



**Improving HMA, Bullfrog – March 24, 2017  
Meeting Minutes**

Present	Name	Company	Present	Name	Company	Present	Name	Company
	Anderson, Taj	Poe	x	DeVol, Joe	WSDOT		McDuffee, Steve	Watson
x	Bell, Dave	Lakeside	x	Dyer, Bob	WSDOT	x	Pederson, Chris	CTL
	Byrd, Andrew	WSDOT	x	Erickson, Dave	WSDOT	x	Russell, Mark	WSDOT
x	Cantrell, Logan	Granite	x	Gent, David	WAPA		Schofield, Dave	CWA
	Chapman, Josh	Granite		Griffith, Brad	Miles		Shearer, Tim	ICON
	Clayton, E. J.	Granite	x	Hill, Kentin	Granite		Shippy, Ron	Inland Asphalt
x	Costello, Mike	Pyramid		Johnson, Torrey	Tucci & Sons		Siegel, Roy	FHWA
x	Damitio, Chris	WSDOT	x	Martin, Preston	Miles		Uhlmeier, Jeff	WSDOT
x	Dempsey, Bill	Lakeside	x	Mathis, Jerome	Inland Asphalt	x	Williams, Kurt	WSDOT

**OLD BUSINESS**

**13-07 High RAP/RAS**

- May 9, 2013 – Industry expressed concerns of not enough room for stockpiles.
- May 9, 2014 - RAP subcommittee reported that we are currently waiting for the industry members of the subcommittee to develop a draft spec for review and discussion. Primary points of discussion have been (a) timing and extent of additional testing currently required when the amount of RAP exceeds 20% or any amount of RAS, and (b) determining the type and timing of testing of RAP and RAS in stockpile needed to make prudent decisions on how variations affect the service life of the end product.
- October 9, 2014 – Update – This subcommittee is looking at increasing the threshold for not requiring the RAP oil to be blended into the mix design for approval, from its present 20%, to 30%. In order to make sure this is a decision that will not jeopardize length of service life, the committee is looking for Washington State test data to support the increase.
- May 8, 2015 – Dave Gent provided a copy (See Attachment #1) of the letter sent to WSDOT summarizing his understanding of the agreement in principle, between WSDOT and WAPA folks on the RAP Subcommittee, which creates a new RAP category for binder bumping in lieu of blending, for RAP between 20% and 25%. It was agreed that the goal is to finalize this into a spec to be published in the January 2016 Amendments.
- October 9, 2015 – Update from Kurt Williams – We need to reconvene the subcommittee to work out a few details. Need more discussion on the proposed changes to RAP between 20% and 25%. Dave Gent and Kurt will get the RAP subcommittee going on this.
- May 6, 2016 – Dave Gent handed out a draft a spec (attach #13-07a) which provides for a new “Medium RAP/No RAS” mix designation, and provided a handout of a report by Shane Buchanan titled “Washington State RAP Blending ‘What If’ Scenarios” (attach #13-07b). Further discussion of that spec will be done by the RAP/RAS subcommittee.
- November 4, 2016 – Dave Gent and Joe DeVol discussed the meeting minutes from the WSDOT/WAPA’s subcommittee on RAP meeting of October 4, 2016 (attachment #1, 13-07).
- March 24, 2017 - Update on proposed 25% RAP with binder bump spec. (Joe DeVol). WSDOT was unable to identify 4 contracts prior to advertisement to include the pilot spec. WSDOT would like to invite contractors on 4 contracts (2 east, 2 west) to propose a no cost change order on a portion of an executed contract for this study. Contractors that are interested in participating are requested to notify the Regional Construction Engineer and the ASCE.

**14-13 Fine Aggregate Angularity (FAA) aka Uncompacted Void Content**

- October 9, 2014 – Bob Dyer reported he is evaluating the enforcement of this spec on projects back to the 2010 spec book, but not done yet. Several contractors expressed that this test is weighted too high in the statistical evaluation and suggested that WSDOT reduce its relative importance in the future, that the test is not very reproducible, and that there is no mechanism to challenge the WSDOT test results. WSDOT responded that it is part of superpave.

- May 8, 2015 – Continued discussion, led by Dave Gent. Agreed that WAPA would develop a proposal for revisions to the spec.
- October 9, 2015 – Update from Dave Gent, who handed out a draft proposal (attached) to change the spec. The key changes Dave is seeking are a) reduce the size of the financial disincentive, which industry believes is disproportionately high, b) an ability for the contractor to challenge the WSDOT test results, and c) a sliding scale for the severity of the out-of-specness. Other test methods were discussed. Finally agreed that Granite will do some computer experimentation on the effect on the CPF of changing the statistical parameters so that the mixture CPF includes the PF for SE, coarse fracture, and FAA, and report results by next meeting.
- May 6, 2016 – Dave Gent provided a draft spec (attach #14-13a) and excerpts from NCHRP Report 539 “Aggregate Properties and the Performance of Superpave-Designed Hot Mix Asphalt” (attach #14-13b). The gist of the draft spec is to: a) move the FAA, Fracture, and SE related incentive/disincentive out of Spec 1-06 and into Spec 5-04, combine it with the statistical evaluation of the hot mixture properties, and “soften” the effect of the incentive/disincentive, and b) provide for challenges to the FAA test results possibly looking to real-time Hamburg testing as a referee in challenges. The ball is now in WSDOT court to consider the draft spec, with a target of having any resulting revisions to the Standard Specs in the January 2017 Amendments.
- November 4, 2016 – Dave Gent discussed WAPA’s proposed spec change (attachment #2, 14-13). It moves the price adjustment factors for SE, FAA, and Fracture out of Section 3-04 and into the price adjustment factors in Section 5-04. It also provides for challenge samples for failing FAA via Hamburg. The challenge samples would be taken from splits of WSDOT’s acceptance samples. Dave’s goal is to do two things – (1) make the price adjustment more equitable and (2) provide some basis for the contractor to challenge WSDOT test results. Dyer agreed to look into and respond at the next meeting.
- March 24, 2017 – Update from Dave Gent. WAPA requests that WSDOT adjust the aggregate valuation to \$15/ton in Table 1 of Section 3-04. WAPA would still like to have a challenge mechanism for FAA. WAPA would like WSDOT to update its FAA procedure to include the use of a strike off guide plate to increase testing accuracy. (attach #1, 14-13). Bob Dyer agreed to consider these requests.

