



Maine DOT Policies and Procedures for HMA Sampling and Testing

November 15, 2012

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Maine DOT Policy

RANDOM NUMBER POLICY

March 14, 2007

I. Methods

Random numbers for use on Maine DOT projects must be generated by one of the following methods:

1. Using a computer program or spreadsheet designed specifically to generate random numbers or locations for material sampling
2. Using a hand held calculator with a random number generating function.
3. Manually, per ASTM D3665

I. Utilization and Documentation

Random numbers are generated to determine the test location or sample tonnage (Mg) in a stratified manner. Random numbers are to be applied to the subplot sizes outlined in the most current 401 Specification, for volumetric and density testing.

An alternative method, such as testing by area using a stratified random station and offset process, may be utilized to determine random sampling locations if the Department and Contractor agree at the preconstruction or pre-pave meeting.

Immediately after the numbers have been generated, they shall be recorded in their entirety. This recordation shall include the numbers, date generated, method used, signature of the individual that generated the numbers, and the Maine DOT project number they have been generated for.

Maine DOT and the Contractor will have the random numbers to be used on the project generated prior to the pre-paving meeting. Both parties will have the random numbers generated and the Contractor shall present the quality control random numbers to the Resident, or his representative, unless the Contractor elects to have the Department generate the random numbers to be used for the Contractors quality control.

If the Contractor elects to have the Department generate the random numbers for quality control, he/she must notify the Project Manager, or Resident, in

writing, a minimum of one week prior to the pre-pave meeting. The Contractor's copy of the quality control numbers will be presented to the Contractor at the pre-pave meeting. Once the Contractor elects to have the random numbers generated by the Maine DOT, they will be required to use those numbers generated for their quality control.

The random numbers generated by Maine DOT for acceptance testing will be kept in a secure location acceptable to the Resident. At no time will the random numbers generated for acceptance testing be available to the Contractor prior to testing. Specific random numbers and locations may be viewed by the Contractor only once the random number or location represented by the specific random number has been tested.

II. Availability of Numbers

Upon completion of the item MDOT random numbers shall be supplied to the contractor in the same format QC random numbers were supplied to MDOT at the prepaving conference. Under no circumstances will MDOT Acceptance random numbers be supplied to the contractor prior to completion of the item.

III. Termination of Lots

In the event the Department determines that it is necessary to terminate a lot, new random numbers will be generated for the remaining material, which will be divided into sublots as circumstances allow. If the terminated lot is too small to make up its own lot, it shall be rolled into the previous lot and all the tests for the prior lot combined with the terminated lot shall be used to determine a pay factor.

Maine DOT Policy

HMA MIX DESIGNS

January 20, 2010



A. HMA SUPPLIERS' MIX DESIGN SUBMITTALS

The HMA supplier shall design HMA in accordance with the process described in AASHTO R 35 .

The HMA supplier shall provide the following information with the mix design submittal:

1. **Properly completed Job Mix Formula (JMF) indicating all mix properties (G_{mm} , VMA, VFB, etc.)**
2. **Stockpile gradation summary (*including RAP if used*)**
3. Design aggregate structure consensus property summary shall include individual aggregate, RAP (if used) and composite blend results.
4. **Design aggregate structure trial blend gradation plots (.45 power chart) for 3 trial blends (*Refer to AASHTO R35, 4.2, Note 4 for exemption*)**
5. **Trial blend (lab or plant) test results for at least 3 different asphalt contents**
6. **Specific gravity and temperature/viscosity charts for the Performance Graded Asphalt Binder (PGAB) to be used**
7. ***Test reports for representative binder content and gradation of RAP stockpile(s) (last 3 performed)***
8. **Material Safety Data Sheets (MSDSs) for PGABs (unless Maine DOT already has one on file)**
9. ***Current PGAB QC Plan (unless Maine DOT already has one on file). Only one PG supplier per design.***
10. **“Asphalt Content vs. Air Voids” trial blend curve**
11. **Sample weight for G_{mb} samples in grams that Contractor uses for 115 mm height at N_{design}**

With the trial batch verification sample, the HMA supplier shall also provide a formal test report indicating the results of testing on their split of the sample. Maine DOT verification testing will not proceed until this report is received, and it indicates that all requirements were met.

B. MIX DESIGN VERIFICATION PROCESS

1. Review of HMA Supplier's Documentation

The Maine DOT will review the documentation provided by the HMA supplier to ensure that the proper mix design procedure was used, that the proposed JMF meets all Maine DOT requirements, and that all required documentation was submitted. No HMA mix design will be approved for use if there is a deficiency in *any* of these criteria.

2. Verification Testing of Hot Mix

Although it is the Department's responsibility to obtain HMA samples for mix verification testing, the supplier may obtain these provided that the QA Engineer or the QA Manager, whoever has jurisdiction, is notified at least 24 hours in advance of the trial batch, and indicates to the supplier the inability of the Department to have a representative present for sampling.

The Maine DOT will perform laboratory verification testing of new HMA designs on samples of the mix trial batched by the supplier according to the proposed JMF at the designated plant. This verification testing will be performed at the Bangor central laboratory, or the Freeport regional laboratory, the location being determined by which laboratory will likely be performing Acceptance testing during production. To avoid re-sampling delays following failing verification testing, the HMA supplier may submit up to three samples of the same mix design from different batches at any one time to the appropriate laboratory, provided they are accompanied with an indication of the preferred order of testing.

The following process shall be observed for performing mix verification testing:

- a. The HMA supplier shall submit all documentation directly to the Bangor Central Laboratory, attention Rollan Walker, HMA Lab Supervisor
- b. Verification testing performed at the Freeport regional laboratory shall not proceed until authorization has been received from the HMA Lab Supervisor
- c. The Freeport regional laboratory shall communicate verification testing results directly to the HMA Lab Supervisor and not to the HMA supplier or others.

3. Verification Testing of Aggregate Consensus Qualities

As indicated in Section 401 of the Maine Standard Specifications, it is the Department's responsibility to obtain samples of HMA aggregate materials for the purpose of mix design verification testing. Such samples obtained by the supplier without prior approval of the Department will not be tested.

