October 23, 2023

Meeting – HMA Tech Team

Date:	October 23, 2023
Time:	10:00 am to 2:00 pm
Location:	Hill Farms / Teams Meeting
Room No.:	S149

Attendance

Agenda Items

- Welcome and Introductions (Ali A.)

- Outside Committee Reports
    a. Aggregate Tech Team (Tirupan M.)
        - No major updates.

    b. IRI Team (MK K.)

        - New hire that will be the point person for the IRI team, replacing Deb Bischoff.

    c. Atwoods/AASHTO Team (Erik L.)
        - 2025 construction season pilot, and 2026 full implementation.

- Research Reports (Ali A.)
    a. Project update
        - Balanced Mixture Design Pilot and Field Test Sections
            - Recently finished, closeout was on 10/9. Draft report submitted by researchers and TOC members provided comments. Once comments are applied the report will be published.

        - Benchmarking Delta Tc (ΔTc) for Wisconsin Materials
            - Literature review is done, researchers are almost done with material and test selection. Sampling loose mix samples with Mathy and Walbec working with the researchers to provide samples.
            - All base binders have been tested. Have received RAM materials.
            - Found the correlation between Delta Tc and other parameters/measured properties such as G-R, phase angle, strain tolerance and thermal cracking resistance.

- Working on blending RAP with base binders.

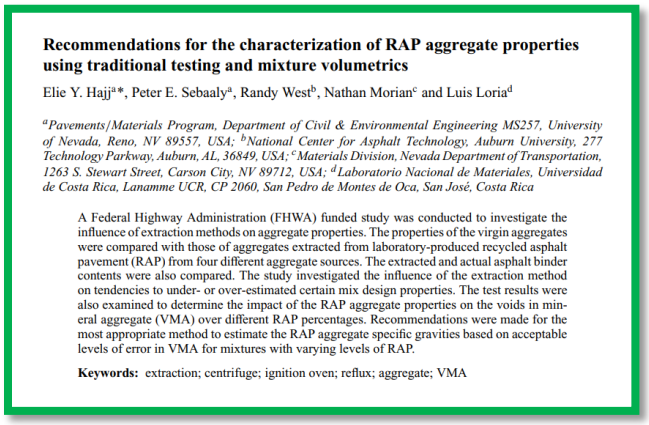
- Design Requirement for High Traffic Asphalt Mixes
  - Decreasing end design for HT mixes. Researchers signed the contract successfully and the kickoff meeting will be happening soon.

- Manual of Test Procedures (Ali A.)
  a. Updates
     - Annually (or every September)
       - Corresponding with standard specification schedule.

     - One intermittent update in the Spring
       - Submit MOTP revisions to Adam Albers by January 1st.

  b. Topics to discuss
     - WTM R35: RAS and RAP Gsb
       - Historical 249 reports including RAS and a statistical analysis have showed that 2.500 gsb constant is appropriate.
       - Typically found by doing extractions.
       - **Action:** value of 2.500 applies to all newly submitted mix designs and is not a retroactive change. It will also not apply to one-point reverifications (effective for March 2024 lets).
       - Still working on an equation for the RAP Gsb. Next continue as is, the following year we should have something to update in the MOTP.

     - WTM R35: Ignition oven for RAP Gsb measurement



Recommendations for the characterization of RAP aggregate properties using traditional testing and mixture volumetrics

Elie Y. Hajj[a]*, Peter E. Sebaaly[a], Randy West[b], Nathan Morian[c] and Luis Loria[d]

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A Federal Highway Administration (FHWA) funded study was conducted to investigate the influence of extraction methods on aggregate properties. The properties of the virgin aggregates were compared with those of aggregates extracted from laboratory-produced recycled asphalt pavement (RAP) from four different aggregate sources. The extracted and actual asphalt binder contents were also compared. The study investigated the influence of the extraction method on tendencies to under- or over-estimated certain mix design properties. The test results were also examined to determine the impact of the RAP aggregate properties on the voids in mineral aggregate (VMA) over different RAP percentages. Recommendations were made for the most appropriate method to estimate the RAP aggregate specific gravities based on acceptable levels of error in VMA for mixtures with varying levels of RAP.