#### **14-16 Concerns with SAM**

- October 9, 2014 - Dave Gent noted that SAM set-up is often cumbersome. He also suggested adding a “time stamp” for when documentation is entered (not shown currently) & add an “auto-notification” for producers / pavers (whether GC or sub.) to allow for timely review in case of challenges. Kurt Williams agreed to follow up.
- May 8, 2015 – Update from Kurt Williams. The lab has added a portal to SAM for all to use. A new field will be added to the database to record when each test data is input into SAM. “Auto-notification” to the contractor when data in SAM has been updated is in the process of being created, but has not happened yet. (MATS already has the ability to “auto-send”.)
- October 9, 2015 – Update from Kurt Williams – MATS program has the ability to auto-email results to the contractor if the Paving contractor so requests the PE, but SAM does not. Bob Dyer agreed to modify Construction Manual to require PE to email MATS results when so requested by the contractor.
- May 6, 2016 – Dave Gent noted that there are still (this spring) delays by some WSDOT offices in getting the WSDOT acceptance test data into SAM. Bob Dyer provided a copy of excerpts from the new 5-04 Standard Spec (attach #14-16) showing the aspirational timeliness goals for WSDOT to provide WSDOT’s test results to the contractor. Bill Dempsey volunteered to draft a revision to the WSDOT Construction Manual for WSDOT inspectors to directly and immediately provide test results to the Contractor.
- November 4, 2016 – Nothing to report.
- March 24, 2017 – Bill Dempsey agreed to provide a draft update to the Construction Manual at the next meeting.

#### **15-09 Optional allowance for submitting RAP with the zero to 20% RAP QPL mix designs**

- October 9, 2015 - Dave Gent - WAPA members would like this option to be allowed, if not in the specs., then by agreement with the Materials Lab. WSDOT agreed to Implement. Kurt and Joe agreed they would get it done.
- May 6, 2016 – Joe DeVol agreed to draft a spec implementing this and get it to Greg Morehouse for processing.

- November 4, 2016 – A draft of the spec allowing RAP to be included as a mandatory part of the mix design for Low RAP mixes is attached. WSDOT will try to get this implemented in the January 2017 amendments to the Standard Specs. (attachment #4, 15-09)
- March 24, 2017 – Update from Bob Dyer. This was included in the January 2017 amendments. Item closed.

#### **15-10 Is WSDOT still evaluating/considering electro-magnetic asphalt density gauges.**

- October 9, 2015 - Dave Gent - Many WAPA members would like to move to new style gauges and away from nuke gauges, but would like WSDOT's current view. Steve McDuffee reported his experience has been that they are sensitive to hot HMA and provide more accurate results when pavement is cooled. WAPA reported that small local agencies don't have nuke gages. Current WSDOT investment in nukes will make this a difficult change, particularly because even if there was established and accepted accuracy of the electric gages, they don't yet work on soils so WSDOT would have to use both technologies.
- May 6, 2016 – WSDOT wants to get out of the nuke gage business and is considering other technology, but given the status of alternatives to the nuke don't expect to make any changes for at least two years. Dave Erickson and Bob Dyer agreed to provide for alternate technology as a pilot spec sometime soon.
- November 4, 2016 – Nothing to report.
- March 24, 2017 – It was pointed out that currently FHWA will not allow using an electro-magnetic gauge. Chris Pederson agreed to provide some data at the next meeting that will give an idea of its reliability.

#### **16-02 Better define the dates to be used for the Current Reference Price for Asphalt Cost Price Adjustments spec**

- May 6, 2016 – Dave Gent reported that WAPA believes the dates for making the calculations are ill-defined in the current spec. He will send a draft spec to Dave Erickson pointing out where he thinks the ambiguities are.
- November 4, 2016 – Dave Gent provided draft spec changes, but discussion was deferred until the next meeting. (attach #5, 16-02)
- March 24, 2017 – (Attach #2, 16-02) Dave Erickson clarified that the adjustment is to be used only once per month using the most recent "Date Effective" value. Item closed.