The HMA supplier shall have aggregate stockpiles of the following minimum sizes available for sampling at the plant site at the time of job mix submittal:

- Crushed Stone 150 Mg
- Sand 75 Mg
- Blend Sand 50 Mg

4. Verification Criteria

The Maine DOT will use the criteria given in Section 401 of the Maine Standard Specifications to evaluate the aggregate consensus quality testing and the following criteria to evaluate proposed mix designs:

- a. % Voids at N_{des} : *Design value $\pm 1.5\%$*
- b. VMA: *ref. Table 1 of Section 401 for minimum values for various nominal maximum aggregate sizes; max. value shall be 2% greater than design target value*
- c. VFB: *ref. Table 1 of Section 401 for minimum values*
- d. Fines to Effective Binder: *0.6 to 1.2*
- e. Binder content: *Aim $\pm 0.4\%$*
- f. Gradation:
 - Passing 4.75 mm and larger sieves: *Target $\pm 7\%$*
 - Passing 2.36 mm to 1.18 mm sieve: *Target $\pm 4\%$*
 - Passing 0.60 mm: *Target $\pm 3\%$*
 - Passing 0.30 mm to 0.075 mm sieve: *Target $\pm 2\%$*

The 19.0 mm, 12.5 mm, and 9.5 mm sieves have a 90 value in the "Max" column for a control point (See Table 3 of AASHTO M 323). Mixes will be considered unacceptable if the resulting gradation for that size mix is 90 or greater.
- g. Aggregate Gsb: *Tolerance of ± 0.020*
- h. Gmm: *Tolerance of ± 0.020*

C. MIX DESIGN APPROVAL

1. New Designs

Approval of the proposed HMA mix design shall require each of the following:

- a. Receipt of all required information with the JMF indicating compliance with all requirements.
- b. Acceptable aggregate properties (including consensus qualities, gradation, Gsb, etc.).
- c. Acceptable test results on the trial batch verification sample (including volumetrics, asphalt content, Gmm, etc.).
- d. Acceptable PGAB properties.
- e. Changes to the design target percentages may be allowed if submitted to the project manager within 24 hours of the reporting of the first Acceptance test for the specific JMF.

2. Extended (Long-Term) Designs

The Maine DOT will accept requests for the extension of HMA mix designs which were approved within the previous two years. Such requests shall be made in writing at the beginning of the construction season, and shall be submitted to the supervisor of the Maine DOT HMA laboratory. The supplier shall, for each design, identify the company name, plant location, mix type, and mix design number. The decision of whether or not to approve such a request will be based on the most recent past performance of the mix as determined by the results of Acceptance testing. Laboratory verification testing will not be required. If approved, the supplier will receive written approval to provide mix produced in accordance with the particular mix designs. A copy of the previously approved mix design documentation will also be provided. The maximum duration of a JMF approval shall be three years.

3. Withdrawal of Mix Design Approval

Approval of a mix design may be withdrawn and its use terminated when any of the following occur:

- a. The maximum specific gravity of the mix as indicated by testing of acceptance samples varies from the design value by more than 0.030.
- b. Maine DOT testing indicates unacceptable material qualities or mix properties.
- c. Maine DOT approves an updated design for the same mix.
- d. The average of gradation sieve results from Acceptance testing are outside of the mix designs's aggregate gradation control points as stated in AASHTO M 323, Table 3.

- e. Design is not used in production (i.e. absence of test results in TIMS database) during one paving season.
- f. Combined Aggregate Specific Gravities based on belt sampling vary by more than 0.030% from design submittal.
- g. *RAP stockpile average binder content varies by $\pm 1.0\%$ from value listed on JMF.*

D. PRODUCTION MONITORING

In addition to those tests performed during mix design verification, aggregate consensus qualities, *RAP binder content and RAP gradation* will be tested during production on samples taken at approximately 15,000 Mg intervals. The percentage of fractured particles will be determined from a mix sample following testing in the ignition oven. Other quality tests will be performed on aggregate samples taken from the belt.

The following procedure shall be observed in the event of failing *production samples*:

- a. The HMA supplier shall be notified of the failing test and shall investigate to determine the cause.
- b. Within 24 hours of the initial failing test a second sample shall be obtained and split between the Maine DOT and the HMA supplier. If Maine DOT testing indicates that the same *properties* are failing, the supplier shall be required to shut down production and make the necessary changes to address the problem. Maine DOT will permit the supplier to produce mix again when satisfied that the supplier has properly addressed the problem.
- c. After changes have been made and production resumes, a third sample shall be taken and tested by Maine DOT. If this sample also fails to meet the aggregate consensus quality requirements, the current mix design shall be discontinued, and the HMA supplier shall be required to submit a new HMA design for approval.

E. CHANGES IN COMBINED AGGREGATE SPECIFIC GRAVITIES

The Contractor will be allowed one change in aggregate specific gravities without re-submitting a new JMF. The change, if verified, will be retroactive to the time when the change was identified by the Contractor.

For the change in Combined Aggregate Gsb's to take effect the following must occur:

- a. The Central Laboratory HMA Lab shall be notified in writing that a change has occurred, in excess of 0.020, with a copy of the notification being provided to any affected Resident Engineers. Likewise, a change of Combined Aggregate Gsb identified by the Department may be initiated by written notice to the Contractor, with a copy to any affected Resident Engineers.
- b. The Department shall sample, as soon as practical, the material that has changed and it shall be tested for Aggregate Gsb.
- c. If the Department verifies that the change is at least 0.020, but no more than 0.040 the change will be allowed retroactively to the date the Department was notified. If the change exceeds 0.040, a new design will be required. If neither condition is met, the existing design shall stand. The change will be effective on the date the variation was identified either by AAHSTO T 84 and T85, or by back-calculating from the TMD and %PGAB testing.



Maine DOT Policy

HMA FIELD SAMPLING POLICY

March 14, 2007

Sampling Equipment

Square ended shovel (side extensions recommended; if available)

HMA mix thermometer 50 - 500 deg F (10 - 260 °C)

4 - 14 to 16 quart galvanized metal pails

4 - 12 - 15,000g boxes

Quartermaster or equivalent splitter

Note: Sampling shovel should be clean and free from any contaminants that may compromise the HMA sample. If cleaned or coated with release agent, allow excess to drain off and work back and forth through clean sand or mix prior to sampling. The use of fuel oil to clean the sampling tools will not be permitted onsite.

