MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR

SUPERPAVE HOT MIX ASPHALT PERCENT WITHIN LIMITS FOR CAPITAL PREVENTIVE MAINTENANCE MILL & RESURFACE PROJECTS AND CAPITAL PREVENTIVE MAINTENANCE ONE COURSE OVERLAY PROJECTS

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a. Description. This special provision sets forth the QC and QA procedures that will be followed for acceptance of and payment for Superpave HMA used on Capital Preventative Maintenance (CPM) Mill & Resurface Projects and CPM One Course Overlay Projects. Except as explicitly modified by this special provision, all materials and HMA mixture requirements of the standard specifications and the contract apply.

1. Terminology.

Alternate Density Acceptance. Density acceptance criteria for applications where standard coring cannot be performed due to core thickness requirements. Alternate density acceptance applies to Hand Patching, Joint Repairs, Driveways, Gores, and Widening less than or equal to 5 feet. Scratch Course density is accepted using Alternate Acceptance In-Place Density Method if the application rate does not meet the minimum core thickness per subsection f.5 of this special provision.

Base Price. Price established by the Department to be used in calculating incentives or adjustments to pay items and shown in the contract.

Outlier. A value identified by the Percent Within Limits (PWL) program that deviates markedly from test results for other samples from the same lot which will be investigated. Outlier applies only to core density evaluation.

Overall Lot Pay Factor (OLPF). Value to be used to determine the lot pay adjustment.

Overall Sublot Pay Factor (OSPF). Value to be used to determine the sublot pay adjustment when Single Test Acceptance (STA) is used.

Percent Within Limits (PWL). The percentage of material within the specification limits or tolerance for a given quality index parameter.

QA Lot Acceptable Quality Limits (AQL) (Table 4 Col. VI). PWL value for an individual quality index parameter that will still result in a PF of 100 for that quality index parameter. AQLs are specified in Table 4.

QA Lot Rejectable Quality Limits (RQL) (Table 4 Col. VII). PWL value for an individual quality index parameter that will result in a PF = 50; remove and replace or corrective action plan. RQLs are specified in Table 4. Any lot subject to RQL will be reviewed with Construction Field Services - HMA Operations prior to removal and replacement.

QA Sublot Rejectable Quality Limits (RQL) (Table 4 Col. V). A range of values defined in Table 4 that, if exceeded on a single QA test may result in the Engineer issuing a Notice of Non-Compliance with Contract Requirements (Form 1165).

QA Suspension Limits (Table 4 Col. IV). A range of values defined in Table 4 that, if exceeded, may result in the Engineer issuing a Notice of Non-Compliance with Contract Requirements (Form 1165).

Quality Characteristic (Table 4 Col. I). The material and mixture characteristics of HMA that are deemed to have direct bearing on the quality and performance of the HMA pavement and for which specification limits have been established.

QC Action Limits (Table 4 Col. II). A range of values established by the Contractor in the HMA-QC Plan or specified in Table 4 that, if exceeded on two consecutive QC tests, requires that the Contractor take corrective action to bring the mixture produced into conformance with the specifications.

QC Suspension Limits (Table 4 Col. III). A range of values established by the Contractor in the HMA-QC Plan or specified in Table 4 that, if exceeded on a single QC test, requires that the Contractor suspend operations and determine, document, and correct the cause before continuing production.

Quality Index Parameter. The HMA quality characteristics that are evaluated under the Department's QA Acceptance Program and on which payment for HMA material is based. The Quality Index Parameters for this project are VMA, Air Voids, Binder Content, and In-Place Density.

Rounding of Numbers and Significant Figures. Rounding of numerical data will follow the Rounding Method as described in the *HMA Production Manual* and the associated *MTMs*.

Single Test Acceptance(STA). Acceptance criteria for non-PWL applications as outlined in subsection f.9 of this special provision.

Vibratory Exclusion Areas. An area of inadequate base condition shown on the plans; or identified by the Contractor and Engineer prior to or during the paving operation; or an area having conditions that are sensitive to vibration as determined by the Engineer. In these areas, during field production Percent of Maximum Specific Gravity (%G_{mm}) at the design number of gyrations, (N_d) will be increased to 97.5 percent. The area, if limited, will be accepted using the STA methodology. If the area is large enough to constitute a Lot, it will be accepted using standard PWL acceptance criteria. The contract requirements for density still apply. Any additional asphalt cement required for regression will be included in the base price bid for that particular mix if the areas are identified on the plans. For areas not identified on the plans there will be no compensation for the additional asphalt if the total tonnage for vibratory exclusion areas are under 1000 tons. Oscillatory rollers are allowed in vibratory exclusion areas as long as the vibratory mode is turned off.

2. Partnering Sessions. The Engineer will schedule a pre-production meeting 3 to 28 calendar days prior to the start of production. The Engineer will provide written notification to all parties a minimum of 14 calendar days prior to the meeting.

Discussion at the pre-production meeting will cover the following:

- The HMA-QC Plan.
- The HMA-QA Plan.
- The roles and responsibilities of all parties involved in the work covered by this special provision.
- The elected binder content procedure.

Notify the Engineer in writing a minimum of 7 calendar days prior to production which method per mix design is selected for binder content determination: ignition method or vacuum extraction. For each mix, the method approved will be used exclusively throughout the project for QA acceptance, including Dispute Resolution.

Department personnel attending the meetings will include the following:

- MDOT Project or Resident Engineer.
- Field inspector for the project.
- All Traveling Mix Inspectors [TMI(s)] with responsibility for this project.
- Any consultant involved in any part of the HMA sampling or testing on this project.

Contractor personnel attending the partnering meetings will include the following:

- Project Superintendent.
- HMA-QC Plan Administrator.
- Any subcontractor involved in any part of the HMA QC sampling or testing on this project.

b. Contractor QC. Be responsible for the quality of the HMA produced and placed on this project and perform QC sampling and testing, provide inspection, and exercise management control to ensure that work conforms to the contract requirements. Perform all testing in accordance with the approved HMA-QC Plan. Provide the Engineer the opportunity to observe sampling and testing. Sample, test, and evaluate all HMA mixtures in accordance with the requirements of this special provision.

Develop and follow an HMA-QC Plan for HMA production and placement as required by the *HMA Production Manual* and herein. Utilize personnel and testing equipment capable of providing a product that conforms to contract requirements. Do not start work on the subject items without an approved HMA-QC Plan.

Perform QC sampling, testing, and inspection during all phases of the work at the minimum guidelines specified for that item or at an increased frequency sufficient to ensure that the work conforms to the contract requirements. Continual production of nonconforming material at a reduced price in lieu of making adjustments to bring material into conformance is prohibited.