Keywords: extraction; centrifuge; ignition oven; reflux; aggregate; VMA

https://utahasphalt.org/wp-content/uploads/2020/02/RMPD-2012_Recommendations_for_Characterization_of_RAP_Aggregate_Properties_Published.pdf (P209-233)

- There is more of an issue with soft limestones than there is with granites.
- **Decision:** Ignition oven will still be allowed for now.

- WTM R35: The equation for the calculation of FAA

$$\text{Mathematically Calculated FAA} = \left[A\left(\frac{a}{(a+b+c+\cdots n)}\right)\right] + \left[B\left(\frac{b}{(a+b+c+\cdots n)}\right)\right] + \left[C\left(\frac{c}{(a+b+c+\cdots n)}\right)\right] + \left[N\left(\frac{n}{(a+b+c+\cdots n)}\right)\right]$$

https://statisticsbyjim.com/basics/weighted-average/

  - For trial blends the DOT has provided this equation. To verify we require extraction and then running the FAA on the agg. It can be included in the WTM in the MOTP and is required as an optional design parameter to estimate FAA for trial blends.
  - **Decision:** Industry has an equation that can calculate a better weighted average. They will share it and we can decide if we want to include it for JMF changes.

- WTM R67: Dry ice and liquid nitrogen
  - **Decision:** It is now not excluded in the MOTP. It was not allowed previously.

- The need for having a new set of specimens
  - WTM T166
    - With the reorg and new PWL specs we will be going to 4-way splits, once that happens there would be material left over to account for this.
    - **Action:** We will refer to these splits as 4-way splits and will discontinue using the term "3-way split" (effective for March 2024 lets).
    - This was originally proposed and didn't make it into the MOTP R47.

13.1.4	*Add Section 13.1.4 with the following:* Report the average Gmb of 2 lab compacted specimens. If one of the individual specimens deviates by more than +/-0.015 from the average, results are considered suspect, and a new set of specimens is required~~, per the following scenarios:~~ ~~1. If the Contractor needs a new set of specimens, the QC Retained portion shall be sent back to the Region for testing, and the contractor will use the Region's Gmm and Gmb in their report.~~ ~~2. If the Region needs a new set of specimens, the QC Retained Portion shall be sent to the Bureau for testing, and the Region will use the Bureau's Gmm and Gmb in their report.~~ For SMA, report the average Gmb of 4 lab compacted specimens. If one of the individual specimens deviates by more than +/- 0.015 from the average, results are considered suspect and the result furthest from the average should be removed from the calculation. Calculate the average using the remaining 3 specimens.

  - WTM T209

14.1.1	*Add the following to Section 14.1.1: Report* For HMA, report the Gmm of 1 sample as required in section 6.3. For SMA, report the average Gmm of 2 samples. For SMA, if one of the individual sample deviates by more than 0.015 from the other, results are considered suspect, and an additional sample is measured ~~according to the scenarios below.~~ ~~1. If the QC SMA Gmms are out of tolerance, the Region must retest the Gmm and Gmb from the QC Retained sample. These results will replace the QC results for this sample.~~ ~~2. If the Region QV SMA Gmms are out of tolerance, the Bureau of Technical Services must retest the Gmm and Gmb from the QV Retained sample. These results will replace the QV results for this sample.~~

- WTM T283: The need for using distilled water.
  - Use potable water, wherever there is no mention of water type:
    - **Action:** The standard procedure doesn't specify to use distilled water currently. The language in WTM T283 will be revised. Therefore, potable water can be used (effective for March 2024 lets).

http://www.aashtoresource.org/docs/default-source/newsletter/is-water-more-than-just-h2o---printer-friendly.pdf?sfvrsn=2

- WTM R30: Compaction temperature
  - Can a compaction temperature of 275F be used for the lab compaction of HMA regardless of binder modification level?
  - Suggestion: Review NCHRP 9-10 should be reviewed for this topic. Review WHRP study by Bob Schmidt in 2007 with permeability and nondestructive tests.
  - Once a decision is made, we'll need to update this in the MOTP.

