SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		*New York State Department of Transportation* **ENGINEERING INSTRUCTION**	**EI** **11-005**

Title: **REVISION TO HOT MIX ASPHALT SECTION 401 – PLANT PRODUCTION**

Target Audience:		Approved:
☒Manufacturers (18) ☒Local Govt. (31) ☒Agencies (32)	☒Surveyors (33) ☒Consultants (34) ☒Contractors (39) _____( )	Anthony Torre 06/07/2011 Anthony Torre, PE — Date Acting Deputy Chief Engineer, Research

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the Letting of January 12, 2012.
- This EI supersedes EI 09-006.
- The revisions issued with this EI will be incorporated into a future update of the Standard Specifications.

PURPOSE: The purpose of this EI is to issue revised Standard Specifications Section 401 – Plant Production.

TECHNICAL INFORMATION: The revisions included in this document are as follows:

- Standard Specifications Section 401 has been revised to be consistent with revisions to the Materials Procedure (MP) 401 - *Quality Control and Quality Assurance Procedures for Hot Mix Asphalt (HMA) Production.*
- Calculation of the QAF is now included in MP 401.
- Quality control (QC), quality assurance (QA), and the quality adjustment factor (QAF) for 37.5 Base Course HMA mixture will be based on volumetric properties.
- A production sub-lot with calculated QAF of 0.85 will now be evaluated as a separate lot.

IMPLEMENTATION: Main Office Design Quality Assurance Bureau will insert the Standard Specification revision into contract proposals beginning with projects submitted for the letting of January 12, 2012.

TRANSMITTED MATERIALS: US Customary and Metric revisions to Section 401 – Plant Production, are transmitted with this EI.

BACKGROUND: HMA QC/QA procedures were revised in 2009 and required the QAF for 37.5 Base Course mix to be based on gradation rather than volumetric properties. Producers and Regional Materials Engineers identified logistical concerns with obtaining representative samples that caused concern when basing the QAF on gradation. As a result of the concerns, the QAF for 37.5 Base Course HMA mixture will again be based on volumetric properties.

BR 343 transmits a Daily QAF of a production Lot to the Engineer for the quality adjustment of a plant produced HMA. Regional Materials Engineers expressed concerns with determining Daily QAF that includes sublots with a QAF of 0.85 when these sublots require evaluation prior to payment adjustment made by the Engineer. By separating this sublot from the rest of the sublots, it will expedite the payment process by not waiting for the sublot with a QAF of 0.85 to be evaluated.

CONTACT: Questions regarding this EI should be addressed to the Materials Bureau. Contact Zoeb Zavery at (518) 485-5277, zzavery@dot.state.ny.us, or Russell Thielke at (518) 457-4585, rthielke@dot.state.ny.us.

SECTION 401 – PLANT PRODUCTION

Make the following changes to the Standard Specifications dated May 1, 2008:

Delete Section 401 – Plant Production entirely and **replace** it with the following:

"SECTION 401 - PLANT PRODUCTION

401-1 DESCRIPTION. The contractor is responsible for Quality Control (QC). QC is defined as all activities required to produce HMA that meets all specification requirements. The contractor shall incorporate a Quality Control system for all plant production of hot mix asphalt (HMA) and assume responsibilities for all QC activities at the production facilities.

The contractor shall produce the HMA according to the specifications herein and provide production documentation. Quality Adjustment Factors (QAFs) will be used to assess HMA production quality and these factors will be applied to calculate a quality payment adjustment.

The Department is responsible for Quality Assurance (QA). QA is defined as all activities performed by the Department to assure that HMA production meets the specification requirements. The Department will determine quality payment adjustments for each day's production using a daily QAF obtained from the calculations of the average absolute values for volumetric and non-volumetric mixes in accordance with Materials Procedure (MP) 401, *Quality Control and Quality Assurance Procedures for Quality Control Hot Mix Asphalt Production.* The daily QAFs measure production variation from the mean of the specification limits.

401-2 MATERIALS. The provisions of §402-2, *Materials*, apply and are as modified herein. Produce HMA in accordance with the requirements outlined in this specification, including all applicable Test Methods and Materials Procedures. HMA mixture designs must be accepted by the Department prior to any HMA production.

The Department reserves the right to suspend any mixture design when the mixture produces unacceptable paving results or exhibits properties that will affect the anticipated pavement performance.

401-2.01 Hot Mix Asphalt Designs. Formulate and submit a HMA design to the Regional Materials Engineer (RME) that satisfies all design criteria outlined in MM 5.16, *Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures*. When the submitted HMA design is assigned verification status, the design must be verified during production. Notify the RME at least 24 hours prior to the start of verification status production. When producing under verification status, make necessary adjustments to control the process. Apply daily QAFs to both verification and production status mix designs. Mixtures produced under verification status are allowed for use on State projects.