The Engineer will not sample or test for QC or assist in controlling the HMA production and placement operations. The results of Department QA testing may not be available for use in QC activities and should not be included in the HMA-QC Plan discussion.

1. HMA-QC Plan. Develop and follow an HMA-QC Plan that addresses personnel; sampling and testing equipment, and calibration records; supplies and facilities for obtaining samples, performing tests, and documenting results; and other activities to control the

quality of the product to meet contract requirements. Include methodology for addressing material that appears to be inconsistent with similar material being sampled. Perform all QC sampling and testing in accordance with the *HMA Production Manual* and herein unless specifically documented in the HMA-QC Plan and discussed at the pre-production meeting.

A. Plan Submittal. Submit the HMA-QC Plan to the Engineer for review and approval a minimum of 10 calendar days prior to the pre-production meeting.

B. Plan Approval. Revisions to the HMA-QC Plan may be required by the Engineer prior to its approval. The Engineer will request plan revisions in writing prior to or the day of the pre-production meeting. If revisions are required by the Engineer, ensure these revisions are made and the HMA-QC Plan approved before HMA production or placement commences.

Approval of the HMA-QC Plan does not imply any warranty by the Engineer that the HMA-QC Plan will result in production of HMA that complies with all contract requirements. It remains the responsibility of the Contractor to demonstrate such compliance.

C. Plan Modification. The HMA-QC Plan may be refined or modified as work progresses. Such refinements or modifications are subject to review and approval by the Engineer.

2. HMA-QC Plan Contents. Include the following specific items in the HMA-QC Plan.

A. QC Organization. Include an organization chart showing key personnel involved in production, placement, compaction, and QC for this project. Provide the names of the HMA-QC Plan Administrator and QC Technician(s) [QCT(s)]. Clearly identify all subcontractor personnel involved in HMA QC.

Maintain consistency in the QC organization throughout the life of the project to the extent practicable. Substitution of qualified personnel is allowed provided that the names are forwarded to the Engineer and approved by the Engineer prior to the substitution.

B. QC Personnel Qualifications and Responsibilities. Provide the qualifications of each individual or position listed on the organization chart and a brief narrative of their area of responsibilities. Describe the coordination of the activities of the Plan Administrator and the QCT(s).

(1) Plan Administrator. This individual will be responsible for administering the HMA-QC Plan and will institute any actions necessary to successfully implement the HMA-QC Plan.

(2) QC Technicians (Plant). Ensure all equipment calibration; QC sampling and testing; and QC documentation is performed by qualified technicians. Document the certification of all QCT(s) through the Michigan Bituminous QC/QA Technician Certification Program or other approved program.

(3) Placement Personnel. Identify the personnel that will be responsible for inspecting all transport, lay down, and compaction equipment to ensure it is

operating properly and for verifying that all lay down and compaction conforms to the contract requirements.

C. HMA Mix Design. Provide the approval status and a copy of the HMA mix design for all HMA mixtures to be produced for this contract and the plant location for production of each mixture.

D. QC Sampling and Testing. Develop and include the schedule of QC testing for the quality characteristics shown in Table 1. For each quality characteristic listed, define test method; minimum sampling and testing frequency; when the sampling and testing will be performed in relationship to production; and sampling location. Describe the random sampling method used.

Determine minimum QC sampling locations, the Contractor may elect to use the QA mixture sample locations or random locations independent of QA. The Engineer will notify the Contractor prior to conducting QA sampling. This notification will be done in a manner that allows the Contractor to witness the sampling but does not provide for the opportunity for the Contractor to alter their production in anticipation of a sample being taken. In addition to the minimum QC sampling required by Table 1, additional non-random QC testing may be included in the HMA-QC Plan, except as otherwise specified.

E. QC Laboratory Facilities. Provide the location of the testing facilities and include a copy of the plant certification. All laboratories that are used to prepare HMA mix designs or perform QC testing of HMA materials must demonstrate that they are equipped, staffed, and managed to be capable of mixing and testing HMA in accordance with the applicable test methods.

F. Corrective Action. Tables 2 and 4 specify the action limits and/or list the quality characteristics for which action limits must be defined in the HMA-QC Plan. Complete and include Tables 2 and 4 with the QC Action Limits defined as indicated. Describe the procedures that will be followed to ensure that test results are properly reviewed and that corrective action, based on the test results, is taken, and documented when necessary to control HMA quality.

G. Suspension of Production. Table 4 specifies the QC Suspension Limits. Discuss the steps to be taken when any suspension criterion is met. Steps must include notifying the Engineer and making all necessary corrections whenever production is suspended. Include discussion of the following suspension criterion, as a minimum.

(1) QC Suspension limits specified in Table 4 Col. III for any of the quality characteristics that are exceeded.

(2) The PWL for VMA, Air Voids, Binder Content, or In-Place Density is below 50 for any lot.

(3) The HMA-QC Plan is not followed.

(4) Visible pavement distress occurs such as segregation or flushing.

(5) Additional QC suspension criteria may be included.

H. Control Charts. Discuss the use of control charts for all quality characteristics listed in Table 1. Include examples of the control charts to be used. As a minimum, the control charts must identify the; project number, pay item code, test number, test parameter, specification limits, action limits, suspension limits, and the test results. Keep the control charts current and available in an accessible location at the laboratory facility.

I. Plant Reports. At the request of the Engineer, provide copies of plant certification and electronic daily cumulative project tonnage report.

c. QC Sampling and Testing During Production.

1. Four cores approximately 6 inches in diameter will be allowed per sublot of material for QC of In-Place Density.

2. At the time any QA or QC cores are taken, remove free standing water from the core hole; apply tack coat to the interior of the core hole, fill with hot mixture, and compact. Obtain and document approval for the type of mix to be used for filling holes and for obtaining compaction at the pre-production meeting.

3. At the time any QA or QC sample is collected from behind the paver, provide and place loose mixture in accordance with *MTM 324* or as directed by the Engineer.

4. In addition to maintaining test reports and control charts, enter all QC data into the PWL Program that can be downloaded from the Construction Field Services web site, provide the results to the Engineer as they become available. QA results will not be provided to the Contractor until corresponding QC results are submitted to the Engineer. If production is truncated and the random QC sample has not been obtained, then the QA results will be provided to the Contractor.

5. Sample and test the plant produced material in accordance with the approved HMA-QC Plan.

d. HMA-QA Plan. The Engineer will develop and follow an HMA-QA Plan. The Engineer will submit the HMA-QA Plan to the HMA-QC Plan Administrator a minimum of 7 calendar days prior to the pre-production meeting. The HMA-QA Plan will be reviewed at the pre-production meeting and any proposed changes will be documented.