Procedure: Sampling from Paver hopper

- Random samples shall be determined by station and offset, or by tonnage. The Department and the Contractor shall agree as to the method of random number generation. (i.e.: area or tonnage)
- All random sample locations are to be determined prior to HMA production and placement.
- The procedure for notifying the Contractors representative of “intent to sample” should be discussed at the pre-paving meeting.
- Verify the random location or tonnage is approaching.
- Notify the Contractors representative of the intent to sample, making sure that the haul truck is on-site prior to notification.

- Identify the haul unit to be sampled from. Note: If sampling by tonnage, the randomly chosen tonnage is to be used only to identify the haul unit to be sampled, and does not imply that the sample should include material from that exact tonnage figure. In cases where a portion of a sampled load is not used on the project, or is used but not paid for, the sample obtained will still be used in determining payment as long as the material in the paver hopper at the time of sampling is placed on the roadway. If the material is later removed due to poor workmanship or rideability, the sample shall still be considered to represent the subplot for which it was sampled.
- Notify the Contractor's QC person of the intent to take a sample off the haul unit.
- Insert thermometer into haul unit (or in HMA material if already in hopper.)
- Record slip number, time of sampling, temperature of mix, and station/lane.
- Discharge the HMA pavement so the material flows into the hopper in one continuous mass. The Contractor should control the discharge of material into the paver hopper.
- The sample should be taken from the center of the overall load. (middle 1/3)
- Make sure the hopper is full of mix at time of sampling.
- Have the Contractor lower the truck body in a manner to minimize spillage.
- Have the truck move out and away from the hopper. The truck should be moved away a minimum of 30 feet (10 M) and parked. Have the driver shut down the engine as a safety concern.
- Have the paver stop, apply brakes, and /or shut down engine.
- For safety, the Contractor's person controlling the truck should remain in full view of the driver to ensure that the truck does not back towards the paver while others are sampling.
- When all equipment is secured, the sampling process can progress.
- Remove the top 6-10" (150-250mm) of mix across the center of the paver hopper, being careful not to sample within 1.5 feet (.5M) of the hopper sides. (see p. 13)
- Trim the front of the area to be sampled to form an 8" (200mm) vertical face.
- Obtain a sample by digging into the vertical face horizontally until the shovel is full, being careful not to overfill the shovel.
- If, in the opinion of the NETTCP certified and trained personnel present at the time of sampling, the sample, or sampling procedure, has been compromised, the sampled material will be discarded and a new representative sample taken from the same haul unit.
- Once the sample has been taken and placed in the sample container, samples will not be discarded.
- Split and fill the sample containers using the MDOT accepted method, being

careful to minimize spillage. (Page 14)

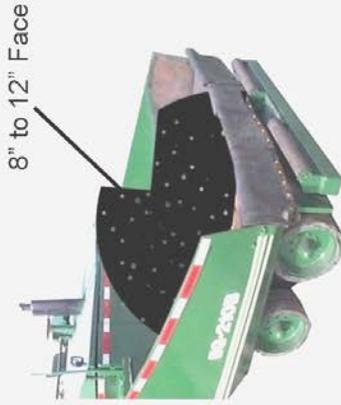
- Insert / attach the completed sampling paperwork (Id tag) into the sample container, with a number from the security tape recorded in the comments section. Finally, secure the cover.
- Record the required information on the front side of the sample container (Ref. #, etc.). Be certain to place the security tape on the front of the box as shown in the illustration.
- All samples should be secured immediately in the transport vehicle and transported directly to the acceptance labs. If immediate transport is not possible, all samples should be stored in a secure, dry location, such as the project field office, until transport to the lab is available.

SAMPLING HMA FROM A PAVER HOPPER



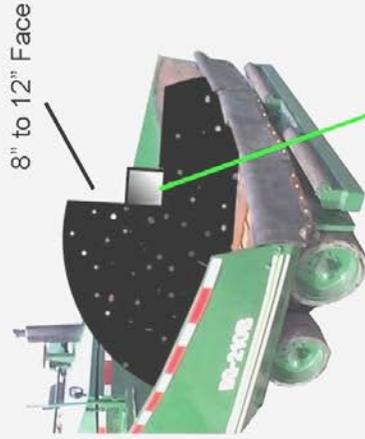
Mix Hump in
Charged Paver Hopper

Random number is selected, in
Megagrams or Tons or by Area and
applied to the proper truck load.



Cut Away
Side View

Shovel down into the mix 10" to 12"
leaving a flat surface 3' to 4' wide.



Sample Area

Then cut in the same distance,
leaving a "shelf". Filled the needed
number of buckets.



Cut-away, front view. Ready to begin sampling.



Sampling from prepared area.



Maine DOT Policy

HMA SAMPLING

FIELD SPLITTING PROCEDURE

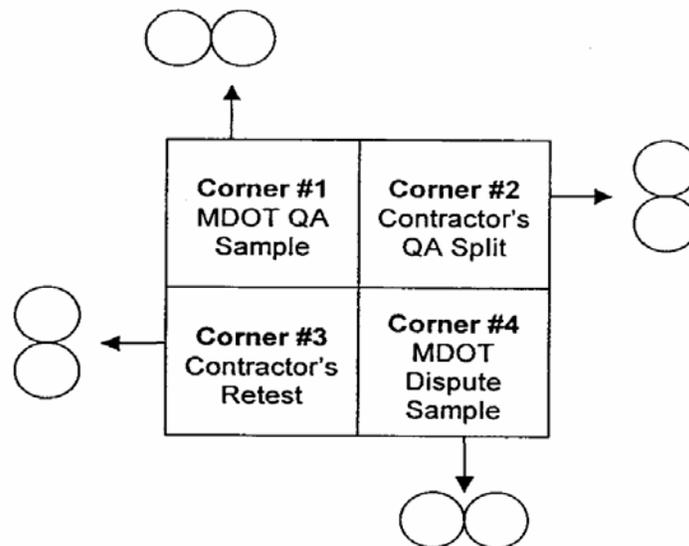
March 14, 2007

The current policy requires the use of the Gilson Quartermaster splitter, or approved equivalent, to split all mix samples down to sample proportions in the field prior to being transported to the designated Acceptance Lab.

