ITEM 04403.017901 M - REFLECTIVE CRACK RELIEF HMA INTERLAYER

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 Reflective Crack Relief HMA interlayer 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. Reflective crack HMA relief interlayer is a mixture of Performance Graded Binder (PG Binder), mineral aggregate and mineral filler, if required. The Reflective Crack Relief HMA interlayer shall be placed in one lift in conformance with lines, grades, and typical cross sections shown on the planes, 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

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

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

"Produce Reflective Crack Releif HMA Interlayer Mixture 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 Reflective Crack Relief HMA Interlayer Mixture Design that satisfies the design criteria outlined in this specification. The minimum PG Binder content shall not be less than 7.0%.

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Table 1 - Reflective Crack Relief Design Control Points

Standard Sieves (mm)	Percent Passing Criteria	
	Maximum	Minimum
9.5		100
4.75	100	80
2.36	85	60
1.18	70	40
0.600	55	25
0.300	35	15
0.150	20	8
0.075	14	6

Table 2 - Reflective Crack Relief Mixture Additional Aggregate Criteria

Sand Equivalent (Percent), minimum
45

Table 3 - Design Number of Gyrations

Compactive Effort	N_{design}
Number of Gyrations	50

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Table 4 - Reflective Crack Relief Volumetric Design Criteria

% Voids in the Mineral Aggregate, minimum
16

Table 5 - Mixture Performance Criteria

Test	Performance Criteria
Hveem Stability[1] (AASHTO T-246) @ 140˚F, 60˚C, 100mm molds, 50 gyrations	**18.0 min.**
Flexural Beam Fatigue[2] (AASHTO TP-8), 2000 Microstrain, 10 Hz, 3.0±1.0% air voids[3], 10˚C	**100,000 cycles, minimum for an average of 2 samples**

Note 1: The Reflective Crack Relief bituminous mixture for Hveem Stability testing should be aged 2 hours at compaction temperature in accordance with AASHTO PP2-99 Section 7.1.

Note 2: The Reflective Crack Relief bituminous mixture for beam testing should be aged 3 hours at 135˚C and 1 hour at compaction temperature in accordance with AASHTO PP2-99 Section 7.2 (mechanical property testing), prior to compacting the beams.

Note 3: The void requirement for the *Flexural Beam Fatigue* test specimens differs from the gyratory samples. The 3.0±1.0% air voids represents the in-place construction density.

Table 6 - Production Gradation Tolerances

Sieve Size (mm)	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Tolerance	± 4	± 3	± 3	± 3	± 2	± 2	± 2	± 1

Table 7 - PG Binder Content Production Tolerance

PG Binder Content
± 0.3% from the JMF

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 Reflective Crack Releif HMA Interlayer 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.

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.

B. Blending. Where coarse 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."

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

"The asphalt binder shall meet the requirements of AASHTO MP-1 with a PG high temperature of 64˚C or higher and a PG low temperature of –28˚C or lower as required to meet the Hveem Stability and Flexural Beam Fatigue mix requirements. The asphalt 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 25°C	60% minimum
Separation Test, ASTM D5976 Sec 6.1	6°C difference max after 48 hr.

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 175˚C, unless the PG Binder supplier recommends it."

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. Gyratory Compactor - A power driven gyratory compactor capable of maintaining an angle of gyration of 1.25° ± 0.02°, 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 190°C with a ± 3°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, 0.30mm, 0.15 mm, 0.075 mm"

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

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"The contact surface shall be tack coated with an undiluted tack at a rate of 0.09 to 0.18 liters per square meter in accordance with §407-3 prior to placing HMA interlayer 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 96-01M, "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."

Delete § 401-3.06 Rollers and replaced with the following:

"All rollers shall be an approved static steel wheel type used according to the requirements of§ 401-3.12. The rollers shall be in good mechanical condition, free from excessive backlash, and capable of operating at speeds slow enough to avoid displacement of the mixture. The number and weight of rollers shall be sufficient to satisfactorily compact the mixture while it is still in a workable condition. The use of equipment which results in excessive crushing of aggregate will not be permitted.

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 and the weight of the rollers."

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Delete §401-3.12 Compaction 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 96-01M, "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 BR340M.

If the average of 4 nuclear density gauge measurements taken at 90° 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 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 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.

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.

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

Reflective Crack Relief HMA Interlayer will be measured as the number of square meters of surface area that have been acceptably completed.

BASIS OF PAYMENT

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.

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 construction of the test sections, and routine nuclear density testing.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
04403.017901M	Reflective Crack Relief HMA Interlayer	Square Meter