"Y. Gyratory Compactor - A power driven gyratory compactor capable of maintaining an angle of gyration of 1.25º ± 0.02º, a speed of gyration of 30.0 rpm ± 0.5 rpm, and a consolidation pressure of 600 k Pa ± 10% for gyrations zero to five and ± 3% for gyrations six and greater. The make and model of the gyratory compactor supplied must be approved by the Director, Materials Bureau.

Z. Gyratory 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. Gyratory Specimen Extractor - A simple means of specimen extraction from the gyratory 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 Gyratory Compactor mold assemblies and asphalt mix samples. The oven shall have a controlled temperature range up to 190ºC with a ± 3ºC 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, 0.30mm, 0.15 mm, 0.075 mm"

Delete the first paragraph under §401 - 3.11 and replace with the following:

"The contact surface shall be tack coated in accordance with §407-3 prior to placing Superthin HMA mixture. The contact surface shall be coated regardless of time period between lifts or construction vehicle use. Paving over a tack coat should not commence until the emulsion has broken (goes from brown to black)."

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

"**Test Section**. Prior to paving operations for this item, construct a test section on the project site at a location approved by the Engineer, using the same equipment and procedures to be used in the construction of the remainder of the course being laid.

The amount of mixture prepared according to the job mix formula should be sufficient to construct a test section 500 meters long on the mainline and shall be the same depth specified for the construction of the course which it represents. Routine paving operations may begin immediately following the construction of the test section once a PTD has been determined to the satisfaction of the Engineer based the evaluation of density readings. The test section is for the purpose of determining the PTD for this item. Construction of the test section will not begin unless both an operator and a nuclear density gauge are present.

Use the first 150 linear meters of the test section to stabilize the paving operation. The remainder of the length will be used to determine the PTD. Once a sufficient amount of material has been placed in the remaining 350 linear meters of the test section compact the pavement with 2 machine passes of the breakdown roller. Perform density readings at three sites, randomly selected by the Engineer in accordance with Materials Procedure 96-01, "Nuclear Gauge Density Data Collection and Determination of Pavement Core Locations for Rut Avoidance Asphalt Concrete." A nuclear density reading at each location will be the average of the four measurements taken at 90°. Mark these sites so that subsequent density readings can be performed at the same locations. Make additional machine passes using either the intermediate or finish roller and perform additional density readings at the three previously selected sites until the increase in density is less than 32.0

kg/m^3, or until the Engineer stops further compaction because the pavement shows signs of distress.

The Engineer will immediately determine the average of the final density measurements at the three test locations. This average density will be the PTD. Once a PTD has been established routine paving operations may begin.

Only gauge(s) calibrated during the construction of the test section will be allowed to be used during normal paving operations."

Add the following to the end of §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."

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

"Immediately after the hot mix asphalt (HMA) has been spread, struck off and surface irregularities adjusted, compact the mix by rolling thoroughly and uniformly. 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 the low edge and working toward the super-elevated edge.

Use a nuclear density gauge to monitor and record the pavement density in accordance with this section and Materials Procedure 96-01, "Nuclear Gauge Density Data Collection and Determination of Pavement Core Locations for Rut Avoidance Asphalt Concrete." The nuclear density gauge should consist of a radioactive source, scaler and other basic components housed in a single backscatter unit. The gauge must be operated by personnel trained in the principles of nuclear testing and safety practices. Only gauge(s) calibrated during the construction of the test section will be used during normal paving operation. If another nuclear gauge is to be used, a new test section must be constructed to calibrate that gauge and to establish a new PTD.

Compact the pavement sufficiently to achieve a minimum density of 96% of the PTD in a single test location and 98% of the PTD calculated as a moving average of the last 10 test locations as determined by a nuclear density gauge. Take nuclear gauge readings at each site, randomly selected by the Engineer, approximately every 60 meters along the length of the pavement for each pass of the paver and record them on a BR340.

If the average of 4 nuclear density gauge measurements taken at 90º angles over two consecutive locations falls below 96% of the PTD or if the moving average of the last 10 nuclear gauge test sites falls below 98% of the PTD, stop routine paving operations and construct a new test section. Normal production will only resume after establishing a new PTD.

Placement and compaction on shoulders, ramps, maintenance widenings, crossovers, and bridges will be deemed satisfactory by the Engineer when the procedures used in these areas are the same as those used on the mainline pavement sections. If shoulders show signs of distress at this level

of compaction decrease the compactive effort until no damage occurs to the shoulder or subbase. Nuclear gauge(s) used to monitor the mainline paving should be used to monitor the above referenced areas.

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

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 rollers, keep the wheels properly moistened with water, water mixed with small quantities of detergent or other approved material. Petroleum products or solvents having an adverse effect upon the HMA pavement will not be permitted for use on State projects.

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 where 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.

When multiple paving operations are utilized with material production from a single plant each paving operation will be evaluated separately.

Routine paving operations will not begin unless both a project calibrated nuclear density gauge and an operator are present."

METHOD OF MEASUREMENT

A. Superthin Mixture

The provisions of §401-4, §402-4 and §403-4, Method of Measurement shall apply.

B. Tack Coat

The quantity to be paid for will be the number of liters of asphalt emulsion for tack coat measured at 15ºC incorporated into the work.

BASIS OF PAYMENT

A. Superthin Mixture

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 the Superthin HMA mixture required during construction, and routine nuclear density testing."

B. Tack Coat

The unit price bid per liter for tack coat shall include the cost of furnishing materials and all equipment and labor necessary to complete the work.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
06403.067201M	6.3 mm F2 Superthin HMA, 70 Series Compaction	Metric Ton
06403.067211M	Plant Production Quality Adjustment to 06403.067201 M	Quality Unit
06407.02 M	Tack Coat	Liter