- WTM T312: Placement of SMA in front of a fan for 15 minutes.
  - This language is already taken out of the MOTP. Agree to leave it out.

Note 6	*Replace Note 6 with the following:* After compaction is completed, the specimen is extruded, protection papers are removed, the briquette is labeled, and cooling by fan is required for a period of at least 1 hour. The specimens can be extruded from the mold immediately after compaction for most asphalt mixtures. If the mixture is extremely fine or tender, then the initial 5 - 10 minutes of cooling should take place while the specimen is only partially extruded to aid in handling. ~~For SMA, after compaction, place the mold in front of a fan for approximately 15 minutes before extruding.~~

- WTP H-003: AASHTO T164
  - The possibility of using DE
    - Minnesota and Michigan have developed state-specific test methods utilizing diatomaceous earth (celite) to better filter the samples and prevent the loss of fines that normally require the

ashing procedure. The DE centrifuge method of Minnesota or the DE assisted vacuum extraction of Michigan are faster, easier, more repeatable, and cheaper than T164 with ashing.

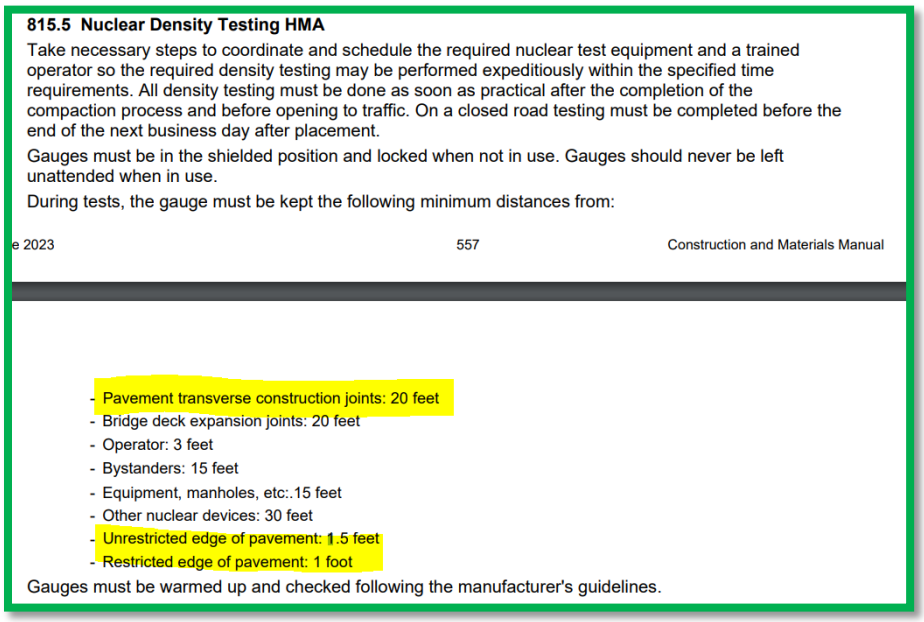
- **Action:** Industry will email Ali the MnDOT Modified procedure for review for potential implementation in MOTP.

6	***Verification of IOCF by Automated Extraction*** The department uses automated extraction to determine the asphalt content used to calculate the ignition oven asphalt binder correction factor for each oven, for each mix design, as follows: 1. The department performs one automated extraction according to WTM D8159 to determine an extracted asphalt binder content of the mixture. Results must be completed and reported by the end of the second business day after arrival at BTS. 2. The contractor has the option to run an automated extraction according to WTM D8159 or a chemical extraction according to AASHTO T164 Method A or B, for comparison to the result obtained by BTS.