#### **16-04 Clarify QPL design costs / process/ rebates**

- May 6, 2016 – Discussion focused on WAPA's concerns regarding getting Commercial HMA mix designs on the QPL. a) WSDOT review cost seems excessive. Joe DeVol agreed to review and report back. b) WSDOT's requirement for advance payment seems antiquated and has caused delays. Dave Jones is working on developing a solution that provides more ways to pay than a check in advance. C) it was pointed out that the old system of dealing with approval of commercial mix designs was at no cost to the contractor, and frustration was expressed that the change to the QPL was what brought about the need for contractor payment. WSDOT reported that when pay is received timely, turn-around time has been 1 or 2 days.
- November 4, 2016 – Costs have been reduced. WSDOT will accept checks but will wait for the check to clear before beginning review. WSDOT is working on trying to be able to accept credit cards or PayPal but that process is not yet in place. Industry asked if WSDOT could post the rates online; Kurt Williams agreed to look into.
- March 24, 2017 – Update from Kurt Williams. – Kurt hopes to post the rates on-line soon. Also, goal is to be able to accept credit cards by January of 2018.

#### **16-08 The MSCR test and proposed changes to binder grades**

- May 6, 2016 – Joe DeVol provided a handout (attach #16-08) and explained that MSCR grading is the direction the national standard is headed, and will likely go into effect for WSDOT contracts about 2018.
- November 4, 2016 – MSCR stands for Multiple Stress Creep Recovery. Joe DeVol is working with a multi-state task group on developing specs. Joe expects WSDOT implementation will occur in 2018. Dave Gent noted that the Paving Industry's concern is the need for extra storage tanks, and how smoothly the Oil Industry will make the transition. The question was raised on what WSDOT's expectations would be for QPL approvals of mix designs when all the binder changes. Further discussion needed.
- March 24, 2017 – Update from Joe DeVol – attached to these minutes is a Construction bulletin that describes the new process and describes most of what the new spec will do, along with a draft of the new spec. (Attach

**#2.5, 16-08)** The question came up – what to do with mix designs on the QPL under the old binder grading system after the new grading system is implemented?

**16-11 How to allow for project generated RAP to be used in the project**

- May 6, 2016 – Dave Gent noted that the requirement for sequestering RAP stockpiles prior to mix design submittal prohibits the use of RAP generated on a project from being used in the HMA on that project and urged that this be overcome somehow. WSDOT reinforced its concern that the RAP properties in this case are unknown. Perhaps provision for real-time RAP testing? More next time.
- November 4, 2016 – Dave Gent will draft a proposed spec and present at the next meeting.
- **March 24, 2017 – Update from Dave Gent. (attach #3, 16-11) Dyer will review to see if the spec currently allows what Dave is proposing.**

**16-13 Discussion on a process to modify the “sequestered” RAP and RAS stockpiles rules/ wording**

- May 6, 2016 – No discussion on this item. Similar to item 16-11.
- November 4, 2016 – Dave Gent provided a draft spec change (attach #7, item 16-13). Joe DeVol noted that Dave’s proposed spec would provide for testing the addition to the stockpile for binder content and gradation which is good, but he also would need to know about the VMA (which means also need to test for Aggregate sp.gr.). That puts the ball back in WAPA court to provide a draft spec that addresses testing for VMA and aggregate specific gravity.
- **March 24, 2017 – Update from Dave Gent. (attach #4, 16-13) Dave presented proposed spec changes. It was pointed out that the proposed spec change does not address the possibility that binder properties could change as the contractor adds to the stockpile, and therefore the questions were asked – What about testing binder properties?, and How will changes in binder properties manifest themselves in the mix being placed on the road, and how will this be addressed?**

**16-14 WAQTC – Implementation Plan**

- May 6, 2016 – Joe DeVol provided a handout (attach 16-14) regarding approximate dates for implementing the requirement for testers to be WAQTC certified. This will initially apply to all WSDOT folks and eventually to Contractor QA personnel. WSDOT has set a target that by 2020 industry will be trained and doing QA, with WSDOT doing QV.
- November 4, 2016 – Kurt Williams noted that the target date for getting all WSDOT testers certified is January of 2018. Also, he is working with ACEC to develop the mechanism to qualify folks that are not WSDOT employees.
- **March 24, 2017 – Nothing to report.**

**16-18 Proposal to Vary Number of Hamburg Passes Based on Number of Gyration**

- May 6, 2016 – Dave Gent handed out a proposal (attach 16-18). Joe DeVol will look at it and provide feedback at the next meeting.
- November 4, 2016 – Joe DeVol noted that Hamburg results have improved since eliminating blend sand and implementing elastic recovery. He will review Dave Gent’s proposal, and Dave Gent will provide supporting data.
- **March 24, 2017 – Update from Joe DeVol. (attach #5, 16-18) Joe needs more time to review with Chris Pedersen and Granite. However, it seemed agreeable that we could consider taking the 50 gyration out of the spec because it is used so infrequently.**

**16-20 Compaction Testing On Bridge Decks**

- November 4, 2016 – Bob Dyer hit the highlights of upcoming changes to compaction testing frequency on bridge decks - that will be effective in the Jan 2017 amendments to the standard specs. (attach #9 & attach #4, 16-20) – Dave Gent requested that the requirement for pneumatic rollers on decks longer than 125 feet be eliminated. Dyer will try to get bridge office to agree to that. More next time.
- **March 24, 2017 – Bob Dyer reported that the bridge office has agreed to eliminate the requirement for pneumatic rollers on bridges longer than 125 feet because it is a performance spec. Dave Gent agreed to provide the bridge office more data on oscillatory rollers. Item Closed.**