- Determine the number of boxes required. Method A, B and C testing requires a minimum of 4 sample containers, and Method D requires a minimum of 2 sample containers.
- Place the mix sampled from the designated haul unit or paver hopper into the galvanized pails, being careful not to overfill the shovel.
- Transport pails to the approved splitter that has been properly leveled onsite.
- Mark the sample boxes so the split samples can be identified, and place them under the splitter to receive mix.
- Check to assure that the bottom splitter chute gate is closed and secured.
- Transfer the mix from the pails into the splitter hopper from opposite sides of the splitter, and in a continuous motion to minimize segregation.
- Trip the chute gate and “tap” the hopper sides lightly, if necessary, to help the material flow through the splitter evenly.
- Remove the boxes from under the splitter and prepare them for transport to the Acceptance Lab.
- Continue the procedure to fill all the required sample boxes.

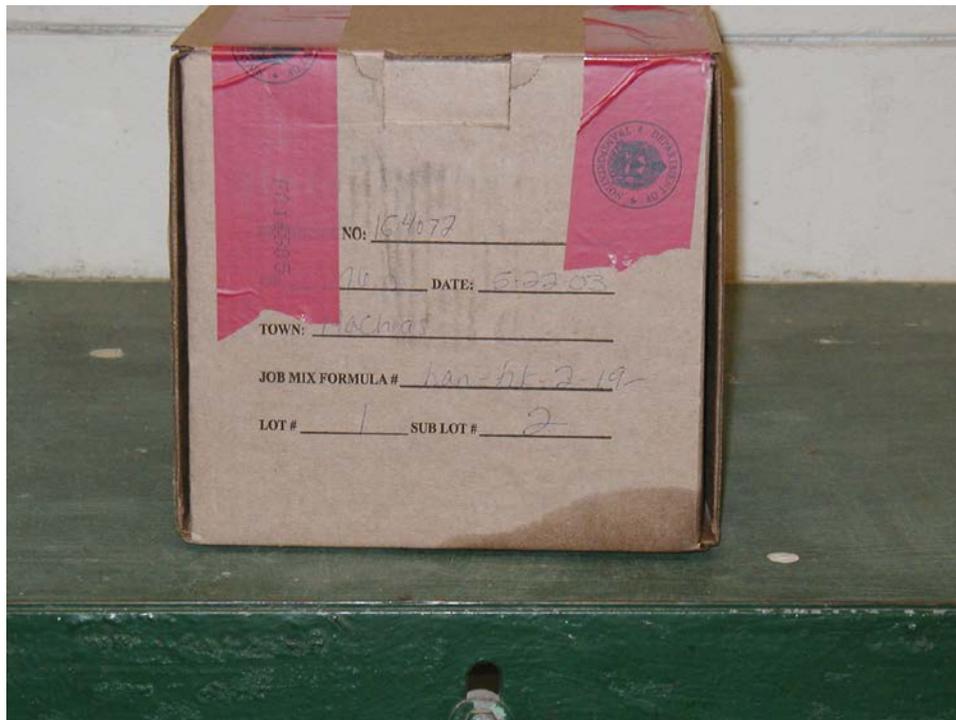
Sample Splitting Details

- 1.) Label the quarters of the splitter from #1 thru #4.
- 2.) Label 4 sample containers from #1 thru #4 and place them under the corresponding splitter corner.
- 3.) Place 2 -12 quart buckets of mix in the splitter hopper and split the mix into the 4 containers.
- 4.) Remove the full containers of mix from the splitter and place an additional 4 containers, which have been numbered from #1 thru #4 under the splitter.
- 5.) Place the remaining 2 -12 quart buckets of mix into the splitter hopper and split into the 4 containers.
- 6.) At this point there should be 8 containers of mix: two labeled #1, two labeled #2, two labeled #3, and two labeled #4.
- 7.) Pair the same numbered containers together and distribute as follows:
 - a. Sample #1 to the MDOT as QA test.
 - b. Sample #2 to the contractors as QA split.
 - c. Sample # 3 to the contractor as retest sample.
 - d. Sample # 4 to the MDOT as dispute sample.
- 8.) The two corresponding sample containers will be combined together in the labs so that the test sample will have a portion from each split.





Paving Inspector loads the Quartermaster splitter.



Properly sealed sample arrives at Freeport Lab.



Maine DOT Policy

HMA CORE SAMPLING POLICY

March 14, 2007

All cores are to be stored in the approved core transport container, secured, and protected from the weather and elements. Cores should never be stored where the ambient temperature exceeds 100 deg. F.

- Locate the random sample location as determined by approved procedure, such that the edge is no closer than 9" from any joint.
- Designate the core location by station and offset, and core / subplot number.
- The Contractor shall cut a 6" (150mm) core through the HMA course, at the location designated.
- The Contractor shall extract the core from the roadway using tools and methods that will not cause damage to the core integrity.
- Inspect the core for damage, and / or foreign material adhered to the bottom.
- The Department shall determine cooperatively, with the onsite Contractor representative, whether the core is acceptable, and whether the core needs to be trimmed. If the core is determined to be damaged, it can be re-cut within 3' (1M) at the same offset to centerline as the original core.
- If it is mutually determined that the core requires trimming, then the core shall be marked at the point of removal, and the core will be trimmed at the Acceptance Lab. Trimming of the core may be allowed by the Contractor on-site, providing the Contractor has the proper equipment available, and the MDOT representative is present.
- If the core is found to be acceptable, and, if necessary, marked for trimming, the core shall be immediately placed in an approved transport case.
- Insert the sampling paperwork along with each corresponding core sample (***Paperwork atop the core and not beneath***), then secure and lock the case for transport to the

Acceptance Lab. Be certain to record the serial numbers from the locking plastic strips on one of the sample ID forms.