California DOT: https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/californiatestmethods-ctm/ctm-362-jan2000-a11y.pdf

- Subcommittee Reports
  a. Density Subcommittee (Brian J.)
     - Density PWL Offsets
       - If the PWL offsets are higher we should be reaching out to the region IAs and comparing with the IAs gauges. If outside the tolerance, can check the region blocks to see if adjustments need to be made.
     - BTS Calibration Blocks
       - Staying at the NE lab for at least another year, then they may move to Rapids lab.
     - Gauge Offsets
       - **Suggestion:** treat transverse joints separately like how we do it with longitudinal joints. These joints should be eligible for testing the same as the rest of the material.
       - **Suggestion:** remove the 20-ft transverse joint offset from incentive and test it just as acceptance.
       - **Suggestion:** Perform informational testing as a shadow spec where when the random lands near the joint they take a measurement there, and then one at 20 feet. They should also purposefully take measurements at these joints, so we have enough data.

- **Suggestion:** do a couple shadow projects – for informational testing purpose – to measure density as close as 6 inches from the pavement longitudinal edge and 1 foot from the transverse butt joint.
    - Prefer QC and QV footprint testing.
    - May implement with a construction memo.
- **Action:** Change the unrestricted offset from 1.5 foot to 1 foot to unify the specs (effective for March 2024 lets).



815.5 Nuclear Density Testing HMA

Take necessary steps to coordinate and schedule the required nuclear test equipment and a trained operator so the required density testing may be performed expeditiously within the specified time requirements. All density testing must be done as soon as practical after the completion of the compaction process and before opening to traffic. On a closed road testing must be completed before the end of the next business day after placement.

Gauges must be in the shielded position and locked when not in use. Gauges should never be left unattended when in use.

During tests, the gauge must be kept the following minimum distances from:

e 2023 557 Construction and Materials Manual

- Pavement transverse construction joints: 20 feet
- Bridge deck expansion joints: 20 feet
- Operator: 3 feet
- Bystanders: 15 feet
- Equipment, manholes, etc:.15 feet
- Other nuclear devices: 30 feet
- Unrestricted edge of pavement: 1.5 feet
- Restricted edge of pavement: 1 foot

Gauges must be warmed up and checked following the manufacturer's guidelines.

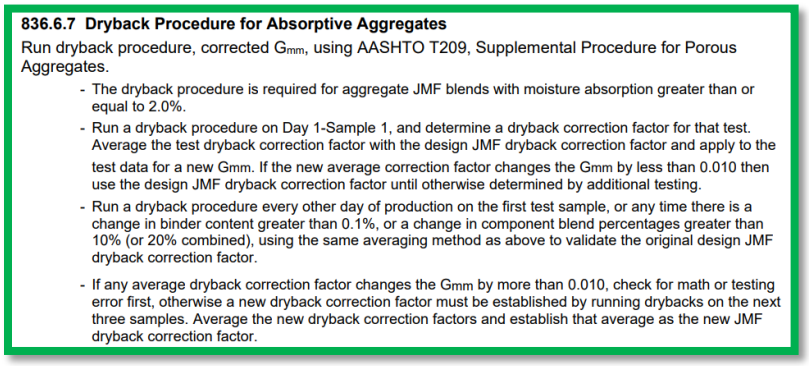
- Non-Nuclear Devices
    - Data is being gathered from certain projects by both the department and industry.

b. Specification Subcommittee (Albert K.)
- Change to gradation lower limits passing #8 (2025 construction)
    - Gradation limit changes were presented (effective for 2025 AWP pilots/2026 construction).

- Clarifying the language on the density requirement for a single/upper layer HMA over CIR
    - Will be added as an additional note to clarify language. Not an official spec change (effective for 2025 AWP pilots/2026 construction).
    - **Action:** Pavement Unit will investigate the ride data with the density data to assess further solutions.

- Remove language on absorptive aggregate/dry back procedure?
    - CMM 836.6.7
        - Applies to 866.2.3.4 as well. Proposal to eliminate it is denied by the team after thorough discussion.