**16-23 Revise retesting specification to reflect 2008 procedure:**

- November 4, 2016 - Kentin Hill of Granite - There appears to have been a lot of issues this year (as well as in the past) with the state’s initial testing of mix samples. When we think that the states testing isn’t correct and

challenge that test, there is no time frame for the retest to be completed. Some retests have taken over a week to get results back. The majority of the retests have come back in our favor (in Granite's experience) indicating that the test wasn't run correctly initially. Since we have to make plant changes based on the state's test results, this lag time isn't acceptable. We propose reinstating a turnaround time frame on retests? Also, if the samples come back in our favor we propose that WSDOT pay for the cost of the retest. Proposal: In the 2008 spec book there was language that evaluated a retest sample and if it was outside of the tolerances then the state would pay for the extra testing. We propose that we return to this standard. Bob Dyer responded that he will look at the aspirational language currently in the specs regarding turn-around time for test results and make sure it addresses retests.

- March 24, 2017 –No discussion.

## **NEW BUSINESS**

### **17-01 – Compaction Testing Changes Effective January 3, 2017**

- March 24, 2017 - Direct Transmission is out, and Bid Items for Coring have been created, Bob Dyer (Attach #6, Item 17-01). Item closed.

### **17-02 How can we cost-effectively increase the service life of HMA Pavements?**

- March 24, 2017 - General Discussion – Bob Dyer – brainstormed ideas were as follows:
  1. Increase binder content
  2. Don't pave as late in the year so as to improve percent compaction
  3. Expand allowable hours of lane closures
  4. Use polymer modified binder
  5. Do a better job with tack
  6. Mill and let traffic run on it for a while, rather than mill and require repaving within a few days as is our frequent practice.
  7. Eliminate the use of studded tires.

It was agreed that a task force would be formed to address this item.

### **17-03 Trackless tack –**

- March 24, 2017 – Dave Gent asked what steps would be required to get Nanotac on the QPL as an acceptable trackless tack additive? The answer is that we need a specification. Kurt Williams will look into. Dave Gent agreed to provide a proposal.

### **17-04 Dual Gyration Design Validation Process Proposal --**

- March 24, 2017 – Information/ proposal provided by Logan Cantrell (Granite). Logan will bring a written proposal to the next meeting.

### **17-05 Testing RAP for Hazardous Materials**

- March 24, 2017 – WSDOT enforcement seems to vary widely. Item closed.

NEXT MEETING –October 27, 2017, at Bullfrog Maintenance.



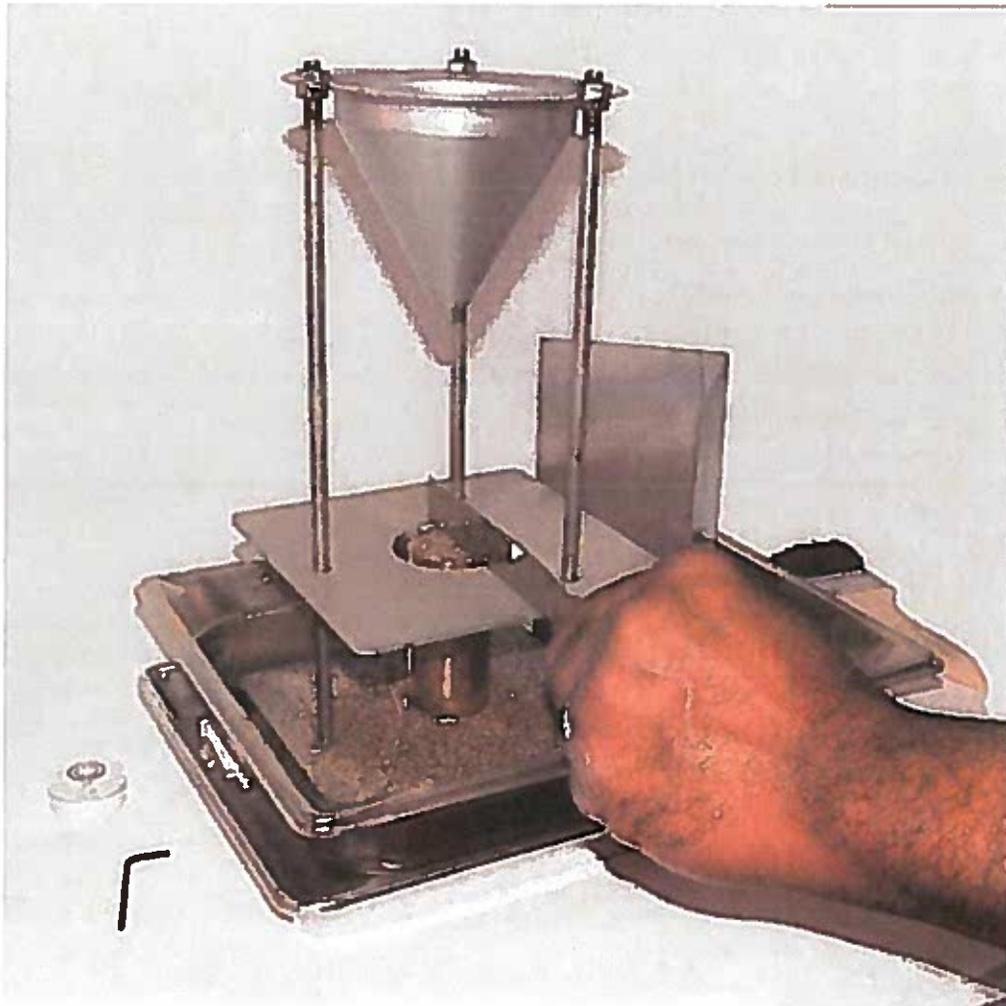
Attach # 1  
item 14-13

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## Void Content Apparatus with Strike-off Guide Plate