Maine DOT Policy

%TMD POLICY

March 14, 2007

CALCULATION OF PERCENT COMPACTION FOR HMA PAY FACTORS

The percent compaction of HMA pavements will be calculated by dividing the bulk density of the cores in a subplot by the theoretical maximum density (TMD) of the mix in that subplot, as determined by the MDOT Acceptance test. Core samples will be identified as coming from a particular subplot by the Resident, based on the core's location relative to the location of the nearest mix sample. In the event that a subplot is partially completed at the end of a paving day, and a mix sample has not yet been obtained from the subplot, and further paving in the lot will not resume on the next working day, any cores obtained on the partially completed subplot will be calculated based on the TMD of the previous subplot unless otherwise agreed to in the field by the Resident or his Representative, and the QC Technician. In the event that no mix samples are taken during a day's production, the Resident may, at his discretion, obtain a mix sample to be tested for TMD only, on which to base that day's cores.



Maine DOT Policy

ACCEPTED SUPPLEMENTAL REQUIREMENTS

March, 14 2007

Bulk Specific Gravity (AASHTO T 166)
Maximum Specific Gravity (AASHTO T 209)
Superpave Gyratory Testing (AASHTO T 312)
Asphalt Content by the Ignition Method (AASHTO T 308)
General Laboratory Procedures
Calibration of RAP mixes

ACCEPTED SUPPLEMENTAL REQUIREMENTS

Bulk Specific Gravity (AASHTO T 166)

1. HMA pavement cores shall be tested in accordance with Method A (overnight method) and the initial oven-dry weight shall be taken within 16 hours of placement in the oven. A subsequent weighing after two additional hours shall be used to determine if the core achieved constant mass during the initial drying period. If the core did not achieve constant mass during the initial drying period, additional two-hour drying intervals may be necessary. In any case, the weight to be used to calculate the density shall be the first weight which is less than 0.05% greater than the subsequent weight taken two hours later.
2. The submerged weight of the core or compacted specimen shall be taken as nearly as possible at an elapsed time of 4 minutes.
3. Cores to be tested in the laboratory which require sawing shall be clearly marked to indicate the location of sawing. Because sawing of cores is to be agreed upon between the Resident or his representative and the QC Technician, no sawing in the laboratory shall be performed unless the core is thus marked.
4. When drying a core to the saturated-surface-dry condition, a damp cloth—one from which no moisture can be wrung—shall be used.
5. The wire/line used to suspend the core or compacted specimen in the water bath shall be of the smallest practicable size.

**ACCEPTED SUPPLEMENTAL REQUIREMENTS
Maximum Specific Gravity (AASHTO T 209)**

1. The bowl (weighing in water) method shall be used to determine maximum specific gravity.
2. A vibrating table shall be used to agitate the maximum specific gravity sample instead of rapping the container with a mallet.
3. The required vacuum to which the sample in the container shall be subjected is 25.5 to 30.1 mm of Hg. This vacuum shall be verified with an in-line mercury manometer, or a vacuum gauge traceable to NIST as illustrated in Figure 1 of the AASHTO method.
4. Two maximum specific gravity tests shall be performed for each sample.
5. The maximum specific gravity specimen shall be agitated at vacuum for as close to 15 minutes as possible.
6. During testing, the sample and container shall be submerged in the water bath for as close to 10 minutes as possible.
7. The maximum specific gravity containers shall be calibrated weekly and the data recorded on a form.

**ACCEPTED SUPPLEMENTAL REQUIREMENTS
Superpave Gyratory Testing (AASHTO T 312)**

1. All gyratory compactor settings (angle, ram pressure, speed of gyration) shall be verified once each month during production, and a detailed log shall be maintained in the lab, or electronically in the Compactor.
2. All gyratory compactors used for acceptance shall be calibrated/inspected by the manufacturer annually.
3. Compaction molds shall be maintained at compaction temperature during testing either by rotating two or more molds from the oven, or by re-heating a single mold between tests.
4. The mold shall be charged with material by dumping from a pan directly into the mold (using a funnel) in one lift without scraping the pan.
5. The DOT labs shall use gyro samples of the same mass used by the Contractor as indicated on the job mix submittal.
6. The temperature of each specimen shall be verified to be at compaction temperature while in the gyro mold prior to testing.
7. All gyratory compaction specimens shall be directly split to a mass as close as possible to the required testing size, and then adjusted to the testing size by the addition or removal of mix.

**ACCEPTED SUPPLEMENTAL REQUIREMENTS
Asphalt Content by the Ignition Method (AASHTO T 308)**

1. The ignition method of determining asphalt content shall be used, exclusively.
2. Oven filters and ductwork shall be inspected regularly and cleaning/replacement performed in accordance with the manufacturer's recommendations.
3. Ignition oven calibration factors shall be determined and used for each mix for the particular oven in which it is to be tested.
4. The mass of the ignition oven sample shall be not less than the specified minimum sample size.
5. Initial and final sample weights shall be taken while the material is in the oven trays to avoid errors due to loss of material. The asphalt content shall be calculated from these weights, and not from weights indicated by the oven's display.

ACCEPTED SUPPLEMENTAL REQUIREMENTS
General

1. Daily checks shall be performed to ensure that all lab balances are level, and that the water bath temperature is within the required range.
2. All test samples (except for gyratory compaction which requires some manipulation) shall be obtained from a direct split of the entire, recombined sample.
3. All HMA samples, with the single exception of those used for Contractors' quality control testing (but not when the Contractors' QC results are used for acceptance purposes) shall be heated in an oven at compaction temperature for two hours to remove moisture from the sample and bring it to constant mass. After the completion of the heating time, individual test specimens shall be obtained from the original sample by splitting in an approved splitter, or by the cone and quarter method. The two specimens for gyratory compaction shall be reheated to compaction temperature prior to testing.

Contractor quality control tests may use another method to obtain theoretical maximum density on hot HMA samples. A method shall be provided in the quality control plan and approved by the MDOT to monitor moisture and TMD variation. Because this method is not in compliance with the requirements of AASHTO T 209, any results obtained from such testing may not be used to dispute MDOT testing, support a claim against MDOT, calculate a pavement density, or to represent a mix design submittal, and shall be considered as informational to the Contractor only.