For any HMA permeable base and shim mixtures required by the contract documents, formulate and submit to the RME a job mix formula that satisfies the General Limits imposed by Table 401-1, *Composition of Hot Mix Asphalt Mixtures*.

401-2.02 Aggregates. Aggregate must be from a source approved by the Department. Use fine aggregate that consists of materials conforming to the requirements of §703-01, *Fine Aggregate*. In addition, fine aggregate may consist of screenings, free from deleterious materials and manufactured from sources of stone, gravel, or slag meeting the requirements of §703-02, *Coarse Aggregate*.

Use coarse aggregate that consists either of crushed stone, crushed gravel, or crushed slag conforming to the requirements of §703-02, *Coarse Aggregate* and MM 5.16.

Use slag aggregate on State projects only when an alternate pay item which takes the mix yield differential into account is included on the plans or in the itemized proposal.

When coarse aggregates for the mixture are from more than one source or of more than one type of material, proportion and blend them to provide a uniform mixture.

TABLE 401-1 COMPOSITION OF HOT MIX ASPHALT MIXTURES

Mixture Requirements	Permeable Base				Shim	
	Type 1		Type 2		Type 5	
Screen Sizes	General Limits % Passing[1]	Job Mix Tolerance %	General Limits % Passing[1]	Job Mix Tolerance %	General Limits % Passing[1]	Job Mix Tolerance %
2 in	100	-	100	-	-	-
1 1/2 in	95-100	-	75-100	±7	-	-
1 in	80- 95	±6	55- 80	±8	-	-
1/2 in	30- 60	±6	23- 42	±7	-	-
1/4 in	10- 25	±6	5- 20	±6	100	-
1/8 in	3- 15	±6	2- 15	±4	80-100	±6
No. 20	-	-	-	-	32- 72	±7
No. 40	-	-	-	-	18- 52	±7
No. 80	-	-	-	-	7- 26	±4
No. 200	0- 4	±2	-	-	2- 12	±2
Asphalt Content, %[2,3]	2.0-4.0	NA	2.5-4.5	NA	7.0-9.5	NA
Mixing and Compaction Temperature Range °F[4]	225-300		225-300		250-325	

NOTES:

1. All aggregate percentages are based on the total weight of the aggregate.
2. 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.
3. Use the PG binder listed in the proposal or as designated by the Region Materials Engineer following the guidance specified in the Comprehensive Pavement Design Manual, Chapter 6, Section 6.2.5 – *Performance Graded Binder Selection.*
4. Or as recommended by the PG binder manufacturer.

A. Coarse Aggregate Type F1 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

a. 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate 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). A minimum of 95.0% of plus 3/8 inch particles must be non-carbonate.

b. 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate 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). A minimum of 95.0% of plus No. 4 particles must be non-carbonate.

B. Coarse Aggregate Type F2 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

    a. 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch 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). A minimum of 20.0% of plus 3/8 inch particles must be noncarbonate.
    b. 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch 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). A minimum of 20.0% of plus No. 4 particles must be noncarbonate.

C. Coarse Aggregate Type F3 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

    a. 12.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch 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). A minimum of 20.0% of plus 3/8 inch particles must be noncarbonate.
    b. 9.5 Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 1/8 inch 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). 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*.

401-2.03 Mineral Filler. Use mineral filler conforming to the requirements of §703-08, *Mineral Filler*.

401-2.04 Performance-Graded Binder. Use the Performance-Graded Binder (PG Binder) in the production of these mixtures that meets Section 702 – *Bituminous Materials*.

Initial acceptance of the PG Binder 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 PG Binder 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 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 Materials Bureau.

The temperature of PG Binder delivered to the HMA Production Facility shall not exceed 350°F, unless the PG Binder supplier recommends it.

401-2.05 Reclaimed Asphalt Pavement. Reclaimed Asphalt Pavement (RAP) shall meet the requirements of MM 5.16.

401-3 CONSTRUCTION DETAILS.

401-3.01 Quality Control. Perform all sampling and testing in accordance with Materials Procedure 401. Document all QC test results and records in a legible manner and provide them to the State at the end of each production season or when requested by the RME. HMA produced without the required sampling, testing and documentation may be rejected.

401-3.02 Production Facility Laboratory. Maintain an approved production facility site laboratory to perform all required HMA sampling and testing according to MP 401.

401-3.03 Plant Lots and Sublots. Determine plant lots and sublots on a daily basis in accordance with MP 401.