- **Suggestion:** modify the language for when it can be used (effective for 2025 AWP pilots/2026 construction).
  - **Suggestion:** remove the reheat correction factor. Discuss it prior to start of the project.

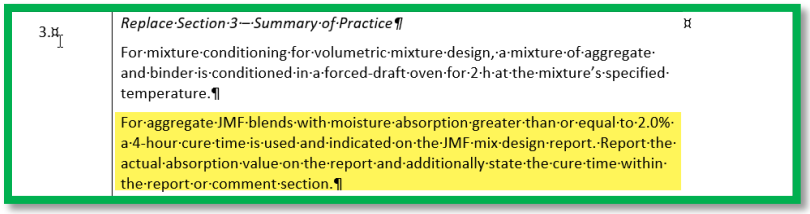


836.6.7 Dryback Procedure for Absorptive Aggregates

Run dryback procedure, corrected G_{mm}, using AASHTO T209, Supplemental Procedure for Porous Aggregates.

- The dryback procedure is required for aggregate JMF blends with moisture absorption greater than or equal to 2.0%.
- Run a dryback procedure on Day 1-Sample 1, and determine a dryback correction factor for that test. Average the test dryback correction factor with the design JMF dryback correction factor and apply to the test data for a new Gmm. If the new average correction factor changes the Gmm by less than 0.010 then use the design JMF dryback correction factor until otherwise determined by additional testing.
- Run a dryback procedure every other day of production on the first test sample, or any time there is a change in binder content greater than 0.1%, or a change in component blend percentages greater than 10% (or 20% combined), using the same averaging method as above to validate the original design JMF dryback correction factor.
- If any average dryback correction factor changes the Gmm by more than 0.010, check for math or testing error first, otherwise a new dryback correction factor must be established by running drybacks on the next three samples. Average the new dryback correction factors and establish that average as the new JMF dryback correction factor.

- CMM 866.2.3.4 / WTM R30



3.	*Replace Section 3—Summary of Practice* For mixture conditioning for volumetric mixture design, a mixture of aggregate and binder is conditioned in a forced-draft oven for 2 h at the mixture's specified temperature. For aggregate JMF blends with moisture absorption greater than or equal to 2.0% a 4-hour cure time is used and indicated on the JMF mix design report. Report the actual absorption value on the report and additionally state the cure time within the report or comment section.

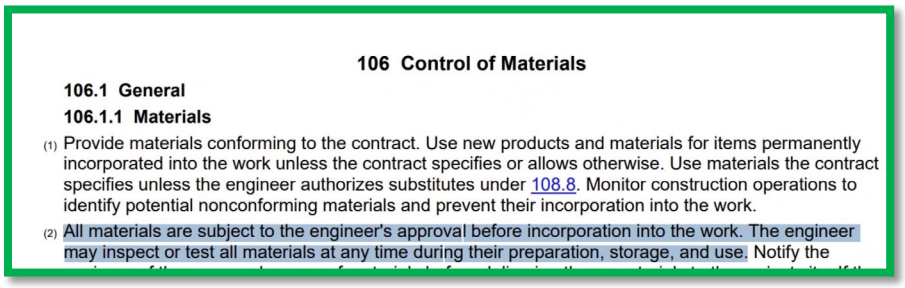
- Distressed pavement milling STSP
  - 4/5 regions have agreed to adopt this STSP. BTS will work with that region to help them understand why the STSP is a good solution, otherwise they will continue to use their SPV (effective for May 2024 lets).

- AWP Specs
  - New QAPs (PowerPoint).
    - New QAPs with testing tonnages and testing frequencies explained.
  - No uncorrelated gauges, more coring unless it makes sense to do a correlation for the job.
    - When it's not feasible to correlate a gauge for a hand full of tests, we'll just use cores.

- New FDM Guidance (FDM 14-10-1 sec. 10.7.1): Surfacing No. 3 mixes before winter.
  - Will be published and active for the February transmittal.

