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Office of General Services
Procurement Services
 Corning Tower - 38th Floor
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 Albany, NY 12242

GROUP SPECIFICATION

COMMODITY GROUP 31502 - 31503 BITUMINOUS CONCRETE - HOT MIX ASPHALT	DATE OF ISSUE	December 11, 2017
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BIDDERS ARE REQUESTED TO RETAIN THIS SPECIFICATION FOR FUTURE REFERENCE

Table of Contents

GENERAL INFORMATION.....3

 MATERIALS: 3

 APPROVED LIST CRITERIA: 3

 QUALITY ADJUSTMENT FACTOR (QAF) (Quality Units):..... 3

DETAILED SPECIFICATIONS4

 GENERAL: 4

 NOTE TO BIDDERS: 4

 HOT MIX ASPHALT CONCRETE PAVEMENT WITH CRUSHED GLASS 5

 SCOPE: 5

 MATERIAL REQUIREMENTS:..... 5

 CONSTRUCTION DETAILS:..... 5

 METHOD OF MEASUREMENT:..... 5

 BASIS OF PAYMENT: 5

 MISCELLANEOUS HOT MIX ASPHALT (HMA) PATCHING MATERIALS 6

 SCOPE: 6

 DESCRIPTION 6

 MATERIALS 6

 CONSTRUCTION DETAILS 8

 METHOD OF MEASUREMENT 8

 BASIS OF PAYMENT 9

 ITEM 402.068X0318 - 6.3 mm POLYMER-MODIFIED HMA10

 MATERIAL SPECIFICATIONS:.....10

 DESCRIPTION10

 MATERIALS10

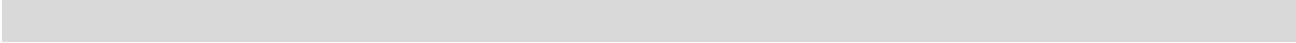
 CONSTRUCTION DETAILS12

 METHOD OF MEASUREMENT13

 BASIS OF PAYMENT13

GROUP SPECIFICATION (SPEC-937) – BITUMINOUS CONCRETE HOT MIX ASPHALT

ITEM 402.00003308 – Longitudinal Joint Density QUALITY ADJUSTMENTS	14
DESCRIPTION	14
MATERIALS	14
CONSTRUCTION DETAILS.....	14
METHOD OF MEASUREMENT.....	15
BASIS OF PAYMENT	15



GROUP SPECIFICATION (SPEC-937) – BITUMINOUS CONCRETE HOT MIX ASPHALT

GENERAL INFORMATION

MATERIALS:

Materials offered must be from a NYS Dept. of Transportation (NYSDOT) approved location. Materials offered from other than approved locations will not be considered for award and will be sufficient cause for rejection of bid.

Inspection of storage locations not currently approved may be requested directly from NYSDOT and may be subsequently certified for consideration in future IFBs.

The following are the material descriptions of items that may be included in IFB's and contracts derived from this specification:

302.01	Bituminous Stabilized Course
402.03810218	Miscellaneous Patching F1, HMA
402.03820218	Miscellaneous Patching F2, HMA
402.03830218	Miscellaneous Patching F3, HMA
402.03890218	Miscellaneous Patching F9, HMA
402.058903	Hot Mix Asphalt, Shim Course F9
402.06810318	6.3 F1 Polymer-Modified HMA, 80 Series Compaction
402.06820318	6.3 F2 Polymer-Modified HMA, 80 Series Compaction
402.06830318	6.3 F3 Polymer-Modified HMA, 80 Series Compaction
402.098103	9.5 F1 Top Course HMA, 80 Series Compaction
402.098203	9.5 F2 Top Course HMA, 80 Series Compaction
402.098303	9.5 F3 Top Course HMA, 80 Series Compaction
402.128103	12.5 F1 Top Course HMA, 80 Series Compaction
402.128203	12.5 F2 Top Course HMA, 80 Series Compaction
402.128303	12.5 F3 Top Course HMA, 80 Series Compaction
402.198903	19.0 F9 Binder Course HMA, 80 Series Compaction
402.258903	25.0 F9 Binder Course HMA, 80 Series Compaction

APPROVED LIST CRITERIA:

The NYS DOT will perform the necessary inspections of the primary source and/or supplier facility to determine conformance with these requirements and establish the approved list of primary sources. Copies of the approved list and written procedures for achieving and maintaining approved list status are available from NYSDOT Materials Bureau, 50 Wolf Road, Albany, NY 12232.