**CALIBRATION OF RAP MIXES—Supplemental Requirements
Ignition Oven Method (AASHTO T 308)**

GENERAL

All HMA samples shall be calibrated and tested in accordance with the requirements of AASHTO T 308, except that all 4 increments shall be used in the calculation of the JMF Correction Factor, and all burns will take place at 538 °C. This procedure is intended to provide additional clarification for the preparation and testing of calibration samples for mixes containing reclaimed asphalt pavement (RAP).

CALIBRATION SAMPLE PREPARATION

1. Determining Aggregate and RAP proportions

The mass of each aggregate component, including RAP, to be used in the calibration sample shall be determined by multiplying the design percentage of each component by the total mass of the aggregate portion of the sample being prepared. (The total mass of the sample must meet the minimum sample size requirements in T 308.) For example if the total mass of the aggregate portion of the sample being prepared is 2,000 grams, then the proportions would be as follows:

Component	Design Proportion	Mass
RAP	20%	400 g
19 mm	40%	800 g
Sand	25%	500 g
Dust	15%	300 g
TOTAL	100%	2,000 g

2. Determining Amount of Virgin Asphalt Required

The total percentage of asphalt in the calibration sample shall be equivalent to the design asphalt content of the mix. The total amount of asphalt in the sample includes both virgin asphalt added to the sample during preparation and “old” asphalt contained in the RAP component. The Contractor shall provide Maine DOT with the asphalt content of the RAP component. The mass of virgin asphalt required in the calibration sample is simply the difference between the total mass of asphalt required to achieve the design percentage, and the mass of asphalt in the RAP. For example, for a 20 % RAP mix, if the design asphalt content is 5 % and the Contractor indicates that the asphalt content of the RAP is 4.0 %, then the percentage of virgin asphalt required in the sample is 5 % minus twenty percent of 4.0 % (which is 0.8 %), or 4.2 %. The mass of virgin asphalt is then simply the percentage required, multiplied by the total mass of the aggregate portion of the sample.

3. Determining Calibration Factor

After testing in the ignition oven, the calibration factor shall be determined on each calibration sample as the difference between the calculated asphalt content and the actual asphalt content. For example, if the actual asphalt content of the prepared calibration sample was 5.0 % and the calculated asphalt content of the sample following testing and weighing was 5.36 %, then the calibration factor for this particular sample would be 5.36 % minus 5.00 %, or 0.36 %. This value is what must be subtracted from the calculated asphalt content to account for material and testing variables to achieve the correct asphalt content. All other requirements in the method regarding determination of calibration factors (except number of samples and temperature) apply.



Maine DOT Policy

POST PAVING CONFERENCE

March 2, 2006

General:

A Post-paving conference will be scheduled to take place, preferably onsite upon completion of all method A, B and C lots prior to project completion. The purpose of this meeting will be to discuss any quality issues that occurred during construction and to finalize pay quantities and price adjustments, subject to final review by the Contracts section.

The Contractor shall be represented by the Project Superintendent, the QC Plan Administrator or his designated representative and the direct supervisor of the paving, The QC Technician or PC Technician when appropriate.

The Department will be represented by The Project Resident, The QA Engineer or Manager or the Pavement Quality Manager and the Paving Inspector when appropriate. The Project Manager and Assistant Project Manager and the Construction Support Manager will also be notified.



Maine DOT Policy

SMOOTHNESS TESTING

March 21, 2006

General:

When smoothness testing is required by the contract the Resident will notify Steve Colson, within 1 week of completion of the mainline surface by phone (207-441-7342) or via Email (Stephen.Colson@maine.gov) that the project is ready for smoothness testing and shall provide the following information;

- Contractors name
- Project begin and end station at the construction joints (should be marked on the roadway for the ARAN crew)
- Bridge deck locations (begin and end station for bridge joints)
- Limits of urban areas with speed limits less than 35 mph and/or manhole covers or obstructions in the roadway that will interfere with smoothness tests.
- Railroad crossing location(s)
- Mainline quantity of surface mix excluding shoulders, ramps, side streets and roads, acceleration and deceleration lanes
- Unit cost for surface mix.

The Department will be responsible for ensuring that the testing is performed prior to the Saturday following November 1st in Zone 1 and the Saturday following November 15th in Zone 2. In the event of a snow or sleet storm prior to testing it may be necessary to arrange for sweeping of the pavement prior to testing.

“Courtesy” testing of non-surface layers prior to Winter will no longer be performed by the Department, due to increased demands on the ARAN.



Maine DOT Policy

SMALL QUANTITY TESTING

April 23, 2012

General:

In an effort to reduce testing on bridge or strut projects with small quantities of HMA items, the Department has established criteria that will be used to evaluate when density incentives/disincentives will not apply to HMA items. The following criteria were chosen by the Department to identify eligible projects are as follows:

1. A) The total length of bridge approach work, measured by taking the total length of the HMA paving to be conducted on the project (measured along the centerline) minus the length of the bridge deck.
B) Total length of strut project (measured along the centerline).
2. The HMA tonnage of mainline travelway work, measured in each separate HMA lift. This tonnage amount does not include the HMA used on bridge decks or shoulders.

Table 1 below outlines the criteria for which projects on National Highway, State Routes or State-Aid highways will have reduced density testing. Eligible projects that meet the criteria will not have a density incentive/disincentive provision for the eligible travelway work. The requirements to attain density will be as outlined in the 403 special provision. A Quality Control Technician (QCT) **will be required** on all eligible projects where the density incentive/disincentive provision have been eliminated. The QCT will be required to use a densometer to monitor density. Other changes to the density requirements may include but are not limited to: the use of specified equipment (rollers) and the establishment of a roller pattern determined by obtaining a maximum field density during the first day of placement.