- Discard the exemption of the first 50 tons of the mix from volumetric testing (2025 Construction).

- No objections from industry about this topic (effective for 2025 AWP pilots/2026 construction).



106 Control of Materials

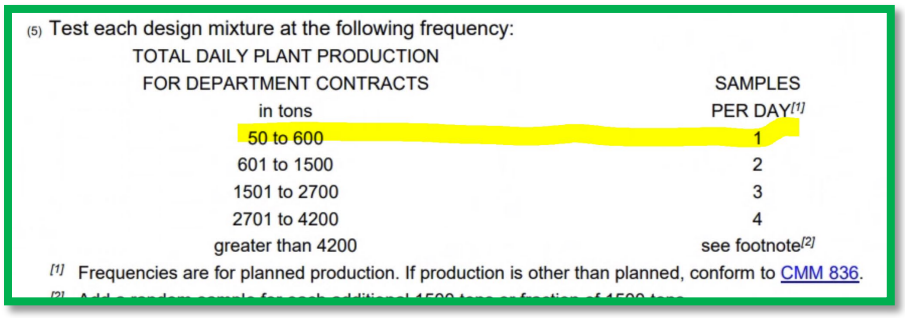
106.1 General

106.1.1 Materials

(1) Provide materials conforming to the contract. Use new products and materials for items permanently incorporated into the work unless the contract specifies or allows otherwise. Use materials the contract specifies unless the engineer authorizes substitutes under 108.8. Monitor construction operations to identify potential nonconforming materials and prevent their incorporation into the work.

(2) All materials are subject to the engineer's approval before incorporation into the work. The engineer may inspect or test all materials at any time during their preparation, storage, and use. Notify the

QMP

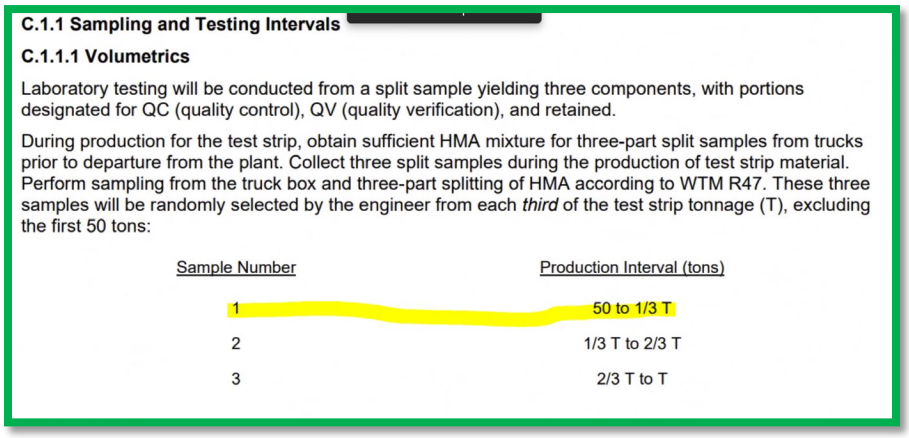


(5) Test each design mixture at the following frequency:

TOTAL DAILY PLANT PRODUCTION FOR DEPARTMENT CONTRACTS in tons	SAMPLES PER DAY[1]
50 to 600	1
601 to 1500	2
1501 to 2700	3
2701 to 4200	4
greater than 4200	see footnote[2]

[1] Frequencies are for planned production. If production is other than planned, conform to CMM 836.

PWL Test Strip



C.1.1 Sampling and Testing Intervals

C.1.1.1 Volumetrics

Laboratory testing will be conducted from a split sample yielding three components, with portions designated for QC (quality control), QV (quality verification), and retained.