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**Void Content Apparatus***AASHTO T-304 Standard Method of Test for Uncompacted Void Content of Fine Aggregate*

Analysis of AMRL Proficiency Test result data by David Jahn confirmed that the biggest cause of variability between labs conducting this test was the way in which the technician struck off the excess material at the top of the cylinder in an attempt to level it.

Not everyone was doing it exactly the same way, every time. Some might not have the spatula blade perfectly perpendicular to the edge of the cylinder, which could push material back down into the cylinder or scoop it out at the end of the sweep. Others may have been holding the spatula higher at one end of the blade than the other, which would leave an angled top cone on top of the cylinder.

What was needed was a way to position the edge of the spatula prior to the strike off to ensure that: A) The full edge of the spatula was horizontal, and B) Perpendicular to the edge of the cylinder.

HMA Lab Supply is pleased to introduce our version of the Void Content Apparatus with the David Jahn Modification. It works, it's easy to use, and it's not expensive.

The plate allows the technician to place the edge of the spatula flat on the plate and push it across the material on top of the cylinder without touching it and causing vibrations that would make the material in the cylinder compact. What this means is that there will be far less variability between agencies and contractors.

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Attach #2

➤ **Item 16-02 – Better define the dates to be used for the Current Reference Price for Asphalt Cost Price Adjustments:**

The issue revolves around how often the price adjustment would be calculated since it is updated twice per month. I believe that Dave clarified that WSDOT would only perform the adjustment calculation once per month and it would be based on the "Date Effective" date, NOT the End Period Date. As you can see from my clip and paste below, the "Date Effective" sometimes lags the "End Period" date for some reason. The current specification only says "posted", but it seems to me that the "Date Effective" should mean just that.

Asphalt binder reference costs get posted at the end of the period .

Date Effective ▲	Begin Period ⇄	End Period ⇄	Eastern ⇄	Western
	4/1/2012	4/15/2012	\$607.50	\$602.50
	3/1/2012	3/15/2012	\$562.50	\$591.25
	3/16/2012	3/31/2012	\$582.50	\$595.00
	2/1/2012	2/15/2012	\$555.00	\$566.25
	2/16/2012	2/29/2012	\$555.00	\$570.00
	1/1/2012	1/15/2012	\$547.50	\$553.75
	1/16/2012	1/31/2012	\$550.00	\$557.50
	12/1/2011	12/15/2011	\$547.50	\$528.75
	12/16/2011	12/31/2011	\$547.50	\$534.17
	11/1/2011	11/15/2011	\$552.50	\$531.25
	11/16/2011	11/30/2011	\$547.50	\$525.00

05/05/2015	04/16/2015	04/30/2015	\$505.00	\$471.25
05/18/2015	05/01/2015	05/15/2015	\$505.00	\$455.00
06/01/2015	05/16/2015	05/31/2015	\$505.00	\$445.00
06/15/2015	06/01/2015	06/15/2015	\$498.75	\$442.50
07/06/2015	06/16/2015	06/30/2015	\$492.50	\$425.83
07/20/2015	07/01/2015	07/15/2015	\$492.50	\$430.00

➤ The specification now reads:

**"Adjustments will be based on the most current reference cost for Western Washington or Eastern Washington as posted on the Agency website, depending on where the work is performed. For work completed after all authorized working days are used, the adjustment will be based on the posted reference cost during which contract time was exhausted. The adjustment will be calculated as follows:".....**

I think it would be clarifying to say....

**"Adjustments will be based on the most current reference cost for Western Washington or Eastern Washington as posted on the Agency website, depending on where the work is performed. **The "Date Effective" reference cost last posted prior to the pay period close date will be the basis for adjustments and adjustments will be calculated only once per pay period.** For work completed after all authorized working days are used, the adjustment will be based on the posted reference cost during which contract time was exhausted. The adjustment will be calculated as follows:".....**

The confusion and differing calculations came from the Contractor wanting to segment the month of work into two price points because the reference costs are posted twice per month. Further confusion was added when the "Date Effective) is several days later than the End Period. The pay period ended on 7/5 but the Date Effective was posted as 7/6. The reference number should be the one "Date Effective" on 6/15 as it was the last posted "Date Effective" before the pay period closed.

Dave E. will be able to interpret my ham-fisted attempt to explain the nuance.

This is really only an issue when binder prices are sliding (or rising) very rapidly.