All QA sampling and testing will be performed in accordance with the *HMA Production Manual* and herein unless specifically documented in the HMA-QA Plan and discussed at the pre-production meeting. The Engineer will provide the Contractor the opportunity to observe QA sampling and testing. The following specific items will be included in the HMA-QA Plan.

1. QA Organization. Key personnel involved in sampling, testing, construction inspection, review of QC, and QA management will be identified. The names of the Engineer, support staff, and QA Technician(s) [QAT(s)] involved in HMA QA for this project will be included along with phone numbers, fax numbers, and e-mail addresses. The Engineer will notify the HMA-QC Plan Administrator of any deletions or additions to the HMA QA team.

2. QA Personnel Qualifications and Responsibilities. The HMA-QA Plan will include a

brief narrative of the area of responsibilities of each HMA QA team member and will describe the coordination of the activities of the Engineer, support staff and the QAT(s).

A. HMA-QA Plan Administrator. The Engineer will be responsible for administering the HMA-QA Plan and will institute any actions necessary to successfully implement the HMA-QA Plan.

B. QA Technicians. All QA testing and QA documentation will be performed by qualified technicians, as defined in the *HMA Production Manual*. All QAT(s) will be certified through the Michigan Bituminous QC/QA Technician Certification Program or other approved program. Certifications required for QAT(s) will be included in the project files.

C. Construction Personnel. The personnel responsible for field inspection and for obtaining QA samples will be identified. Certifications/qualifications required for individuals collecting QA samples will be included in the project files.

D. Laboratory Facilities. The testing facilities with responsibility for QA testing on this project will be identified. All laboratories that perform QA testing of HMA materials must demonstrate that they are equipped, staffed, and managed to be capable of testing HMA in accordance with the applicable test methods.

e. Initial QC/QA Correlation. To verify test results, procedures, and equipment used are capable of generating QC test results that agree with QA results to within acceptable tolerances the Engineer and Contractor may agree to perform correlation testing.

For purposes of correlation the Engineer will collect one 45,000 gram split sublot sample and provide the Contractor with splits, for testing of all quality characteristics listed in Table 1. These split sample test results will be evaluated using the current lab correlation procedure found in the *HMA Production Manual*. The Department's split portion will be used as the QA acceptance test.

If the split sublot sample test results do not correlate, the Contractor and the Engineer will jointly review the results, check equipment and review the test procedures for all testing laboratories to determine if there is an identifiable cause for the discrepancy; recalibrate equipment; and arrange for independent assurance sampling and testing reviews for the QAT(s) and QCT(s), if necessary, before continuing with production or conducting tests on a subsequent sublot. If the vacuum extraction process is used to determine the asphalt binder content, the Engineer and Contractor will communicate the number of washes used.

If mutually agreed upon by the Engineer and Contractor, split sampling frequency can be modified or waived.

1. JMF Adjustment Requests. JMF adjustments may be requested based on test data submitted from previous use of the approved mix designs. The previous usage may be on commercial, local agency, or state construction projects.

f. QA Sampling and Testing. Acceptance of HMA is the responsibility of the Engineer and will be accomplished by conducting QA sampling and testing, monitoring the Contractor's adherence to the HMA-QC Plan, and inspection of field placed material (see section 104 of the Standard Specifications for Construction). The Engineer will notify the Contractor prior to

conducting QA sampling. This notification will be done in a manner that allows the Contractor to witness the sampling but does not provide for the opportunity for the Contractor to alter their production in anticipation of a sample being taken.

1. Random Sampling. Except as modified herein, QA sample locations will be determined as outlined in Section 1.05 of the *MQAP Manual*.

A. Prior to the pre-production meeting, the Engineer will generate three columns of random numbers using a computer spreadsheet program or a calculator. The random numbers will be used for the longitudinal and the transverse measurement for determining the core location.

For HMA mixture sample location, use the random number from the third column, then multiply it by sublot tonnage. An excess amount of random numbers will be generated to take into account overruns or any situation where another random number is required.

B. At the pre-production meeting, each page that lists random numbers, with the numbers covered by a separate sheet of paper, will be presented to be signed by the HMA-QC Plan Administrator and the Engineer.

C. The original signed list will be placed in the project file and a copy will be provided to the field inspector for the project.

D. Random numbers and associated field calculations for completed sublots will be provided to the Contractor upon request.

2. Production Lot size. Each lot will be divided into sublots of approximately equal size but not greater than 1000 tons.

If only one or two sublots remain at the end of production of a mixture, the test results for these sublots will be combined with the previous lot for evaluation of PWL and PF.

3. Plant Produced Material (Mixture) QA Sampling. Location of QA sample sites within each sublot will be by a random process managed by the Engineer. Immediately after the Engineer acquires the samples, fill the voids with HMA in accordance with *MTM 324*.

The Engineer will sample the mixture in accordance with *MTM 324* or *MTM 313*, collecting two separate 20,000 gram samples at each sample site. These are the QA and dispute resolution samples. The Engineer will assign an identifier to each sample consisting of contract ID, mixture, lot and sublot and deliver the samples to the testing facility identified in the HMA-QA Plan where one will be tested and the other retained for possible Dispute Resolution testing.

Sampling for wedging operations will be in accordance with *MTM 313* using a ministockpile.

4. Plant Produced Material (Mixture) QA Testing. Plant produced material acceptance testing will be completed by the Engineer within 4 calendar days after the Engineer has taken the samples from the project site. The Engineer will conduct the following tests.

A. Maximum Specific Gravity, G_{mm} (*MTM 314*)

B. Bulk Compacted Density, N_{des} (*AASHTO T312*)

C. Air Voids, N_{ini}*, N_{des}, (*AASHTO R35*) (* for information only)

D. Voids in Mineral Aggregate, VMA (*AASHTO R35*)

E. Voids Filled with Asphalt, VFA* (*AASHTO R35*) (* for information only)

F. Ratio of Fines to Effective Asphalt Binder, P#200/P_{be}

G. Composition of the Mixture (Using one of the following methods)

Method 1. Asphalt binder content based on ignition method (*MTM 319*). Gradation (*ASTM D5444*) and Crushed particle content (*MTM 117*) based on aggregate from *MTM 319*. If method 1 is selected, the incineration temperature will be established at the pre-production meeting. The Contractor will provide a laboratory mixture sample to the QA Acceptance Laboratory to establish the correction factor for each mix. Provide this sample to the Engineer 14 calendar days prior to production.

Method 2. Asphalt binder content based on vacuum extraction by *MTM 325* and the "Checklist for HMA Mixture Analysis Vacuum Extraction", of the *HMA Production Manual*. Gradation (*ASTM D5444*) and Crushed particle content (*MTM 117*) based on extracted aggregate from *MTM 325*.