During production for the test strip, obtain sufficient HMA mixture for three-part split samples from trucks prior to departure from the plant. Collect three split samples during the production of test strip material. Perform sampling from the truck box and three-part splitting of HMA according to WTM R47. These three samples will be randomly selected by the engineer from each *third* of the test strip tonnage (T), excluding the first 50 tons:

Sample Number	Production Interval (tons)
1	50 to 1/3 T
2	1/3 T to 2/3 T
3	2/3 T to T

c. Percent Within Limits (PWL) Subcommittee (Dan K.)
   - Removal of density test strip from core only SPV
     - Allow QC to correlate gauge.
     - To be used on 2024 construction projects.
     - Coring on shoulders.
       - Dan sent an email to all the members asking them to review it and bring feedback. No feedback from the team, approved.
       - MOTP references will be included in the core only LJD SPV.

- Will be available to the regions (effective for December 2023 lets).

- Density
  - G_{mm} from the current day instead of 4 point running average from previous day.
    - Use average of previous 2 for gauge entry and for 3% below analysis. Density values will be updated with the daily average G_{mm}.
    - You can use the average for the day, or if you only have one test, that's the test you need to use. If you have density but no G_{mm}, use the most recent 2 tests.
    - Very similar to Federal Aviation Administration (FAA) specs.
    - Proposal approved.
    - **Action:** A draft MOTP language will be shared during the next Spec Subcommittee.

  - Dispute Coring.
    - Allow dispute coring for any lot in penalty.
    - Concern over the responsibility of regions to take possession of the cores and transport them.
    - Proposal approved.
    - **Action:** A draft STSP language will be shared during the next Spec Subcommittee.

  - Add allowing next day coring to spec for test strip.
    - Proposal approved.
    - **Action:** A draft STSP language will be shared during the next Spec Subcommittee.

- PWL on SMA projects
  - **Action:** HMA Unit will do analysis to determine PWL limits for air voids for SMA.
  - **Action:** HMA Unit will return with a proposal at a PWL Subcommittee meeting.

- Adding AC content to PWL
  - **Action:** HMA Unit will return with a proposal at a PWL Subcommittee meeting.

d. Mix Acceptance Subcommittee (Jeff A.)
- Industry would like to go through issues relating to dispute resolution to identify trends.
- **Action:** New QA engineer will begin tracking nonperformance and nonconformance issues statewide and can work with the tech team.

e. Mix Performance Subcommittee (Ali A.)
   - Round Robin study
   - Approach C
   - The plan is to use this approach in a few pilot projects. The details will be discussed at a Performance Subcommittee meeting.
   - **Action:** DOT BMD specialist will visit the partnering labs to observe BMD sample preparation and test procedures.
   - **Action:** Technicians from partnering labs will be invited to the department's lab to observe BMD sample preparation and test procedures.
   - **Action:** Preliminary data from the round robin will be presented and discussed in an upcoming performance subcommittee meeting. This is a starting point and we'll be doing more round robins like this in the future. The standard procedure developed for the round robin seemed to have contributed to a successful round robin.

- Auto Extractors (Adam A.)
  a. IA Evaluation
     - Adam Johnson and the IA team are making improvements to the auto extractor portion of the IA program.

  b. Round Robin Study
     - 3 more labs participated this year compared to last year. Total of 16 Labs.
     - Standard deviation of 0.16 and COV of 3%. No outliers identified.

  c. Regions' Status
     i. SW – Madison lab came online this fall. Lacrosse has been active for about a year.

     ii. NCR – Rapids online for about a year. Rhinelander dealing with electrical issues before they can be online.

     iii. NE - Online for about a year.

     iv. NW – No auto extractor plans for the superior lab; Eau Claire is online, but staff need to be trained.

     v. SE – Been online for a while.

- Gyratory Compactors
  a. Round robin study status (Adam A.)
     i. Enough samples prepared to supply the gyratory, auto extractor, and BMD round robins.
     ii. **Action:** Email with instructions for participating in the upcoming gyratory round robin will be sent out soon.

- Miscellaneous (Ali A.)
  a. Sample labeling: the addition of cumulative tonnage.