401-3.04 Quality Control Sampling and Testing. Obtain and test QC samples as outlined in MP 401.

401-3.05 Production Control. Produce HMA according to MP 401. Make necessary process control adjustments during production according to MP 401.

401-3.06 Production Quantities. Whenever production is made for the Department, notify the Regional Materials office by 3:00 p.m. the business day before the day of production.

Maintain a record of each day's production quantity for each mix design supplied to the project site daily. Retain these records at the production facility. These records must be available to the Department's representative for review. Ship all production quantities as outlined in §401-3.07 *Documentation.*

401-3.07 Documentation. Record all QC test data for each plant on the appropriate forms provided by the Department according to MP 401. Also, keep a copy of the plant automation printout at the plant facility for each mix type produced and make them available for review at all times. Transmit a summary of all test data weekly to the RME.

Provide a delivery ticket indicating the total quantity in tons being delivered with each delivery vehicle supplying HMA. The method of determining the delivered quantity is subject to the approval of the RME. Make one legible copy of the delivery ticket available to the Department's paving inspector prior to the placement of the mixture showing the following minimum information:

- Ticket number
- Plant identification
- Contract number
- Site Manager Mix ID (as outlined in MP 401)
- Mix Code (as outlined in MP 401)
- Quantity of material in vehicle
- Date and Time

The quality assurance technician (QAT) will determine the quality adjustment factor (QAF) for each day's production in accordance with MP 401.

The Engineer will use the Daily QAF to calculate the payment adjustment for each day's production according to §402-4 *Method of Measurement.*

401-3.08 HMA Mixing Plant. HMA mixing plants must meet the requirements in MP 401.

401-3.09 Hot Mix Asphalt Holding Bins. HMA mixtures may be held in holding bins which meet the requirements in MP 401.

401-3.10 Evaluation of Lots Represented by 0.85 QAF. When any material results in a QAF of 0.85, the Engineer will evaluate the subject material to determine if it will be left in place. The Engineer may require the Contractor to core the pavement to determine if the in-place density is acceptable at no additional cost to the State. When cores are required, the Engineer will divide the pavement area being evaluated into 4 sublots in accordance with the requirements of §402-3.08, *Pavement Density Samples.* The material will be left in-place when either of the following sets of conditions is met.

- The calculated plant air voids used for payment are greater than 5.5% and less than or equal to 7.0%, the asphalt content, based on automation, is within 0.2% of the production target, the Contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.
- The calculated plant air voids used for payment are greater than or equal to 1% and less than 1.5%, the validated QC and QA plant air void test results, according to MP 401, average 1.5% to 5.5%, the asphalt content, based on automation, is within 0.2% of the production target, the contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.

If the material does not meet the above conditions or it is unknown, such as for mixes accepted based on gradation or if QA testing was not required, the Engineer will determine if the material in question may remain in-place considering, but not limited to, the following:

- Type of material produced
- The layer in which the material was placed
- The location and traffic volume
- Laboratory test results
- Field test results, such as density

If the subject material is left in-place, it will be assigned a QAF of 0.85. If determined the subject material will not be left in-place, the Contractor shall remove and replace the material at no additional cost to the State.

401-4 METHOD OF MEASUREMENT. The quantity will be the number of tons delivered as determined from the automated proportioning system, the delivery vehicle weigh system, or the HMA holding bin weigh system. The measurement or calculation will be the quantity based on the measured amount and reported to the nearest 0.01 of a ton."

Make the following changes to the Standard Specifications dated May 4, 2006:

Delete Section 401 – Plant Production entirely and **replace** it with the following:

"SECTION 401 - PLANT PRODUCTION

401-1 DESCRIPTION. The contractor is responsible for Quality Control (QC). QC is defined as all activities required to produce HMA that meets all specification requirements. The contractor shall incorporate a Quality Control system for all plant production of hot mix asphalt (HMA) and assume responsibilities for all QC activities at the production facilities.

The contractor shall produce the HMA according to the specifications herein and provide production documentation. Quality Adjustment Factors (QAFs) will be used to assess HMA production quality and these factors will be applied to calculate a quality payment adjustment.

The Department is responsible for Quality Assurance (QA). QA is defined as all activities performed by the Department to assure that HMA production meets the specification requirements. The Department will determine quality payment adjustments for each day's production using a daily QAF obtained from the calculations of the average absolute values for volumetric and non-volumetric mixes in accordance with Materials Procedure (MP) 401, *Quality Control and Quality Assurance Procedures for Quality Control Hot Mix Asphalt Production*. The daily QAFs measure production variation from the mean of the specification limits.