The determination of which method will be used for each mix will be made by the Contractor at the pre-production meeting. The method selected cannot be changed during mix production without submitting a new mix design to the MDOT Construction Field Services (CFS) Central Laboratory for verification.

5. In-Place Density QA Sampling. The Engineer will locate and mark all QA core locations. All QA coring operations will be completed by the Contractor including dispute resolution and sublot retest coring. The Engineer will test all QA cores. If, for any reason, a core is damaged or determined not to be representative at the time of coring, the Engineer will evaluate and document the problem and determine if re-coring is necessary.

Core sample locations will be marked after final rolling. Core sample locations will be marked at the completion of a sublot and cores will be taken, prior to traffic staging changes, or at another time that is independent of paving operations. Ensure exceptions are approved by the Engineer. The Engineer will identify four core sample locations for each sublot based on longitudinal and transverse measurements. The Contractor will provide and pay for traffic control as required in the Special Provision for Maintaining Traffic for all coring procedures including dispute resolution and sublot retest coring.

The Engineer will mark each core location with a 2 inch diameter paint dot, paint marker, or keel, which represents the center of the core. When sampling behind the paver, cores will not be taken from 5 feet before the loose mixture sampling area through 5 feet after the loose mixture sampling area. If the random core location falls within these areas, new longitudinal and transverse random numbers will be selected, and the core sample site moved to the new location. If the center of the core is less than 5 inches from either edge of pavement, another transverse random number will be selected, and the core sample site moved to the new location.

Notify the Engineer in advance of coring to ensure that MDOT has a representative to witness the coring operation and take immediate possession of the cores. Drill a core sample approximately 6 inches in diameter at each core location. Do not damage cores during removal from the roadway. Measure cores at the time they are extracted from pavement.

Any core disqualified based on the minimum thickness criterion will be discarded and a new core location will be selected by the Engineer. If more than 50 percent of the cores in a lot are disqualified, production must stop. Production will not be allowed to continue until the Engineer has confirmed that the paving operation is meeting the contract application rate. All previous pavement, base aggregate or bond coat material will be sawed off the bottom of the core samples by the Engineer.

The minimum core thickness for each mixture type is:

HMA Mixture No.	Minimum Core Thickness
2	3 inch
3	2¼ inch
4	1½ inch
5	1⅛ inch

A. Alternate Acceptance In-Place Density Method. Density acceptance for Hand Patching, Joint Repairs, Driveways, Scratch Course, and Widening/Tapers/Gores of less than or equal to 5 feet will be as follows. Density acceptance for these processes will be by density gauge. Establish the compaction effort for each pavement layer to achieve the required in place density values. After the final rolling, the Engineer will use a density gauge using the G_{mm} from the JMF for acceptance. A minimum of six random locations per sublot will be tested for density. If the average of the density values is equal to or greater than 92.00 percent of the G_{mm}, the pavement density will be accepted. If the average of the sublot density tests are less than 92.00 percent of the G_{mm}, the Contractor must take corrective action to achieve a minimum average of 92.00 of the G_{mm}. Density values will not be used in the PWL spread sheet; the alternate density application in the drop-down of the PWL spread sheet should be selected.

Sampling will be in accordance with *MTM 313*.

6. In-Place Density QA Testing. Pavement In-Place Density acceptance testing will be completed by the Engineer within 4 calendar days after the Engineer has taken possession of the cores at the project site. Testing will be in accordance with *MTM 315*. The Engineer and Contractor will mutually agree to use either vacuum dry or oven dry method as outlined in *MTM 315*. This agreement will be documented at the pre-production meeting. The Engineer's test results on the compacted HMA will be used as a basis of acceptance and payment.

At the completion of lot testing all individual tests for In-Place Density will be checked for apparent outliers in accordance with *ASTM E178* at a significance level of 5 percent (following the example in subsection 6.2 of that standard). If a test result is determined to be an apparent outlier the doubtful value will be investigated.

This investigation will include, but may not be limited to, visual and physical examination of

the core (i.e. short core, core damaged during transport or during laboratory handling); and a careful review of the sampling and testing procedure including data entry and calculations (i.e. was raw data transposed or incorrectly entered into test calculations). If no documentable reason is found for the apparent outlier, the value will remain as part of the In-Place Density PF calculations. If a documentable reason is found for the apparent outlier, the value will be discarded and the remaining test results will be used to calculate the In-Place Density PF.

7. QA Stop Production Criteria. The Engineer may issue a Notice of Non-Compliance with Contract Requirements (Form 1165) if the Contractor has not suspended operations and taken corrective action. HMA production must stop when any one or more of the following criteria are met or exceeded:

A. The QA Suspension Quality Limits in Table 4 Col. IV is exceeded for consecutive QA tests for fines to effective binder or is exceeded for the lot average for effective specific gravity.

B. One or more of the QA Sublot Rejectable Quality Limits in Table 4 Col. V is exceeded for a single QA test.

C. The PWL for VMA, Air Voids, Binder Content or In-Place Density is below 50 when calculated in accordance with section j. of this special provision.

D. The HMA-QC Plan is not followed.

Resume production only after making all necessary adjustments to bring the mixture into conformance with all applicable specifications; documenting these adjustments as discussed in the HMA-QC Plan; and receiving a Notice to Resume Work (Form 1165) from the Engineer.

8. Sublot Removal and Replacement Criteria. Exceeding one or more of the QA Sublot Rejectable Quality Limits in Table 4 Col. V may result in removal and replacement of the associated sublot of material.

9. STA Criteria. STA (for Density use the average of four cores) applies to specific mixtures between 500 and 5000 tons, and the following applications regardless of tonnage: Hand Patching, Joint Repairs, Driveways, Scratch Course, and Widening of less than or equal to 5 feet. The STA sublot size must not exceed 1000 tons. If a days production is less than 1000 tons the days tonnage will be considered a sublot. If a days production exceeds 1000 tons the tonnage will be divided into approximately equal sublot sizes. For hand patching with daily quantities of less than 200 tons, obtain 1 random STA sample for each day of production for up to 5 days of paving. One of the daily samples will be randomly selected and tested for acceptance. If the QA results are not subject to a negative price adjustment per section k. of this special provision, the test result may represent multiple days of paving (up to 5 days) at the discretion of the Engineer. The Engineer reserves the right to test the additional daily samples. All tested samples will have payment calculated in accordance with section k. If the QA results are subject to a negative price adjustment per section k., all random STA samples will be tested, and payment calculated in accordance with section k. For individual mix quantities of 500 tons or less, Visual Inspection (*MQAP Manual* Section 1.07) may be used in lieu of STA. Sampling will be in accordance with *MTM 324* or *MTM 313*. Table 4 will not apply to STA. Dispute Claim

Process will be in accordance with sections g. and h. of this special provision. All QA sampling and testing procedures and acceptance criteria described in this special provision will apply. Payment will be in accordance with section l. of this special provision.