Table 1: Criteria for elimination of density incentives/disincentives on bridge/strut projects located on State Routes or State-Aid roadways

	Project Criteria (Project is eligible if <u>either</u> of the criteria apply)	
	Total length of HMA paving on bridge approaches (along centerline) or total strut length	HMA tonnage of mainline travelway approach work (by lift)
National Highway System (NHS)	100' or less	50 Tons or less
State Routes and State-Aid Roadways (Non-NHS)	150' or less	75 Tons or less

Table 2 below outlines the criteria for which projects on local roadways (Non-State Routes) will have reduced density testing. Eligible projects that meet the criteria will not have a density incentive/disincentive provision for the eligible travelway work. The requirements to attain density will be as outlined in the 403 special provision. A Quality Control Technician (QCT) **will be required** on all eligible projects where the density incentive/disincentive provision have been eliminated. The QCT will be responsible for ensuring the methods and equipment required in the 403 special provision. Generally, the QCT will not be required to use a densometer to monitor density. Other changes to the density requirements may include but are not limited to: a method specification for equipment and means of compaction.

Table 2: Criteria for elimination of density incentives/disincentives on bridge/strut projects located on local roadways (Non-State-Aid)

	Project Criteria (Project is eligible if <u>either</u> of the criteria apply)	
	Total length of HMA paving on bridge approaches (along centerline) or total strut length	HMA tonnage of mainline travelway approach work (by lift)
Local Roads (Off-System)	100' or less	50 Tons or less



Maine DOT Policy

APPROVAL OF RECYCLED ASPHALT PAVEMENT (RAP)
FOR USE IN HOT-MIX ASPHALT
November 15, 2012

Note: This policy has been developed for phased implementation beginning in the 2013 construction season. Certain provisions of this policy will be measured in 2013, but not used in qualifying RAP sources. Data will be collected for the first season to further refine and improve the policy for full implementation in 2014.

II. GENERAL

The Department approves RAP on a stockpile and yearly basis, following the process set forth in these guidelines. RAP from a currently approved stockpile may be included as an ingredient in dense-graded asphalt mixtures designed and approved under Section 401.03 of the Standard Specifications. Each stockpile at each plant must be approved separately, even if the piles originate from the same material. The stockpile may be separated into multiple piles within the same facility, but they must all be clearly marked and originate from the same material.

The Contractor's responsibilities in the process are as follows:

- To obtain the Department's approval of all RAP stockpiles prior to its use on a State project and to deliver test data and samples as required
- To monitor and preserve the quality and uniformity of the approved material during storage and handling

The Department may approve RAP based on its composition and variability in gradation and asphalt content, as explained below, and on visual inspections of the stockpile. The RAP will also be approved based upon the quality of the aggregate contained in the RAP. The Department may withdraw approval of a previously approved stockpile if the requirements of this policy are not met.

The Maximum Percentage Allowed in a mix design will be based on these criteria from testing of the RAP source, as defined in Part VI below. Approval of a material pertains to its condition as tested and sampled after final processing. If an approved material is to be re-processed later in a manner which appreciably alters the gradation, the material must be re-approved in its reprocessed condition. This does not apply to removal or re-crushing of oversize particles during production.

III. APPROVAL PROCESS

The Contractor shall submit requests for RAP stockpile approval to the Materials Engineer, in the format given in the Attachment below. The Contractor shall submit results from RAP testing as prescribed in Part III along with the request. A visual inspection of the RAP stockpile will be performed by the Department to ensure that the material is free of contaminants (i.e. wood, brick, deleterious materials, etc.) The Department will obtain samples from the RAP stockpile for laboratory testing and evaluation. The Department will test the samples to identify their mineral components and to determine the maximum specific gravity, gradation, asphalt cement content, and variability of composition. The residual aggregate will also be tested in the Micro-Deval apparatus for its loss value. The Department will use the testing results and the criteria in Part V to determine the Maximum Percentage Allowed for the RAP stockpile. The Department may adjust the amount and nature of testing required according to the history and nature of the material.

Upon completion of testing and visual inspection, the Materials Engineer will approve or disapprove the material by letter and will assign a Stockpile Identification Number for each approved RAP stockpile. Note: The average gradation and asphalt content from Department testing shall be used in subsequent mix designs using the RAP stockpile. The approval letter will state the applicable limits on the use of the material in mix designs and will summarize the Department's findings, listing the average gradation and asphalt content from the Department's tests. Where the maximum percentage allowed is low due to excessive variability, the contractor may elect to improve the uniformity of the material by further processing and may again sample, test, and request approval for the material.

IV. RAP APPROVAL SUBMITTAL

To request approval of a RAP stockpile, the Contractor must submit the following documents to the Materials Engineer (it is the requester's responsibility to correctly address, label, and deliver these submittals):

- Contractor's Request for RAP Stockpile Approval (Complete the form attached to this document.)
- Test reports of last ten asphalt content and gradation (must be within the last month)
- A drawing/map of the plant site showing the location of the stockpile to be approved *and all other stockpiles on the premises*
- Global positioning system (GPS) coordinates, in decimal form, of the RAP stockpile

V. PROCEDURE

1. Upon receipt of the RAP Stockpile Approval request, the Department shall obtain a minimum of seven individually labeled samples, approximately 4 kg each, from at least seven different positions in the stockpile. The material sampled must be in its final condition, after all crushing and screening.
2. The maximum specific gravity will be determined on three of the individual samples as specified in AASHTO T 209 using approximately 2 kg for each determination.

3. The asphalt binder content of each of the seven individual samples will be determined as specified in AASHTO T 164. Approximately 2 kg of material will be required for each test.
4. The gradation of the aggregate portion of each individual sample obtained from Step 3 will be determined according to AASHTO T 27 and T 11. The amount of material passing the 0.075 mm sieve and remaining on the filter paper and in the extract shall be included when calculating the gradation.
5. The values for maximum specific gravity, asphalt binder content, and gradation of the stockpile will be expressed as the numerical averages of the data obtained from the seven representative samples.
6. The residual aggregate from the RAP samples will be combined to create one Coarse Micro-Deval sample (Grading C/Table 3). The 1.5 kg sample will be tested according to AASHTO T 327. The sample shall be sieved, according to AASHTO T 27, after testing. The Micro-Deval loss value will be used in Table 1 to determine the Maximum Percentage Allowed.
7. The standard deviation of the asphalt binder content of the RAP material shall be calculated using an *n-1* procedure. The standard deviation value will be used in Table 1 to determine the Maximum Percentage Allowed.