401-2 MATERIALS. The provisions of §402-2, *Materials*, apply and are as modified herein. Produce HMA in accordance with the requirements outlined in this specification, including all applicable Test Methods and Materials Procedures. HMA mixture designs must be accepted by the Department prior to any HMA production.

The Department reserves the right to suspend any mixture design when the mixture produces unacceptable paving results or exhibits properties that will affect the anticipated pavement performance.

401-2.01 Hot Mix Asphalt Designs. Formulate and submit a HMA design to the Regional Materials Engineer (RME) that satisfies all design criteria outlined in MM 5.16, *Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures*. When the submitted HMA design is assigned verification status, the design must be verified during production. Notify the RME at least 24 hours prior to the start of verification status production. When producing under Verification Status, make necessary adjustments to control the process. Apply daily QAFs to both verification and production status mix designs. Mixtures produced under Verification Status are allowed for use on State projects.

For any HMA permeable base and shim mixtures required by the contract documents, formulate and submit to the RME a job mix formula that satisfies the General Limits imposed by Table 401-1, *Composition of Hot Mix Asphalt Mixtures*.

401-2.02 Aggregates. Aggregate must be from a source approved by the Department. Use fine aggregate that consists of materials conforming to the requirements of §703-01, *Fine Aggregate*. In addition, fine aggregate may consist of screenings, free from deleterious materials and manufactured from sources of stone, gravel, or slag meeting the requirements of §703-02, *Coarse Aggregate*.

Use coarse aggregate that consists either of crushed stone, crushed gravel, or crushed slag conforming to the requirements of §703-02, *Coarse Aggregate*, and MM 5.16.

Use slag aggregate on State projects only when an alternate pay item which takes the mix yield differential into account is included on the plans or in the itemized proposal.

When coarse aggregates for the mixture are from more than one source or of more than one type of material, proportion and blend them to provide a uniform mixture.

TABLE 401-1 COMPOSITION OF HOT MIX ASPHALT MIXTURES

Mixture Requirements	Permeable Base				Shim	
	Type 1		Type 2		Type 5	
Screen Sizes	General Limits % Passing[1]	Job Mix Tolerance %	General Limits % Passing[1]	Job Mix Tolerance %	General Limits % Passing[1]	Job Mix Tolerance %
50.0 mm	100	-	100	-	-	-
37.5 mm	95-100	-	75-100	±7	-	-
25.0 mm	80- 95	±6	55- 80	±8	-	-
12.5 mm	30- 60	±6	23- 42	±7	-	-
6.3 mm	10- 25	±6	5- 20	±6	100	-
3.2 mm	3- 15	±6	2- 15	±4	80-100	±6
850 µm	-	-	-	-	32- 72	±7
425 µm	-	-	-	-	18- 52	±7
180 µm	-	-	-	-	7- 26	±4
75 µm	0- 4	±2	-	-	2- 12	±2
Asphalt Content, %[2,3]	2.0-4.0	NA	2.5-4.5	NA	7.0-9.5	NA
Mixing and Compaction Temperature Range °C[4]	110-150		110-150		120-165	

NOTES:

1. All aggregate percentages are based on the total weight of the aggregate.
2. 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.
3. Use the PG binder listed in the proposal or as designated by the Region Materials Engineer following the guidance specified in the Comprehensive Pavement Design Manual, Chapter 6, Section 6.2.5 – *Performance Graded Binder Selection.*
4. Or as recommended by the PG binder manufacturer.

A. Coarse Aggregate Type F1 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

a. 12.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 95.0% of plus 9.5 mm particles must be non-carbonate.

b. 9.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 95.0% of plus 4.75 mm particles must be non-carbonate.

B. Coarse Aggregate Type F2 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

    a. 12.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 20.0% of plus 9.5 mm particles must be noncarbonate.
    b. 9.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 20.0% of plus 4.75 mm particles must be noncarbonate.

C. Coarse Aggregate Type F3 Conditions. Use one of the following types of coarse aggregate.

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 requirements:

    a. 12.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 20.0% of plus 9.5 mm particles must be noncarbonate.
    b. 9.5 mm Nominal Maximum Size Aggregate Mixes. Noncarbonate plus 3.2 mm 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). A minimum of 20.0% of plus 4.75 mm particles must be noncarbonate.

D. Coarse Aggregate Type F9 Conditions. Use coarse aggregate meeting the requirements of §703-02, *Coarse Aggregate*.

401-2.03 Mineral Filler. Use mineral filler conforming to the requirements of §703-08, *Mineral Filler*.