QUALITY ADJUSTMENT FACTOR (QAF) (QUALITY UNITS):

The Quality Adjustment Factor will be 1.0 for all material produced under resultant contract for any agency other than the New York State Department of Transportation.

The following Quality Unit Index prices will apply to material produced under resultant contracts for the New York State Department of Transportation only:

<u>Region</u>	<u>Index Price (\$/Quality Unit)</u>
1	\$65
2	\$70
3	\$70
4	\$70
5	\$80
6	\$70
7	\$80
8	\$90
9	\$65
10	\$100
11	\$105

DETAILED SPECIFICATIONS

GENERAL:

All plant mixed HMA items shall be furnished in accordance with Sections 401 and 402 of the New York State Department of Transportation Standard Specifications, Construction and Materials, most current version at the time of bid opening and can be found at:

<https://www.dot.ny.gov/main/business-center/engineering/specifications/updated-standard-specifications-us>;

The latest Materials Method 5.16 found at:

<https://www.dot.ny.gov/divisions/engineering/technical-services/materials-bureau-repository/mm516.pdf> ;

Chapter 6 of the Comprehensive Pavement Design Manual, latest version (Revision 6, dated May 14, 2014) found at:

<https://www.dot.ny.gov/divisions/engineering/design/dqab/cpdm/repository/chapter6.pdf> ; and

Engineering Instruction 12-008, Optional Use of Warm Mix Asphalt (WMA) Technologies found at:

https://www.dot.ny.gov/portal/pls/portal/mexis_app.pa_ei_eb_admin_app.show_pdf?id=10916 .

(The links are from the NYS Department of Transportation website at www.dot.ny.gov)

NOTE TO BIDDERS:

All Hot Mix Asphalt quantities are specified in U.S. customary units, and should be bid accordingly.

References are made herein to New York State Department of Transportation, Standard Specifications, Construction and Materials, most current version at the time of bid opening. A copy may be obtained through the Department's publication unit. Call 518-457-2124 for information or follow the link:

<https://www.dot.ny.gov/main/business-center/engineering/specifications/updated-standard-specifications-us>

For information regarding how to become an approved facility, or, to make arrangements for inspection of materials or equipment when required, contact the Materials Bureau of the Department of Transportation at 518-457-3240.

DETAILED SPECIFICATIONS (Cont'd)

HOT MIX ASPHALT CONCRETE PAVEMENT WITH CRUSHED GLASS

SCOPE:

This specification covers the requirements for the addition of crushed glass to asphalt concrete mixes. The provisions of Section 401 – Plant Production and Section 402 - Hot Mix Asphalt (HMA) Pavements applies except that the Contractor has the option of blending crushed glass in the following mixes:

- 37.5 Nominal Max. Size
- 25.0 Nominal Max. Size
- 19.0 Nominal Max. Size
- Truing and Leveling Course

If the Contractor chooses the crushed glass option, the following modifications to the Standard Specifications shall apply:

MATERIAL REQUIREMENTS:

Crushed glass shall be subject to the approval of the Regional Materials Engineer prior to its use. The crushed glass shall contain no more than 1% (by weight) contaminants and shall meet the following gradation:

Sieve Size	Percent Passing
3/8 in.	100
1/4 in.	90-100
No. 20	0-20

Note: The gradation requirements may be modified upon approval of the Regional Materials Engineer.

Crushed glass may be included in the mixture up to 5%, maximum, of the total aggregate weight. The crushed glass, aggregate and added asphalt cement shall meet the requirements specified in Table 401-1, Composition of Hot Mix Asphalt Mixtures and latest MM 5.16, for aggregate gradation, PG binder content, PG binder grade and temperature range.

CONSTRUCTION DETAILS:

The crushed glass shall be proportioned from a separate feed bin approved by the Regional Materials Engineer. In addition, all requirements pertaining to aggregate shall apply to crushed glass including the equipment requirements for automatic proportioning and recording stipulated for aggregate in §401-3.08.

METHOD OF MEASUREMENT:

The provisions of Section 401-4 shall apply.

BASIS OF PAYMENT:

The provisions of Section 402-5 shall apply.