Sampling will be in accordance with the provisions stated herein or *MTM 313* where applicable.

g. Dispute Resolution Process for Plant Produced Material (Mixture).

1. Lot Dispute Resolution.

A. Lot Dispute Resolution Criteria. The QA results for a lot, including an initial production lot, may be eligible for Dispute Resolution only if the PF for Air Voids, Binder Content, or VMA based on the QC test results is larger than the corresponding PF for Air Voids, Binder Content, or VMA based on the QA test results. Only QC test results from the corresponding sublots in the lot under Dispute Resolution will be used by the Engineer when processing the Dispute Resolution request. Ensure the QC testing and sampling used for Dispute Resolution is conducted in the same manner as the QA testing. The Dispute Resolution test results will replace the QA test results and the PF for Air Voids, Binder Content, VMA and In-Place Density will be recomputed based on the Dispute Resolution sample test results.

B. Dispute Resolution Schedule.

(1) Submit request for Mixture Dispute Resolution testing in writing within 2 working days of receipt of the lot Mixture test results.

(2) The request for Dispute Resolution must include the QC test results for the lot. A signed statement certifying that the QC test results are true and accurate must accompany the request for Dispute Resolution.

(3) The Engineer will document receipt of the request for Dispute Resolution and will deliver the Dispute Resolution samples to the MDOT CFS Central Laboratory within 2 working days of the receipt of the request.

(4) The MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results to the Engineer within 13 calendar days upon receiving the Dispute Resolution samples.

C. Dispute Resolution Testing Process.

(1) All sublot dispute resolution samples will be tested for all mix properties. Binder Content will be determined using the method specified by the Contractor for the specific mix.

(2) All dispute resolution results will replace original QA test results.

(3) The OLPF and the lot pay adjustment for the lot under Dispute Resolution will be recalculated.

(4) If the recalculated OLPF is less than or equal to the original QA OLPF, all

costs associated with completing the Dispute Resolution sample testing will be borne by the Contractor.

(5) If the recalculated OLPF is greater than the original QA OLPF, all costs (excluding traffic control) associated with completing the Dispute Resolution sample testing will be borne by the Department.

2. Sublot Retest. If any one or more QA sublot RQL (Table 4 Column V) is exceeded, the Engineer will direct the corresponding sublot Dispute Resolution sample to be tested and the results will be substituted for the QA results for Air Voids, Binder Content and VMA. The PFs for Air Voids, VMA, Binder Content and Density will be recomputed. Sublot Retest can be waived if the QA test results are agreed upon by the Engineer and Contractor. All costs associated with completing the Sublot Retest testing will be borne by the Department.

3. STA Dispute Resolution.

A. STA Dispute Resolution Criteria. The QA results for a STA sublot, may be eligible for Dispute Resolution only if the OSPF from QC test results from the corresponding sublot is 5 percent or larger than the OSPF for QA results. The PFs for Air Voids, VMA, Binder Content and Density will be recomputed based on the results of the dispute sample. If the recalculated OSPF is greater than the original QA OSPF, all costs (excluding traffic control) associated with completing the Dispute Resolution sample testing will be borne by the Department.

B. Dispute Resolution Schedule.

(1) Submit request for Mixture Dispute Resolution testing in writing within 2 working days of receipt of the lot Mixture test results.

(2) The request for Dispute Resolution must include the QC test results for the lot. A signed statement certifying that the QC test results are true and accurate must accompany the request for Dispute Resolution.

(3) The Engineer will document receipt of the request for Dispute Resolution and will deliver the Dispute Resolution samples to the MDOT CFS Central Laboratory within 2 working days of the receipt of the request.

(4) The MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results to the Engineer within 13 calendar days upon receiving the Dispute Resolution samples.

C. Dispute Resolution Testing Process.

(1) Sublot dispute resolution samples will be tested for all mix properties. Binder Content will be determined using the method specified by the Contractor for the specific mix.

(2) All dispute resolution results will replace original QA test results.

(3) The OSPF for the sublot under Dispute Resolution will be recalculated.

h. Dispute Resolution Process for In-Place Density.

1. Lot Dispute Resolution.

A. Lot Dispute Resolution Criteria. The QA In-Place Density results for a lot, including an initial production lot, may be eligible for Dispute Resolution if the lot PF for In-Place Density based on the QC test results is larger than the corresponding PF based on the QA test results. Only QC test results (minimum of two random sublot cores from each sublot) from the corresponding lot under Dispute Resolution will be used by the Engineer when processing the Dispute Resolution request. The Dispute Resolution test results will replace the QA test results and the lot PF for In-Place Density will be recomputed based on the Dispute Resolution sample test results.

B. Dispute Resolution Schedule.

(1) Submit request for In-Place Density Dispute Resolution testing in writing within 2 working days of receipt of the lot In-Place Density test results.

(2) The request for Dispute Resolution must include the QC test results for the lot. A signed statement certifying that the QC test results are true and accurate must accompany the request for Dispute Resolution.

(3) The Engineer will document receipt of the request for Dispute Resolution.

(4) The Engineer will check the lot In-Place Density test results for data entry and mathematical errors. If there are errors, the lot PF for In-Place Density will be recomputed on the recalculated test results.

(5) If the Vacuum Dry method is used, the Engineer will re-test the original cores at the QA Lab and report out test results within 2 working days. All test values will replace the original QA results. The PF for Density will be recomputed.

If the conditions of subsection h.1.A of this special provision, are still met for dispute testing, Sublot Dispute Resolution cores will be sampled and tested in accordance with this section and the results will be substituted for the QA results. The PF for Density will be recomputed.

(6) The Engineer will locate and mark new random Dispute Resolution core locations in accordance with subsection f.1 of this special provision. Dispute Resolution coring will be completed within 5 calendar days of the receipt of the request for Dispute Resolution for the oven dry method and within 3 calendar days of retest results for the vacuum dry method.

(7) The MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results to the Engineer within 7 calendar days upon receiving the Dispute Resolution samples. If there is a Dispute Resolution in process for Air Voids, Binder Content, or VMA, MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results within 13 calendar days upon receiving the Dispute Resolution samples.

C. Dispute Resolution Testing Process.

(1) Dispute Resolution Cores. If it is determined that the test discrepancy has not been resolved, the Engineer will locate and mark new random Dispute Resolution core locations in accordance with subsection f.1 of this special provision. The Engineer will take possession of the cores when cut and extracted by the Contractor and submit them to MDOT CFS Central Laboratory for testing. The Dispute Resolution density cores will be tested in accordance with *MTM 315* and in the same manner as the original QA cores. The G_{mm} from the original QA test results will be used to calculate the new In-Place Density values. If volumetric properties are in Dispute Resolution for the same lot, the new G_{mm} value will be used to calculate the new Dispute Resolution In-Place Density values.