401-2.04 Performance-Graded Binder. Use the Performance-Graded Binder (PG Binder) in the production of these mixtures that meets Section 702 – *Bituminous Materials*.

Initial acceptance of the PG Binder 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 PG Binder 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 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 Materials Bureau.

The temperature of PG Binder delivered to the HMA Production Facility shall not exceed 175°C, unless the PG Binder supplier recommends it.

401-2.05 Reclaimed Asphalt Pavement. Reclaimed Asphalt Pavement (RAP) shall meet the requirements of MM 5.16.

401-3 CONSTRUCTION DETAILS.

401-3.01 Quality Control. Perform all sampling and testing in accordance with Materials Procedure 401. Document all QC test results and records in a legible manner and provide them to the Department at the end of each production season or when requested by the RME. HMA produced without the required sampling, testing and documentation may be rejected.

401-3.02 Production Facility Laboratory. Maintain an approved production facility site laboratory to perform all required HMA sampling and testing according to MP 401.

401-3.03 Plant Lots and Sublots. Determine plant lots and sublots on a daily basis in accordance with MP 401.

401-3.04 Quality Control Sampling and Testing. Obtain and test QC samples as outlined in MP 401.

401-3.05 Production Control. Produce HMA according to MP 401. Make necessary process control adjustments during production according to MP 401.

401-3.06 Production Quantities. Whenever production is made for the Department, notify the Regional Materials office by 3:00 p.m. the business day before the day of production.

Maintain a record of each day's production quantity for each mix design supplied to the project site daily. Retain these records at the production facility. These records must be available to the Department's representative for review. Ship all production quantities as outlined in §401-3.07 *Documentation.*

401-3.07 Documentation. Record all QC test data for each plant on the appropriate forms provided by the Department according to MP 401. Also, keep a copy of the plant automation printout at the plant facility for each mix type produced and make them available for review at all times. Transmit a summary of all test data weekly to the RME.

Provide a delivery ticket indicating the total quantity in metric tons being delivered with each delivery vehicle supplying HMA. The method of determining the delivered quantity is subject to the approval of the RME. Make one legible copy of the delivery ticket available to the Department's paving inspector prior to the placement of the mixture showing the following minimum information:

- Ticket number
- Plant identification
- Contract number
- Site Manager Mix ID (as outlined in MP 401)
- Mix Code (as outlined in MP 401)
- Quantity of material in vehicle
- Date and Time

The quality assurance technician (QAT) will determine the quality adjustment factor (QAF) for each day's production in accordance with MP 401.

The Engineer will use the Daily QAF to calculate the payment adjustment for each day's production according to §402-4 *Method of Measurement.*

401-3.08 HMA Mixing Plant. HMA mixing plants must meet the requirements in MP 401.

401-3.09 Hot Mix Asphalt Holding Bins. HMA mixtures may be held in holding bins which meet the requirements in MP 401.

401-3.10 Evaluation of Lots Represented by 0.85 QAF. When any material results in a QAF of 0.85, the Engineer will evaluate the subject material to determine if it will be left in place. The Engineer may require the Contractor to core the pavement to determine if the in-place density is acceptable at no additional cost to the State. When cores are required, the Engineer will divide the pavement area being evaluated into 4 sublots in accordance with the requirements of §402-3.08, *Pavement Density Samples.* The material will be left in-place when either of the following sets of conditions is met.

- The calculated plant air voids used for payment are greater than 5.5% and less than or equal to 7.0%, the asphalt content, based on automation, is within 0.2% of the production target, the Contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.
- The calculated plant air voids used for payment are greater than or equal to 1% and less than 1.5%, the validated QC and QA plant air void test results, according to MP 401, average 1.5% to 5.5%, the asphalt content, based on automation, is within 0.2% of the production target, the contractor achieved field density of 92% to 97%, and there are no defects such as, but not limited to, cracking, raveling, rutting, shoving, or bleeding.

If the material does not meet the above conditions or it is unknown, such as for mixes accepted based on gradation or if QA testing was not required, the Engineer will determine if the material in question may remain in-place considering, but not limited to, the following:

- Type of material produced
- The layer in which the material was placed
- The location and traffic volume
- Laboratory test results
- Field test results, such as density

If the subject material is left in-place, it will be assigned a QAF of 0.85. If determined the subject material will not be left in-place, the Contractor shall remove and replace the material at no additional cost to the Department.

401-4 METHOD OF MEASUREMENT. The quantity will be the number of metric tons delivered as determined from the automated proportioning system, the delivery vehicle weigh system, or the HMA holding bin weigh system. The measurement or calculation will be the quantity based on the measured amount and reported to the nearest 0.01 of a metric ton."