GROUP SPECIFICATION (SPEC-937) – BITUMINOUS CONCRETE HOT MIX ASPHALT

DETAILED SPECIFICATIONS (Cont'd)

MISCELLANEOUS HOT MIX ASPHALT (HMA) PATCHING MATERIALS

SCOPE:

This specification covers the requirements for Miscellaneous Hot Mix Asphalt (HMA) patching materials. The requirements of Section 401- Plant Production and Section 402 – Hot Mix Asphalt (HMA) Pavements shall apply except as modified below.

<u>ITEM 402.03810218</u>	<u>MISCELLANEOUS PATCHING F1, HOT MIX ASPHALT</u>
<u>ITEM 402.03811218</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.03810218</u>
<u>ITEM 402.03820218</u>	<u>MISCELLANEOUS PATCHING F2, HOT MIX ASPHALT</u>
<u>ITEM 402.03821218</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.03820218</u>
<u>ITEM 402.03830218</u>	<u>MISCELLANEOUS PATCHING F3, HOT MIX ASPHALT</u>
<u>ITEM 402.03831218</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.03830218</u>
<u>ITEM 402.03890218</u>	<u>MISCELLANEOUS PATCHING F9, HOT MIX ASPHALT</u>
<u>ITEM 402.03891218</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.03890218</u>

DESCRIPTION

This work shall consist of developing an HMA mixture for pothole patching, small pavement repairs, and paver placed patching.

MATERIALS

The materials and composition for Miscellaneous Patching mixtures shall meet the requirements specified in §401-2 and §402-2, Materials, except as noted herein.

TABLE 1 COMPOSITION OF MISCELLANEOUS PATCHING HOT MIX ASPHALT		
Screen Sizes	General Limits % Passing¹	Job Mix Tolerance %²
1/2 in.	100	-
3/8 in.	95-100	-
1/4 in.	90-100	-
No. 4	67-85	±4
No. 8	35-60	±6
No. 16	24-50	±7
No. 30	12-34	±7
No. 50	6-22	±4
No. 100	3-11	±3
No. 200	2-6	±2
Asphalt Content, %^{3,4}	6.0 – 8.0	±0.4
Mixing and Placing Temperature Range °F	250-325	

Notes:

1. All aggregate percentages are based on the total weight of the aggregate.
2. In no case shall the job mix tolerance fall outside the general limits.
3. The asphalt content is based on the total weight of the mix. When using slag aggregates in the mix, the asphalt content shall be increased accordingly, a minimum of 25 percent for an all slag mix.
4. Use a standard Performance-Graded Binder (PG Binder) appropriate for the county in which the mix shall be used, as specified in Table 6-4 Performance Graded Binder Selection of the Comprehensive Pavement Design Manual (CPDM).

DETAILED SPECIFICATIONS (Cont'd)

MISCELLANEOUS HOT MIX ASPHALT (HMA) PATCHING MATERIALS (CONT'D)

MATERIALS (Cont'd)

Use Table 2, Pay Item Selection Criteria, to select the appropriate friction requirements for the location and type of use for the mixture.

TABLE 2 PAY ITEM SELECTION CRITERIA			
Use Type	Traffic Volume²	Location³	Pay Items
Paver-Placed Patching and Pavement Repairs greater than 10 feet in length ¹	High	Downstate	402.038102 18 (Type F1 Conditions)
		Upstate	402.038202 18 (Type F2 Conditions)
	Low	Statewide	402.038302 18 (Type F3 Conditions)
Pothole Patching and Pavement Repairs 10 feet or less in length ¹	High or Low	Statewide	402.038902 18 (Type F9 Conditions)

- Notes:
1. Pavement Repair lengths are measured in the longitudinal direction of the roadway.
 2. “High Volume” refers to 2- or 3-lane highways with design-year, two-way AADT over 8,000, or for more than three lanes with a two-way AADT over 13,000. “Low Volume” refers to highways with lower volumes for the specified number of lanes.
 3. The City of New York and the surrounding counties of Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, and Westchester are referred to as “Downstate.” All other areas are referred to as “Upstate.”

A. Coarse Aggregate Type F1 Conditions

1. Sandstone, granite, chert, traprock, ore tailings, slag, or other similar noncarbonate materials.
2. Use gravel or blend two or more of: gravel, limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials to produce a final blend of which the non-carbonate plus 1/8 inch particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). In addition, at least 90.0% of the plus No. 4 particles must be non-carbonate.