(2) All lot Dispute Resolution core samples will be tested.

(3) All lot Dispute Resolution core results will replace original QA test results.

(4) The OLPF and the lot pay adjustment for the lot under Dispute Resolution will be recalculated.

(5) If the recalculated OLPF is less than or equal to the original QA OLPF, all costs associated with completing the Dispute Resolution sample testing will be borne by the Contractor.

(6) If the recalculated OLPF is greater than the original QA OLPF, all costs (excluding traffic control) associated with completing the Dispute Resolution sample testing will be borne by the Department.

2. Sublot Retest. If any one or more QA Density sublot RQL (Table 4 Column V) is exceeded, the Engineer will direct the corresponding action:

A. Vacuum Dry. The Engineer will re-test the original cores at the QA Lab. All test values will replace the original QA results. The PF for Density will be recomputed. If the test results still exceed QA Density sublot RQL (Table 4 Column V), Sublot Dispute Resolution cores will be sampled and tested in accordance with this subsection and the results will be substituted for the QA results. The PF for Density will be recomputed.

B. Oven Dry. Since using this method destroys the original cores new Sublot Dispute Resolution cores will be sampled and tested in accordance with this subsection and the results will be substituted for the QA results. The PF for Density will be recomputed.

All costs (excluding traffic control) associated with completing the Sublot Retest testing will be borne by the Department.

Sublot Retest can be waived if the QA test results are agreed upon by the Engineer and Contractor.

3. STA Dispute Resolution.

A. STA Dispute Resolution Criteria. The QA results for a STA sublot, may be eligible for Dispute Resolution only if the OSPF from QC test results from the corresponding sublot is 5 percent or larger than the OSPF for QA results. The Dispute

Resolution test results will replace the QA test results and the STA sublot PF for In-Place Density will be recomputed based on the Dispute Resolution sample test results.

B. Dispute Resolution Schedule

(1) Submit request for Dispute Resolution testing in writing within 2 working days of receipt of the QA sublot test results.

(2) The request for Dispute Resolution must include the QC test results for the lot. A signed statement certifying that the QC test results are true and accurate must accompany the request for Dispute Resolution.

(3) The Engineer will document receipt of the request for Dispute Resolution.

(4) The Engineer will check the sublot test results for data entry and mathematical errors. If there are errors, the OSPF will be recomputed on the recalculated test result.

(5) If the Vacuum Dry method is used the Engineer will re-test the original cores at the QA Lab and report out test results within 2 working days. All test values will replace the original QA results. The PF for Density will be recomputed. If the conditions of subsection h.3.A of this special provision, are still met for dispute testing, Sublot Dispute Resolution cores will be sampled and tested in accordance with this subsection and the results will be substituted for the QA results. The PF for Density will be recomputed.

(6) The Engineer will locate and mark new random Dispute Resolution core locations in accordance with subsection f.1 of this special provision. Dispute Resolution coring will be completed within 5 calendar days of the receipt of the request for Dispute Resolution for the oven dry method and within 3 calendar days of retest results for the vacuum dry method.

(7) The MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results to the Engineer within 7 calendar days upon receiving the Dispute Resolution samples. If there is a Dispute Resolution in process for Air Voids, Binder Content, or VMA, MDOT CFS Central Laboratory will complete all Dispute Resolution testing and return test results within 13 calendar days upon receiving the Dispute Resolution samples.

C. Dispute Resolution Testing Process.

(1) Dispute Resolution Cores. If it is determined that the test discrepancy has not been resolved, the Engineer will locate and mark new random Dispute Resolution core locations in accordance with subsection f.1 of this special provision. The Engineer will take possession of the cores when cut and extracted by the Contractor and submit them to MDOT CFS Central Laboratory for testing. The Dispute Resolution density cores will be tested in accordance with *MTM 315*. The G_{mm} from the original QA test results will be used to calculate the new In-Place Density values. If volumetric properties are in Dispute Resolution for the same STA sublot, the new G_{mm} value will be used to calculate the new Dispute Resolution In-Place Density values.

(2) All sublot Dispute Resolution core samples will be tested.

(3) All sublot Dispute Resolution core results will replace original QA test results.

(4) The OSPF and the lot pay adjustment for the lot under Dispute Resolution will be recalculated.

(5) If the recalculated OSPF is less than or equal to the original QA OSPF, all costs associated with completing the Dispute Resolution sample testing will be borne by the Contractor.

(6) If the recalculated OSPF is greater than the original QA OSPF, all costs (excluding traffic control) associated with completing the Dispute Resolution sample testing will be borne by the Department.

i. Documentation. Ensure the following documentation is current and available for review as stated herein.

1. QC Records. Maintain a complete record of all QC tests and inspections. Make these records available at the laboratory facility at all times for the Engineer to review. Update all records within 24 hours of test completion. Failure to keep the required documentation updated constitutes a violation of the HMA-QC Plan. Furnish copies of individual records to the Engineer upon request and all records within 7 working days of completion of the project. Report all sampling and testing on MDOT approved forms. The records must contain, as a minimum, the accepted HMA-QC Plan, signed originals of all QC test results and raw data, random numbers used and resulting calculations made for QC sampling locations if applicable, control charts, and summaries of all test results.

2. QA Records. The Engineer will maintain a complete record of all QA tests and inspections. Records will be updated within 1 working day of test completion. Copies of individual records, random numbers, and associated field calculations for completed sublots will be furnished to the Contractor upon request. The records will contain, as a minimum, the HMA-QA Plan, signed originals of all QA test results and raw data, random numbers used and resulting calculations made for QA sampling locations if applicable, and summaries of all test results. QA results will not be provided to the Contractor until corresponding QC results are submitted to the Engineer. If production is truncated and the random QC sample has not been obtained, then the QA results will be provided to the Contractor.

j. PWL - Quality Index Analysis. The Engineer's QA test results for HMA (mixture) and In-Place Density will be evaluated in accordance with the MDOT PWL Worksheet (go to the following website for the latest PWL spreadsheet and version control: https://www.michigan.gov/mdot/business/construction/pavement-operations/hma---pwl---sta). The upper and lower specification limits used in the quality index analysis are shown in Table 3. The Engineer will calculate PWL, PF and payment for all HMA material covered by this special provision using the MDOT PWL Worksheet. All values of PWL and OLPF in these formulae are percents not decimals. All values of PWL are rounded to whole numbers. All values of PF are rounded to two decimal places.