VI. PERCENTAGE OF RAP ALLOWED

A. Implementation: 2013 Construction Season

The maximum allowable percent of RAP shall be determined by the percent passing the 0.075 mm sieve and Coarse Micro-Deval loss values as tested by the Department. The standard deviation of at least seven RAP samples will be measured, but not used in the determination by the Department. The numerical average of the percent passing the 0.075 mm sieve values will be used for the approval. The maximum percentage of RAP allowable shall be the lowest percentage as determined according to Table 1 below:

Table 1(a): Maximum Percent RAP According to Test Results

Classification	Maximum RAP Percentage Allowed	Percent passing 0.075 mm sieve	Residual aggregate M-D loss value
Class III	10%	> 11.0	< 18
Class II	20%	≤ 11.0	
Class I	30%	≤ 10.0	

B. 2014 - Future

The maximum allowable percent of RAP shall be determined by the asphalt content, the percent passing the 0.075 mm sieve, and Coarse Micro-Deval loss values as tested by the Department. The standard deviation of at least seven RAP samples will be used in the determination. Apparent outliers shall not be considered in determining the asphalt content standard deviation. Where one result appears to be unrepresentative of the whole, two or more additional samples shall be tested. The outlying value of all tests shall then be excluded from the standard deviation calculation. The numerical average of the percent passing the 0.075 mm sieve values will be used for the approval. The maximum percentage of RAP allowable shall be the lowest percentage as determined according to Table 1 below:

Table 1(b): Maximum Percent RAP According to Test Results

Classification	Maximum RAP Percentage Allowed	Asphalt content standard deviation	Percent passing 0.075 mm sieve	Residual aggregate M-D loss value
Class III	10%	< 1.0	> 11.0	< 18
Class II	20%	≤ 0.5	≤ 11.0	
Class I	30%	≤ 0.3	≤ 10.0	

VII. STOCKPILE IDENTIFICATION SIGNS

RAP stockpiles shall be identified with posted signs displaying the original stockpile number assigned to the stockpile by the Department in the approval letter. These signs shall be made of weatherproof material and shall be highly visible. The sign shall be easily readable from outside the stockpile area. If a stockpile exists in two or more parts, each part must have its own sign.

VIII. PRODUCTION MONITORING

The Department will monitor RAP asphalt content and gradation during production by testing samples from the stockpile at approximately 15,000 T (Mg) intervals (in terms of mix production). The allowable variance limits (from the numerical average values used for mix designs) for this testing are determined based upon the maximum allowable RAP percentage, and are shown below in Table 2.

Table 2: RAP Variance Limits

Classification	Maximum RAP Percentage Allowed	Asphalt content	Percent passing 0.075 mm sieve
Class III	10%	± 1.5	± 2.0
Class II	20%	± 1.0	± 1.5
Class I	30%	± 0.5	± 1.0

The following procedure shall be observed in the event of failing RAP production samples:

1. The Contractor shall be notified of the failing test and shall investigate to determine the cause.
2. Within 24 hours of the initial failing test a second sample shall be obtained and split between the Department and the Contractor. If Department testing indicates that the same initial and re-test properties fail to meet criteria, the Contractor shall be required to submit a proposed corrective action letter by the end of the work day outlining changes to bring the non-conforming material into the required range specified for the material type (further processing, etc.) If the corrective action proposed by the Contractor involves changing the aim design values of the RAP material, re-classification of the RAP material may be required by the Department. Failure to do so will be treated as a second incident under 106.4.6 QCP Non-compliance. In this case, additional samples shall be obtained by the Department and tested for asphalt content and gradation. The Department will re-qualify the RAP stockpile according to the results of samples (including those from the production monitoring) and Table 1. If the maximum allowable percentage for the RAP pile remains the same according to Table 1, the stockpile will be allowed for continued use by the Contractor and the numerical averages for the asphalt content and gradation will be used for designs. All mix designs will be updated to reflect the change. If the maximum allowable percentage according to Table 1 decreases, the Contractor's mix designs using the RAP source will be required to be redesigned.

IX. DEPLETION OF STOCKPILE AND EXPIRATION OF APPROVAL

Approval of a stockpile may be withdrawn by the Materials Engineer if the RAP stockpile has been depleted. The approval for RAP stockpiles may last for one year and stockpiles must be reapproved on a yearly basis. This shall apply to all stockpiles, regardless of status or history of use.

X. RECORDS

The Contractor shall maintain records at each plant site for all RAP stockpiles. These records shall be available for inspection by representatives of the Department and shall include the following:

- All test results.
- The Department's approval letter for each stockpile and replenishment, together with the Contractor's requests for approval and all data submitted therewith.
- A current drawing of all stockpile locations at the plant site, including unapproved stockpiles, showing stockpile numbers of all stockpiles approved for State work.



MaineDOT

Date: _____

CONTRACTOR'S REQUEST FOR RAP STOCKPILE QUALIFICATION

To: Materials Engineer From: _____

(Name, address, and email address of person to receive approval letter)

Company: _____

Location: _____

GPS Coordinates

Please provide the GPS coordinates (in decimal degrees form) of the RAP stockpile for all its locations in the Plant Facility:

Latitude: _____

Longitude: _____

Latitude: _____

Longitude: _____

Latitude: _____

Longitude: _____

RAP Category

Please indicate the source of the RAP stockpile (if single source, specify the state route, project number, project limits, etc.):

Multiple Sources

Single known source

Comments: _____

Estimated Quantity of RAP: _____ tons

Initial RAP Stockpile Designation: _____

Designation in the form of MDOT JMN company apprev., dash, location apprev. and the construction year, dash and a Q (i.e. LAN-HE13-Q, MAN-PH13-Q, or PII-PO13-Q)

Qualification is requested as indicated above. I certify that, to the best of my knowledge, the material conforms to the Specifications and is as represented in the information and test results submitted herewith.

Name and signature of authorized representative:

Enclosures: Test results & Map of plant stockpile area