DETAILED SPECIFICATIONS (Cont'd)

MISCELLANEOUS HOT MIX ASPHALT (HMA) PATCHING MATERIALS (CONT'D)

MATERIALS (Cont'd)

B. Coarse Aggregate Type F2 Conditions

1. Limestone, dolomite, or a blend of the two having an acid-insoluble residue content of not less than 20.0%.
2. Sandstone, granite, chert, traprock, ore tailings, slag, or other similar noncarbonate materials.
3. Gravel or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials, meeting the following requirement:

Noncarbonate plus 1/8 in. particles must comprise a minimum of 10.0% of the total aggregate (by weight, with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus No. 4 particles must be noncarbonate.

C. Coarse Aggregate Type F3 Conditions

1. Limestone or a blend of limestone and dolomite having an acid-insoluble residue content of not less than 20.0%.
2. Dolomite.
3. Sandstone, granite, chert, traprock, ore tailings, slag, or other similar noncarbonate materials.
4. Gravel or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials, meeting the following requirement:

Noncarbonate plus 1/8 in. particles must comprise a minimum of 10.0% of the total aggregate (by weight, with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus No. 4 particles must be noncarbonate.

D. Coarse Aggregate Type F9 Conditions.

Use coarse aggregate meeting the requirements of § 703-02, Coarse Aggregate.

CONSTRUCTION DETAILS

The provisions of §401-3 and §402-3, Construction Details, shall apply except as noted herein.

Compact the pavement in accordance with 402-3.07 D. 80 Series Compaction Method. Use the same number of passes as for 9.5 Top Pavement Course in Table 402-6, Number of Passes.

METHOD OF MEASUREMENT

The provisions of §401-4 and §402-4, Method of Measurement, shall apply. A QAF of 1.00 will be assigned to material meeting the specification requirements as certified by the QCT. A QAF of 0.85 will be assigned to material that fails to meet the specification as tested by the QAT. Quality Units will be determined when there is a disincentive and will be calculated as per §402-4, Method of Measurement.

GROUP SPECIFICATION (SPEC-937) – BITUMINOUS CONCRETE HOT MIX ASPHALT

DETAILED SPECIFICATIONS (Cont'd)

MISCELLANEOUS HOT MIX ASPHALT (HMA) PATCHING MATERIALS (CONT'D)

BASIS OF PAYMENT

The provisions of subsection 402-5 Basis of Payment shall apply. Payment will be made under:

ITEM NO	ITEM	PAY UNIT
402.03810218	Miscellaneous Patching F1, Hot Mix Asphalt	Ton
402.03811218	Plant Production Quality Adjustment to 402.03810218	Quality Unit
402.03820218	Miscellaneous Patching F2, Hot Mix Asphalt	Ton
402.03821218	Plant Production Quality Adjustment to 402.03820218	Quality Unit
402.03830218	Miscellaneous Patching F3, Hot Mix Asphalt	Ton
402.03831218	Plant Production Quality Adjustment to 402.03830218	Quality Unit
402.03890218	Miscellaneous Patching F9, Hot Mix Asphalt	Ton
402.03891218	Plant Production Quality Adjustment to 402.03890218	Quality Unit

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.068X0318 - 6.3 MM POLYMER-MODIFIED HMA

MATERIAL SPECIFICATIONS:

<u>ITEM 402.06810318</u>	<u>6.3 F1 POLYMER-MODIFIED HMA, 80 SERIES COMPACTION</u>
<u>ITEM 402.06811318</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.06810318</u>
<u>ITEM 402.06820318</u>	<u>6.3 F2 POLYMER-MODIFIED HMA, 80 SERIES COMPACTION</u>
<u>ITEM 402.06821318</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.06820318</u>
<u>ITEM 402.06830318</u>	<u>6.3 F3 POLYMER-MODIFIED HMA, 80 SERIES COMPACTION</u>
<u>ITEM 402.06831318</u>	<u>PLANT PRODUCTION QUALITY ADJUSTMENT TO 402.06830318</u>

DESCRIPTION

This work shall consist of mixture design and placement of 6.3 Polymer-Modified Hot Mix Asphalt (HMA) in accordance with Section 401, Section 402, the contract documents and as directed by the Engineer.

MATERIALS

The materials and composition for Polymer-Modified HMA mixtures shall meet the requirements specified in §401-2 *Materials* and Materials Method (MM) 5.16, *Hot Mix Asphalt (HMA) Mixture Design and Mixture Verification Procedures*, except as noted herein.