1. Pay Factor for Air Voids (PF_{AV}).

A. If PWL for Air Voids (PWL_{AV}) is between 100 and 71 inclusive, use the following formula to determine PF_{AV}.

$PF_{AV} = 55 + (0.5 \times PWL_{AV})$

B. If PWL_{AV} is between 70 and 50 inclusive, use the following equation to determine PF_{AV}.

$PF_{AV} = 37.5 + (0.75 \times PWL_{AV})$

C. If PWL_{AV} is less than 50, the Engineer may elect to do one of the following:

(1) Require removal and replacement of the entire lot with new QA sampling and testing and repeat the evaluation procedure. Any lot subject to RQL will be reviewed with CFS - HMA Operations prior to removal and replacement.

(2) Allow the lot to remain in place and apply an OLPF of 50.

(3) Allow submittal of a corrective action plan for the Engineer's approval. The corrective action plan may include removal and replacement of one or more sublots. If one or more sublots are replaced, the sublot(s) will be retested and the OLPF will be recalculated in accordance with this special provision. If the Engineer does not approve the plan for corrective action, subsections j.1.C.(1) or j.1.C.(2) of this special provision will be applied.

2. Pay Factor for Binder Content (PF_{BINDER}).

A. If PWL for Binder Content (PWL_{BINDER}) is between 100 and 71 inclusive, use the following formula to determine PF_{BINDER}.

$PF_{BINDER} = 55 + (0.5 \times PWL_{BINDER})$

B. If PWL_{BINDER} is between 70 and 50 inclusive, use the following equation to determine PF_{BINDER}.

$PF_{BINDER} = 37.5 + (0.75 \times PWL_{BINDER})$

C. If PWL_{BINDER} is less than 50, the Engineer may elect to take one of the actions specified in subsection j.1.C of this special provision.

3. Pay Factor for VMA (PF_{VMA}).

A. If PWL for VMA (PWL_{VMA}) is between 100 and 71 inclusive, use the following formula to determine PF_{VMA}.

$PF_{VMA} = 55 + (0.5 \times PWL_{VMA})$

B. If PWL_{VMA} is between 70 and 50 inclusive, use the following equation to determine PF_{VMA}.

$PF_{VMA} = 37.5 + (0.75 \times PWL_{VMA})$

C. If PWL_{VMA} is less than 50, the Engineer may elect to take one of the actions specified in subsection j.1.C of this special provision.

4. Pay Factor for In-Place Density (PF_D).

A. If PWL for In-Place Density (PWL_D) is between 100 and 71 inclusive, use the following formula to determine PF_D.

$PF_D = 55 + (0.5 \times PWL_D)$

B. If PWL_D is between 70 and 50 inclusive, use the following equation to determine PF_D.

$PF_D=37.5 + (0.75 \times PWL_D)$

C. If PWL_D is less than 50; the Engineer may elect to take one of the actions specified in subsection j.1.C of this special provision.

5. Overall Lot Pay Factor (OLPF). Round the value of the OLPF to whole numbers.

$OLPF = (0.40 \times PF_D) + (0.30 \times PF_{AV}) + (0.15 \times PF_{BINDER}) + (0.15 \times PF_{VMA})$

k. STA. The Engineer's QA test results for plant produced material (mixture) and In-Place Density will be evaluated in accordance with the MDOT STA Worksheet (go to the following website for the latest STA Worksheet and version control: https://www.michigan.gov/mdot/business/construction/pavement-operations/hma---pwl---sta) . The Engineer will calculate PF and payment for all Non-PWL HMA material covered by this special provision using the MDOT STA Worksheet. All values of PF in these formulae are percents not decimals. All values of PF are rounded to two decimal places as shown in the MDOT STA Worksheet.

1. Pay Factor for Air Voids (PF_{AV}).

A. If the single test deviation for Air Voids is less than or equal to 1.00, use the following formula to determine PF_{AV}.

PF_{AV} = 105 - (5 x Deviation from Target)

B. If the single test deviation for Air Voids is between 1.01 and 2.00 inclusive, use the following formula to determine PF_{AV}.

PF_{AV} = 140 - (40 x Deviation from Target)

C. If the single test deviation from the target for Air Voids is greater than 2.00 the Engineer may elect to do one of the following:

(1) Require removal and replacement of the entire sublot with new QA sampling and testing and repeat the evaluation procedure.

(2) Allow the sublot to remain in place and apply an OSPF Pay Factor of 50.

(3) Allow submittal of a corrective action plan for the Engineer's approval. The

corrective action plan may include removal and replacement of the sublot.

2. Pay Factor for Binder Content (PF_{BINDER}).

A. If the single test deviation for Binder Content is less than or equal to 0.45, use the following formula to determine PF_{BINDER}.

PF_{BINDER} = 105 - (11.1111 x Deviation from Target)

B. If the single test deviation for Binder Content is between 0.46 and 1.00 inclusive, use the following formula to determine PF_{BINDER}.

PF_{BINDER} = 181.8181 - (181.8181 x Deviation from Target)

C. If the single test deviation from the target for Binder Content is greater than 1.00 the Engineer may elect to take one of the actions specified in subsection k.1.C of this special provision.

3. Pay Factor for VMA (PF_{VMA}).

A. If the single test deviation from the target for VMA is less than or equal to 1.00, use the following formula to determine PF_{VMA}.

PF_{VMA} = 105 - (5 x Deviation from Target)

B. If the single test deviation for VMA is between 1.01 and 2.43 inclusive, use the following formula to determine PF_{VMA}.

PF_{VMA} = 168 - (69 x Deviation from Target)

C. If the single test deviation from the target for VMA is greater than 2.43 the Engineer may elect to take one of the actions specified in subsection k.1.C of this special provision.

4. Pay Factor for In-Place Density (PF_D).

A. If the test result for In-Place Density is greater than 94.00 the In-Place Density (PF_D) = 105.

B. If the test result for In-Place Density is between 92.50 and 94.00 inclusive, use the following formula to determine In-Place Density (PF_D).

PF_D = (3.3333 x Density) – 208.3333

C. If the test result for In-Place Density is less than 92.50 but greater than or equal to 91.00 use the following formula to determine PF_D.

PF_D = (20 x Density) - 1750

D. If the test result for In-Place Density is less than 91.00 the Engineer may elect to take one of the actions specified in subsection k.1.C of this special provision.

5. Overall Sublot Pay Factor (OSPF). Round the value of the OSPF to the whole number.

$$OSPF = (0.40 \times PF_D) + (0.30 \times PF_{AV}) + (0.15 \times PF_{BINDER}) + (0.15 \times PF_{VMA})$$

If any individual PF is below 100 then the OSPF may not be greater than 100.

If the OSPF result for a sublot is less than 50 the Engineer may elect to do one of the following:

A. Require removal and replacement of the entire sublot with new QA sampling and testing and repeat the evaluation procedure.