Item 16-08  
Attach # 2.5



Washington State  
Department of Transportation

## CONSTRUCTION BULLETIN

State Construction Office  
Engineering and Regional Operations

New Asphalt Binder Test & Specification:  
Multiple Stress Creep Recovery (MSCR)  
Bulletin #2016-07  
Date: December 15, 2016

### Purpose

This Construction Bulletin provides information regarding the new Multiple Stress Creep Recovery (MSCR) test and specification for Performance Graded (PG) asphalt binders used in production of Hot Mix Asphalt (HMA).

### Summary

The MSCR test provides a major improvement in our ability to specify performance-related asphalt binders for highway materials, successfully identifies chemically modified asphalt binders, and eliminates the need to run other time consuming, less discriminating test procedures. The new MSCR specification will be implemented by WSDOT in January of 2018 and includes a major improvement in how grade bumping is done to accommodate increased traffic and loading.

### Background

In 1993, the Performance Graded (PG) asphalt binder specifications were introduced as part of the Strategic Highway Research Program (SHRP). The PG specifications were eventually adopted by the American Association of State and Highway Transportation Officials (AASHTO) and formally implemented by WSDOT in 1999.

The PG asphalt binders are designed for the pavement service temperature where they are to be used and are identified by two different temperatures (in six degree increments). The first number is the average seven-day maximum pavement design temperature in Celsius (°C) and the second is the minimum pavement design temperature °C. For example, a PG 58-22 is designed to be used where the pavement high temperature will not exceed 58°C and the pavement low temperature will not exceed minus 22°C.

While the PG specifications provided a number of tools to address performance of asphalt binders used in production of Hot Mix Asphalt (HMA) pavements there are some shortcomings. The PG binder specifications were developed based on studies of unmodified binders, or what is referred to as "Neat" asphalt binders, but did not account for high traffic volumes and slow speed loading which can cause rutting in the pavement. Rather than change the specifications or test procedure, the researchers opted to elevate or bump the test temperature and require the same stiffness in the binder to reduce the risk

of rutting from increased traffic and loading. For example, if the temperature requirements for a location required a PG58-22 asphalt binder, but the location had high traffic volumes there would be an initial grade bump to a PG64-22 and if the location also had slow speed loading there would be a second grade bump to a PG70-22. This bumping process resulted in the asphalt binder being tested at elevated temperatures that they would not see in service and allowed asphalt producers to utilize various modification processes to stiffen the asphalt binders that could negatively affect the in service life of the pavement.



Dynamic Shear Rheometer (DSR)

### The New Process

The Dynamic Shear Rheometer (DSR) is used to run the Multiple Stress Creep Recovery (MSCR) test. In the MSCR test higher levels of stress and strain are applied to the binder which better represents what occurs in an actual pavement under traffic. By using the higher levels of stress and strain the MSCR test captures both the stiffening effects of the modified binder and the delayed elastic effects (where the binder behaves like a rubber band). The MSCR test successfully identifies chemically modified asphalt binders and can also be used to evaluate the presence of polymer modification in the binder while eliminating the need to run other time consuming, less discriminating test procedures.

The new MSCR specification includes a major change to the current PG specification in how grade bumping is done to accommodate increased traffic and loading. The initial or base grade MSCR binder is denoted by placing a S for "Standard" traffic loading just after the maximum pavement design temperature e.g., PG58S-22. Then if the location had high traffic volumes there would be an initial grade bump to a PG58H-22 for "Heavy" traffic loading and if the location also had slow speed loading there would be a second grade bump to a PG58V-22 for "Very Heavy" traffic loading. This results in the

asphalt binder testing being performed at the temperature that the pavement is expected to experience in the roadway. The table below shows the current performance grades used by WSDOT compared with the new MSCR performance grades, including the bumping for traffic and loading.

Asphalt Binder Performance Grades	
<ul style="list-style-type: none"> <li>• Current Performance Grades               <ul style="list-style-type: none"> <li>○ PG58-22 (Base Grade)</li> <li>○ PG64-22 (Bumped Once)</li> <li>○ PG70-22 (Bumped Twice)</li> <li>○ PG64-28 (Base Grade)</li> <li>○ PG70-28 (Bumped Once)</li> <li>○ PG76-28 (Bumped Twice)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• MSCR Performance Grades               <ul style="list-style-type: none"> <li>○ PG<u>58S</u>-22 (Base Grade)</li> <li>○ PG<u>58H</u>-22 (Bumped Once)</li> <li>○ PG<u>58V</u>-22 (Bumped Twice)</li> <li>○ PG<u>64S</u>-28 (Base Grade)</li> <li>○ PG<u>64H</u>-28 (Bumped Once)</li> <li>○ PG<u>64V</u>-28 (Bumped Twice)</li> </ul> </li> </ul>

The -22 grades are used across Western WA while the -28 grades are used across Eastern WA

#### **Additional Information**

The State Materials Laboratory has been working with asphalt binder users and producers to advance the implementation of the MSCR procedure and specifications by member states of the Pacific Coast Conference on Asphalt Specifications (PCCAS). The State Materials Laboratory has also formed a multi-state task group with FHWA Western Federal Lands which includes Idaho, Montana, Nevada, California and Oregon designed to get all member states familiar and proficient in running the MSCR test procedure and further advance the implementation of the new procedure and specification.