The 6.3 Polymer-Modified HMA shall be designed and produced in accordance with the procedures outlined in this specification and MM 5.16. The mixture shall be designed to meet the following requirements:

- <30 million ESALs,
- 96% of the mixture’s maximum theoretical density
- Minimum PG Binder content of 6.0% by the total weight of the mixture.

The design shall be submitted to the Regional Materials Engineer (RME) which satisfies the design criteria outlined as modified below.

Standard Sieves	Percent Passing Criteria	
	Maximum	Minimum
3/8 in.		100
1/4 in.	100	90
No. 4	90	--
No. 8	70	37
No. 200	10	2

% Gmm @ N _{initial}	% Voids Filled with Binder		% Voids in the Mineral Aggregate, Minimum
	Minimum	Maximum	
< 90.5	70	78	16

Compactive Effort	N _{initial}	N _{design}	N _{maximum}
Number of Gyration	7	75	115

Sieve Size	3/8 in.	1/4 in.	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
Tolerance (% Passing)	± 4	± 4	± 3	± 3	± 3	± 2	± 2	± 2	± 2

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.068X0318 - 6.3 POLYMER-MODIFIED HMA (CONT'D)

MATERIALS (Cont'd)

Aggregate. The aggregate shall meet the requirements of Section 703, MM 5.16, and the following:

A. Aggregate Type F1 Conditions

1. Sandstone, granite, chert, traprock, ore tailings, slag, or other similar non-carbonated materials.
2. Use gravel, or blend two or more of: gravel, limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, or other similar materials to produce a final blend of which the non-carbonate plus No. 8 particles must comprise at least 30.0% of the total aggregate. In addition, at least 90.0% of the plus No. 4 particles must be non-carbonate.

B. Aggregate Type F2 Conditions

1. Limestone, dolomite, or a blend of the two having an acid insoluble residue content of not less than 20.0%.
2. Sandstone, granite, chert, traprock, ore tailings, slag, or other similar non-carbonated materials.
3. Use gravel or blend two or more of: gravel, limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, or other similar materials to produce a final blend of which the non-carbonate plus No. 8 particles must comprise at least 10.0% of the total aggregate. In addition, at least 20.0% of the plus No. 4 particles must be non-carbonate.

C. Aggregate Type F3 Conditions

1. Limestone or a blend of limestone and dolomite having an acid insoluble residue content of not less than 20.0%.
2. Dolomite.
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 tailings, or other similar materials to produce a final blend of which the non-carbonate plus No. 8 particles must comprise at least 10.0% of the total aggregate. In addition, at least 20.0% of the plus No. 4 particles must be non-carbonated.

PG Binder. The Performance-Graded Binder (PG Binder) grades are listed in Table 5, *PG Binder Selection*. Appropriate binder grade shall be selected based on the project location. The PG binder shall be modified with either elastomeric polymer or terminal blend crumb rubber for the production of HMA mixture. The modified PG Binder shall meet the requirements of AASHTO M 332, Standard Specification for Performance Graded Asphalt Binder using Multiple Stress Creep Recovery (MSCR). In addition, the binder grade must also meet the **elastomeric** properties as indicated by one of the following equations for %R_{3.2}:

1. For $J_{nr3.2} \geq 0.1$, $\%R_{3.2} > 29.371 * J_{nr3.2}^{-0.2633}$
2. For $J_{nr3.2} < 0.1$, $\%R_{3.2} > 55$

Where

R_{3.2} is % recovery at 3.2 kPa

J_{nr 3.2} is the average non-recoverable creep compliance at 3.2 kPa

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.068X0318 - 6.3 POLYMER-MODIFIED HMA (CONT'D)

MATERIALS (Cont'd)

Table 5 – PG Binder Selection		
Location	Location by Counties	PG Binder Grades (Material Designation)
Upstate ¹	All Other Counties Not Listed Under Downstate	64V-22 (702-64V22)
Downstate	Orange, Putnam, Rockland, Westchester, Nassau, Suffolk Counties and City of New York	64E-22 (702-64E22)

Notes:

1. For high volume roadways in Upstate Counties, PG 64E-22 may be specified with the concurrence of the Regional Materials Engineer. “High Volume” is defined as 2 or 3 lane highways with design year two-way AADT over 8,000, or for more than three lanes, with two-way AADT over 13,000.