B. Allow the sublot to remain in place at the calculated OSPF.

C. Allow submittal of a corrective action plan for the Engineer's approval. The corrective action plan may include removal and replacement of the sublot.

I. Measurement and Payment. Separate payment will not be made for providing and maintaining an effective HMA QC program as specified by this special provision. All costs associated with the work described in this special provision will be included in the applicable unit prices for the related HMA mixtures. HMA, (type) will be measured as specified in subsection 501.04 of the Standard Specification for Construction and the contract. If HMA Quality Initiative is not included in the contract as a pay item, there will be no positive pay adjustment for the HMA pay items.

HMA Pay Adjustment (PWL). Payment for HMA pay items will be based on the contract prices for the completed items of work as adjusted in accordance with this special provision. Adjusted payment for HMA, (type) will be calculated on a lot-by-lot basis.

The OLPF will be used to determine the lot pay adjustment as follows:

Lot Payment Adjustment = (OLPF-100)/100 x (Contract Base Price) x (Lot Quantity).

HMA Pay Adjustment (Non-PWL). Payment for HMA pay items will be based on the contract prices for the completed items of work as adjusted in accordance with this special provision. Adjusted payment for HMA, (type) will be calculated on a sublot-by-sublot basis.

The OSPF will be used to determine the sublot pay adjustment as follows:

Sublot Payment Adjustment = (OSPF-100)/100 x (Contract Base Price) x (Sublot Quantity).

Pay Item	**Pay Unit**
HMA Quality Initiative	Dollar

Table 1: Minimum Quality Control Sampling and Testing Requirements

Quality Characteristic	Test Method	Minimum Test Frequency	Sampling Location	Sampling Method
Aggregate Gradation (optional)	As defined in HMA-QC Plan	As defined in HMA-QC Plan	As defined in HMA-QC Plan	Random *AASHTO T2*
Aggregate Moisture	As defined in HMA-QC Plan	As defined in HMA-QC Plan		
PG Binder Content	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
Combined Mixture Gradation	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
Maximum Theoretical Specific Gravity	MTM 314	1 per day	As defined in HMA-QC Plan	Random MTM 313
Bulk Specific Gravity	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
Volumetrics: Air Voids	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
Volumetrics: VMA	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
Fines to Effective Binder	As defined in HMA-QC Plan	1 per day	As defined in HMA-QC Plan	Random *AASHTO T168*
In-Place Density(a)	As defined in HMA-QC Plan	1 per day	From compacted HMA	Random *AASHTO T168*

a. A maximum of 4 cores per sublot of material will be allowed.

Table 2: Action and Suspension Limits for Combined Gradation (from JMF)

	HMA Mixture							
	5		4 & SMA		3		2	
Sieve Size	QC Action	QC Sus-pension	QC Action	QC Sus-pension	QC Action	QC Sus-pension	QC Action	QC Sus-pension
3/4 inch	Defined		Defined		Defined	±10	Defined	±10
1/2 inch	In the		In the	±10	In the	±10	In the	±10
3/8 inch	HMA-QC	±10	HMA-QC	±10	HMA-QC	±10	HMA-QC	±10
No. 4	Plan	±8	Plan	±8	Plan	±8	Plan	±8
No. 8		±8		±8		±8		±8
No. 30		±6		±6		±6		±6
No. 200		±2		±2		±2		±2

Table 3: PWL - HMA Quality Index Parameter Specification Limits

Quality Index Parameter	Specification Limits
Air Voids, (%@ N_{des})(a)	Target Air Voids ±0.90 (c)
VMA	Target VMA ±0.90 (d)
	VMA Targets
2	13.00
3	14.00
4	15.00
5	16.00
SMA	18.00
Binder Content (b)	JMF -0.35, +0.50
Mat Density, $\%G_{mm}$	92.50% minimum

a. Unless noted otherwise on the plans, all mixtures must be designed to 96.0% of Maximum Specific Gravity ($\%G_{mm}$) at the design number of gyrations, (Nd). During field production Percent of Maximum Specific Gravity ($\%G_{mm}$) at the design number of gyrations, (Nd) will be increased to 97.0%. Regress mixes with liquid asphalt cement unless otherwise noted on plans.
b. The Binder Content used as the target will be the value on form 1911.
c. Target air voids for SMA: ±1.20
d. Target VMA for SMA: ±1.00

Table 4: Quality Control and Quality Assurance Limits

Col. I - Quality Characteristic	Col. II - QC Action Limits (a)	Col. III - QC Suspension Limits (b)	Col. IV - QA Suspension Limits Form 1165	Col. V - Sublot RQL Form 1165 (c)	Col. VI - Lot AQL (d)	Col. VII - Lot RQL (d)
Aggregate Gradation (optional)						
Aggregate Moisture						
Binder Content	Defined in the HMA-QC Plan	-0.35, +0.50 JMF		-0.50, +0.65 JMF	$PWL_{BINDER} \geq 90$ For any lot	$PWL_{BINDER} < 50$ For any lot
Combined Mixture Gradation	Defined in the HMA-QC Plan	Refer to Table 2				
Maximum Theoretical Specific Gravity	±0.013 JMF	±0.020 JMF				
Effective Specific Gravity	Defined In the HMA-QC Plan	+0.025, -0.020 JMF(g)	+0.025, -0.020 JMF(g)			
Bulk Specific Gravity						
Volumetrics: Air Voids	Defined In the HMA-QC Plan	±0.90 of Target Air Voids (e)		+2.00, -1.50 of Target Air voids	$PWL_{AV} \geq 90$ For any lot	$PWL_{AV} < 50$ For any lot
Volumetrics: VMA	Defined In the HMA-QC Plan	±0.90 of VMA Targets in Table 3 (f)		±2.00 of VMA Targets in Table 3	$PWL_{VMA} \geq 90$ For any lot	$PWL_{VMA} < 50$ For any lot
Fines to Effective Binder	Defined In the HMA-QC Plan	0.60 – 1.40 (a)	0.60 – 1.40(a)			
In-Place Density	Defined in the HMA-QC Plan	Defined in the HMA-QC Plan		Average Sublot Value < 90.00%	$PWL_D \geq 90$ For any lot	$PWL_D < 50$ For any lot

a. Limits apply to two consecutive QC or QA tests.
b. Limits apply to single QC tests.
c. Specified. Limits apply to a single QA sublot Air Void or VMA test or on the sublot average In-Place Density.
d. Specified. Limits apply on a lot-by-lot basis. Based on QA results for the lot.
e. QC suspension limits for SMA: ±1.20 target air voids.
f. QC suspension limits for SMA: ±1.00 target VMA.
g. Limits apply on a lot-by-lot basis (including Initial Production Lots) by averaging the value from each sublot.