#### **Contact Information**

Any comments about this new process or questions about future implementation may be directed to:

Joe DeVol  
 Asst. State Materials Engineer – Materials Testing  
 Washington State Department of Transportation  
 devolj@wsdot.wa.gov  
 (360) 709-5421

*item 16-08*

# WSDOT Binder Grading Comparison

Current Grading System	MSCR Grading System
<del>PG58-22</del>	<del>PG58S-22 (Standard)</del>
PG64-22	PG58H-22 (Heavy)
PG70-22	PG58V-22 (Very Heavy)
<del>PG64-28</del>	<del>PG64S-28</del>
PG70-28	PG64H-28
PG76-28	PG64V-28

## 9-02.1(4) Performance Graded Asphalt Binder (PGAB)

PGAB meeting the requirements of AASHTO M 332 Table 1 of the grades specified in the Contract shall be used in the production of HMA. For HMA with greater than 20 percent RAP by total weight of HMA or any amount of RAS the new asphalt binder, recycling agent and recovered asphalt (RAP and/or RAS) when blended in the proportions of the mix design shall meet the PGAB requirements of AASHTO M 332 Table 1 for the grade of asphalt binder specified by the Contract.

In addition to AASHTO M 332 Table 1 specification requirements, all performance grade (PG) asphalt binders shall meet the following requirements:

Property	Test Method	Additional Requirements by Performance Grade (PG) Asphalt Binders					
		PG58H-22	PG58V-22		PG64H-28	PG64V-28	
RTFO Residue: Average Percent Recovery @ 3.2 kPa <sup>1</sup>	AASHTO T 350 <sup>1</sup>		35% Min.		30% Min.	35% Min.	

<sup>1</sup>Specimen conditioned in accordance with AASHTO T 240 – RTFO.

*elastic recovery is gone!*  
*M-332 used as recovery*

The RTFO Jnr diff and the PAV direct tension specifications of M 332 are not required.

*variables: S, H, V, E*

*we only use S, H, V, so no prob w/ revision f*

*Jan 1, 2018 will go into effect*

# Attach #3

Y  
Y  
Y

**Item 16-11 - Project generated RAP – Proposed spec. update language:**

RAP generated from a WSDOT project that will receive a newly paved HMA surface is allowed. The project generated RAP shall not be used at a rate greater than 20% by weight. The Contractor shall submit a one page RAP processing plan to the Engineer for review. The plan shall address 1.) the methods for processing and/or screening of the RAP to successfully achieve a top size aggregate RAP, in the cold feed stockpile, equal to or smaller than the maximum aggregate size of the HMA being produced for the project and 2.) the system to be used (e.g. feeder, weigh system, screens) for feeding RAP into the HMA plant. The Contractor may also propose "just in time" RAP processing using an inline RAP re-sizing and/ or screening system on the HMA plant feed system. The RAP processing plan shall be submitted for review and comment at least one week prior to HMA production.

At the request of the Contractor, sampling of the existing pavement can be performed, at the Contractor's sole expense, prior to the bid. The Engineer shall approve the sample collection time and place in coordination with the Contractor upon receipt of a written request from the Contractor at least one week in advance of the proposed sampling date.

# Attach # 4

- Item 16-13 - Specification allowing for adding RAP or RAS to a WSDOT sequestered stockpile – In the text shown below the dark gray highlighted language was proposed at the last meeting. Joe DeVol was concerned about lower VMA than achieved in the HMA design if the specific gravity of the added RAP / RAS varies. WAPA proposes the additional language highlighted in light gray. We want to keep the spec. as simple and practical as possible.

WSDOT/WAPA Improving HMA Committee – 3/24/2017

WAPA Proposal for Updating RAP Stockpile Sequestering Rules – Item 16-13 -

## CURRENT SPECIFICATION

### 5-04.2(1)A2 High RAP/Any RAS - Mix Design Submittals for Placement on QPL

For High RAP/Any RAS mixes, comply with the requirements of Section 5-04.2(1) and all of the following that apply:

1. For mixes with any RAS, test the RAS stockpile (and RAP stockpile if any RAP is in the mix) in accordance with Table 4.
2. For mixes with no RAS, test the RAP stockpile in accordance with Table 4.
3. For mixes with High RAP/Any RAS, complete constructing a single stockpile for RAP and a single stockpile for RAS and isolate these stockpiles from further stockpiling before beginning development of the mix design. Test the RAP and RAS stockpile during their construction as required by item 1) or 2) above. Use the test data in developing the mix design, and report the test data to WSDOT as part of the mix design submittal for approval on the QPL. Do not add to these stockpiles after starting the mix design process.
4. Comply with 5-04.3(5)A for stockpiling RAP and/or RAS after sequestering the RAP/RAS stockpiles for mix design approval on the QPL.

Table 4  
Test Frequency of RAP and RAS During RAP and RAS Stockpile Construction  
For the Purpose of Approving a Mix Design for Placement in the QPL

Test Frequency	Test for	Test method
• 1/1000 tons of RAP (minimum of 10 per mix design) and • 1/100 tons of RAS (minimum of 10 per mix design)	Asphalt Binder content	FOP for AASHTO T 308
	Aggregate Gradation	FOP for WAQTC T 27/T 11

## SUPPLEMENTAL LANGUAGE

5. The initial RAP or RAS stockpile(s), as defined above, may be supplemented in volume with additional RAP or RAS when:
  - a. The RAP or RAS is processed in the same manner as the original stockpile(s) resulting in RAP or RAS of the same general quality as in the initial stockpile(s) and
  - b. Testing of the supplemental RAP or RAS, as outlined in Table 4 and above, is certified to have been performed at a minimum of 1/2 the frequency defined in the Table. Testing documentation shall be maintained and be available for review.
  - c. The supplemental RAP or RAS has been tested for specific gravity for every 5,000 tons for RAP and every 500 tons for RAS to document variance in the RAP/ RAS that would lead to projected lower VMA.