When terminal blend CRM PG binder is used, the following shall apply:

- Crumb rubber particles shall be finer than #30 sieve size.
- The CRM PG binder shall be storage-stable and homogeneous.
- The Dynamic Shear Rheometer (DSR) shall be set at 2-mm gap.
- The CRM PG binder shall be 99% free of particles retained on the 600µm sieve as tested in accordance with Section 5.4 of M 332.

In addition, the PG Binder shall meet the following requirements:

Upstate. Use of polyphosphoric acid (PPA) to modify PG binder properties is prohibited. This prohibition also applies to the use of PPA as a cross-linking agent for polymer modification.

Downstate. Polyphosphoric acid (PPA) is the only type of acid allowed when PG binders are modified using acid. The use of PPA modified PG binder is prohibited for mixtures containing limestone, limestone as an aggregate blend component, limestone as a constituent in crushed gravel aggregate, or recycled asphalt pavement (RAP) that includes any limestone. This prohibition also applies to the use of PPA as a cross-linking agent for polymer modification.

Other modified PG Binder grades may be used with a prior approval by the Director of the Materials Bureau.

Tack Coat. The tack coat used for this mixture shall meet the requirements of 702-3002T or 702-4002T Asphalt Emulsion Straight Tack Coat.

Reclaimed Asphalt Pavement (RAP). The maximum RAP blend portion is 20% by weight of the total mixture.

CONSTRUCTION DETAILS

The provisions of §401-3 and §402-3, *Construction Details*, will apply except as modified herein.

Tack Coat. The Straight Tack shall be applied and paid for in accordance with Section 407 of the Standard Specifications.

The Provisions of 402-3.07 Compaction, D. 80 Series Compaction Method, apply except as modified.

GROUP SPECIFICATION (SPEC-937) – BITUMINOUS CONCRETE HOT MIX ASPHALT

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.068X0318 - 6.3 POLYMER-MODIFIED HMA (CONT'D)

CONSTRUCTION DETAILS (Cont'd)

Table 6 – Number of Passes¹			
Option 1 Three Roller Train (Static)		Option 2 Vibratory Rollers	
Steel-Wheel Roller Passes	Pneumatic Roller Passes	Vibratory Roller Passes	Static Roller Passes
4	2	2	2

Note1 – These are recommended number of roller passes. Engineer-in-Charge may change the number of passes as needed.

METHOD OF MEASUREMENT

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

BASIS OF PAYMENT

The provisions of §402-5 Basis of Payment shall apply. Payment will be made under:

ITEM NO	ITEM	PAY UNIT
402.06810318	6.3 F1 Polymer-Modified HMA, 80 Series Compaction	Ton
402.06811318	Plant Production Quality Adjustment to 402.06810318	Quality Unit
402.06820318	6.3 F2 Polymer-Modified HMA, 80 Series Compaction	Ton
402.06821318	Plant Production Quality Adjustment to 402.06820318	Quality Unit
402.06830318	6.3 F3 Polymer-Modified HMA, 80 Series Compaction	Ton
402.06831318	Plant Production Quality Adjustment to 402.06830318	Quality Unit

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.00003308 – LONGITUDINAL JOINT DENSITY QUALITY ADJUSTMENTS

DESCRIPTION.

This work will consist of constructing, compacting, and coring of the longitudinal construction joints in Hot Mix Asphalt (HMA) pavements for 50 and 60 Series Top Course only.

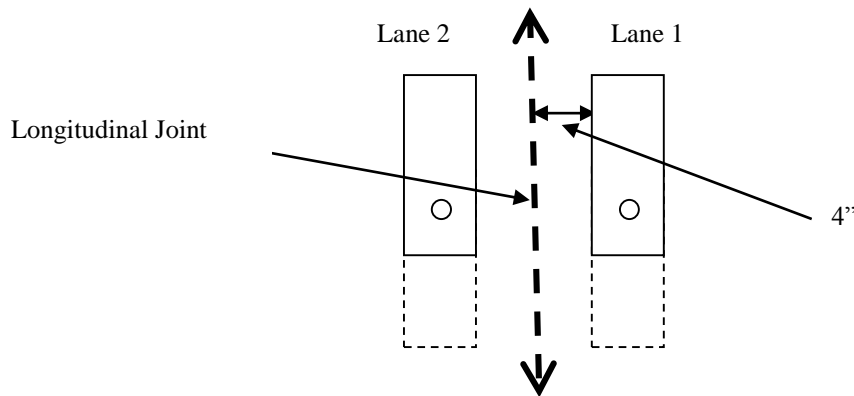
MATERIALS.