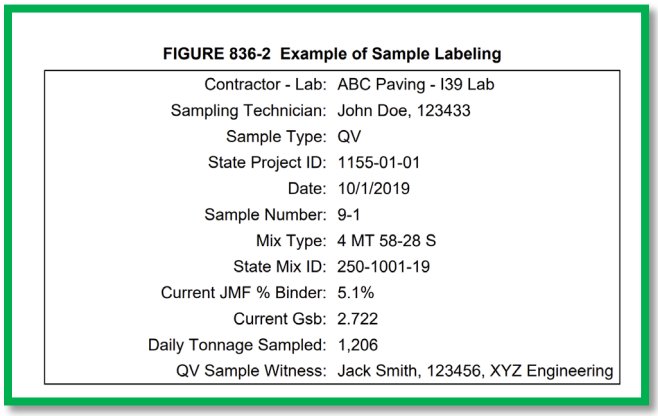


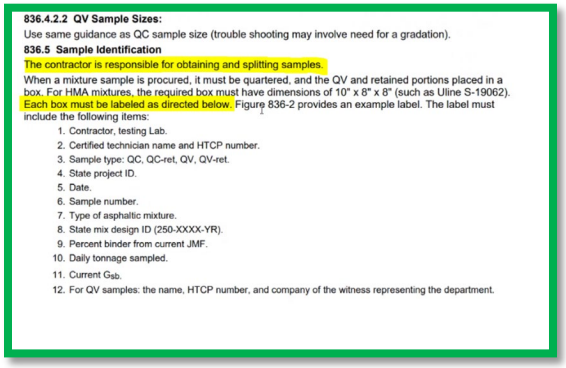
FIGURE 836-2 Example of Sample Labeling

Contractor - Lab:	ABC Paving - I39 Lab
Sampling Technician:	John Doe, 123433
Sample Type:	QV
State Project ID:	1155-01-01
Date:	10/1/2019
Sample Number:	9-1
Mix Type:	4 MT 58-28 S
State Mix ID:	250-1001-19
Current JMF % Binder:	5.1%
Current Gsb:	2.722
Daily Tonnage Sampled:	1,206
QV Sample Witness:	Jack Smith, 123456, XYZ Engineering

  - **Action:** the project cumulative tonnage will be added to the label (effective for March 2024 lets).

  b. Making the use of Antistripping agents mandatory?
    - Displayed images of moisture damage. Is hydrated lime a solution? Evotherm series P could be used.
    - **Suggestion:** We could include the freeze/thaw part of the test. Our neighboring state counterparts do.
    - Experiences from contractors in the northern part of the state, who use antistripping additive, claim this distress is still happening.
    - **Suggestion:** Research and test. Identify which aggregates have/don't have stripping issues, with and without antistripping, then see if there is a test that can reliably identify the stripping issue.
    - **Suggestion:** Hamburg wheel tracking test can be replaced with TSR test at the design and production stages.

  c. The contractor is responsible for labeling the samples.



836.4.2.2 QV Sample Sizes:
Use same guidance as QC sample size (trouble shooting may involve need for a gradation).
836.5 Sample Identification
The contractor is responsible for obtaining and splitting samples.
When a mixture sample is procured, it must be quartered, and the QV and retained portions placed in a box. For HMA mixtures, the required box must have dimensions of 10" x 8" x 8" (such as Uline S-19062). Each box must be labeled as directed below. Figure 836-2 provides an example label. The label must include the following items:

1. Contractor, testing Lab.
2. Certified technician name and HTCP number.
3. Sample type: QC, QC-ret, QV, QV-ret.
4. State project ID.
5. Date.
6. Sample number.
7. Type of asphaltic mixture.
8. State mix design ID (250-XXXX-YR).
9. Percent binder from current JMF.
10. Daily tonnage sampled.
11. Current G_{sb}.
12. For QV samples: the name, HTCP number, and company of the witness representing the department.

  - **Action:** Relevant language will be added to the MOTP requiring a pre-printed blank label to be used, so the required fields will not be missed (effective for March 2024 lets).