The provisions of §401-2 & §402-2, *Materials*, apply.

CONSTRUCTION DETAILS.

The Contractor shall compact the longitudinal joint in HMA pavements to meet the longitudinal joint density requirements. The requirements of §401-3 *Construction Details* shall apply except as modified below:

- A. **Density Monitoring.** The contractor shall monitor density of longitudinal joints using the same density gauge used on mainline. Place the gauge parallel to the joint and take a reading as the lane is constructed. A reading is the average of two measurements taken parallel to the joint, with one measurement taken in the direction of placement and the other with the gauge turned 180°. The placement of the gauge shall be 4 inches from the joint. The contractor shall determine the density reading by averaging the two measurements at each location.
 - 1. **50 Series.** The contractor shall take density readings as necessary to assure consistent density at the longitudinal joint.
 - 2. **60 Series.** The contractor shall monitor density of the longitudinal joint using the same density gauge used on the mainline. The density readings shall be taken every 400 feet at the longitudinal joint as it is constructed. A density reading is the average of two density measurements taken with a density gauge at 0° and 180° parallel to the joint. The edge of the gauge shall be offset no more than 4 inches from the joint.



The contractor shall record and submit the density gauge readings on the appropriate BR Form as shown in Materials Procedure 402-02 *Hot Mix Asphalt (HMA) Pavement Density Determination*. These readings shall be recorded on a separate BR form from the one used for the mainline. The Longitudinal Joint Project Target Density (LJPTD) is 95% of the mainline Project target Density (PTD). If the average of the last 10 readings is less than 93% of mainline PTD, the Engineer will locate 4 cores over the entire length of the day's longitudinal joints represented by the unacceptable density readings in accordance with B. *Pavement Density Samples*, below.

- B. **Pavement Density Samples.** The contractor shall take cores on the mainline longitudinal joints in accordance with §402-3.08 *Pavement Density Samples* to determine the joint density. The Engineer will randomly select the core locations in accordance with MP 402-02, using the X coordinates only and mark cores directly on top of the joint after the adjacent lane(s) have been placed.

- 1. **50 Series.** The Engineer will locate joint density cores according to the table below:

DETAILED SPECIFICATIONS (Cont'd)

ITEM 402.00003308 –LONGITUDINAL JOINT DENSITY QUALITY ADJUSTMENTS (Cont'd)

TABLE 1 – CORING FREQUENCY FOR 50 SERIES COMPACTION	
Longitudinal Length (feet)	No. of Cores
Length ≤ 10,000	4
10,000 < Length ≤ 20,000	6
Length > 20,000	8

2. **60 Series.** The Engineer will locate 4 cores on the longitudinal joint every third day of mainline paving or when the longitudinal joint of the third day of mainline paving is matched.

Additional loose mix samples are not required. The density determination will be based on the loose mix samples representing the mainline placement. When the mainline lanes are placed on different days, the RME will use the average maximum theoretical specific gravity of the mixture representing the constructed joint. The RME will determine the average of the longitudinal density cores.

METHOD OF MEASUREMENT.

The quantity of longitudinal joint density quality adjustment to be measured for payment will be in quality units (QUs) in accordance with Table 2 - *Longitudinal Joint Density Quality Adjustment for 50 & 60 Series* shown below.

For both 50 and 60 Series - The Engineer will determine the assigned QUs in accordance with

TABLE 2 - LONGITUDINAL JOINT DENSITY QUALITY UNITS FOR 50 & 60 SERIES	
Average Core Density, % MMTD	Assigned Quality Units (QU)
≥ 92	4
90 ≤ Core Density < 92	2
88 ≤ Core Density < 90	0
86 ≤ Core Density < 88	-2
< 86	-4

The Engineer will measure distance of the longitudinal joint(s) between the mainline lanes, in linear feet, and determine the Quality Units for joint density quality adjustments using the formula below.

$$\text{Quality Units} = \text{Assigned QUs} \times \left(\frac{\text{Mainline Longitudinal Joint (ft)}}{528} \right)$$

BASIS OF PAYMENT.

Payment of longitudinal Joint Quality Adjustment will be made based on the number of Quality Units representing the quality of the mainline longitudinal joint multiplied by the fixed index price for Quality Adjustment.

Item No.	Item	Pay Unit
402.00003308	Longitudinal Joint Density Quality Adjustment to HMA Items	Quality Unit