# Attach #5, Item 16-18

## Proposal for revision of Hamburg test

With running Hamburgs the past couple years there is an obvious trend between the gyrations of a mix and performance in the Hamburg wheel tracker test. With 50 gyrations mixes most noticeably having a near impossible time passing the current specifications.

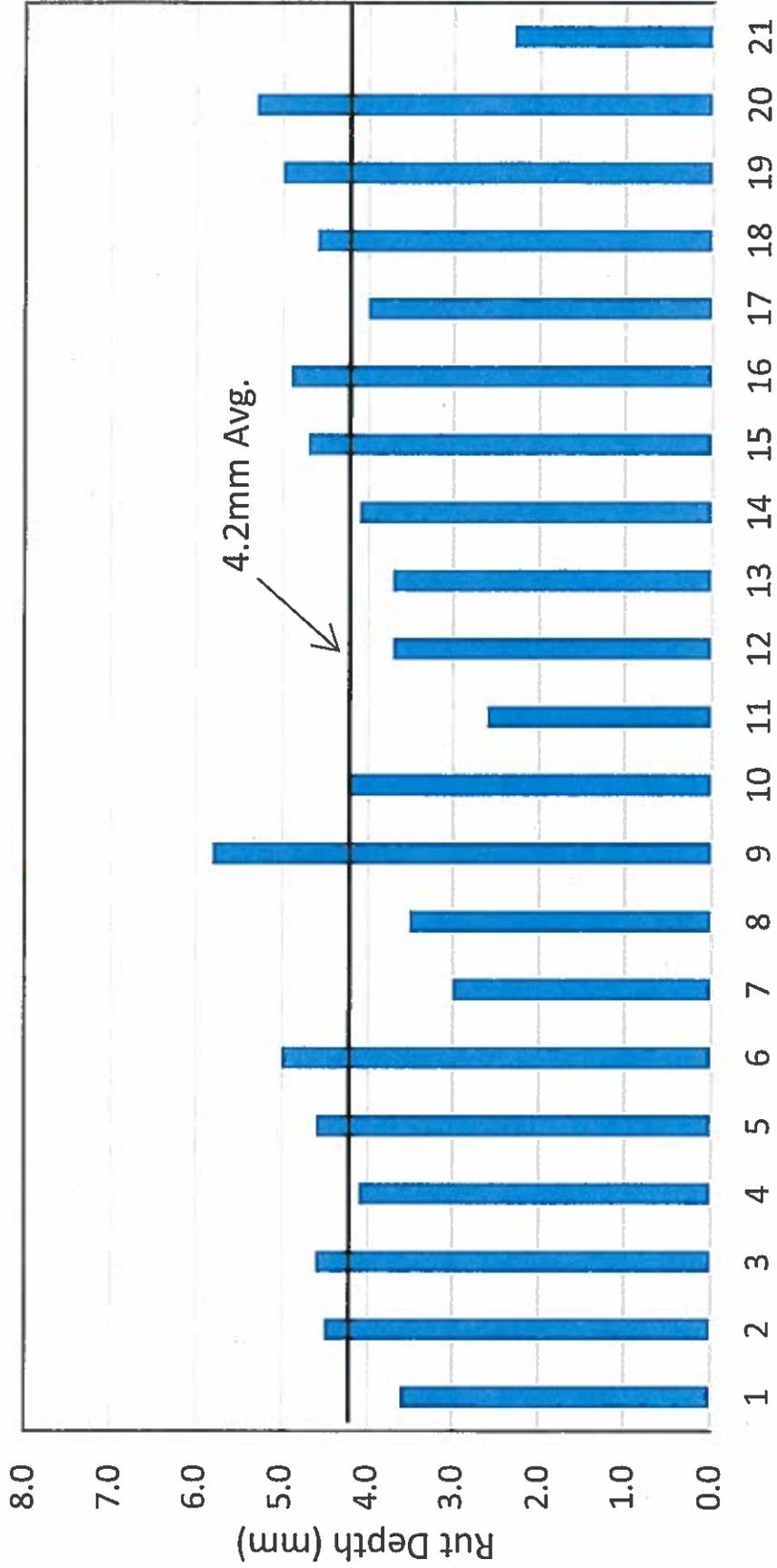
## Proposal

The correlation between expected traffic level and gyrations leads the current proposal to change the passes of the Hamburg wheel tracker to vary based on gyrations (ESAL level). Instead of the current 15,000 passes for every gyration level I would like to propose a drop in the required passes for 50 and 75 gyration mixes. This would be for both the stripping inflection point and where the rut depth is calculated.

Hamburg Wheel-Track Testing, FOP for AASHTO T 324	Gyrations	Passes for Rut Depth and SIP	Max Rut Depth (mm)
	50	10,000	10
	75	12,500	10
	100	15,000	10
	125	15,000	10

16-18

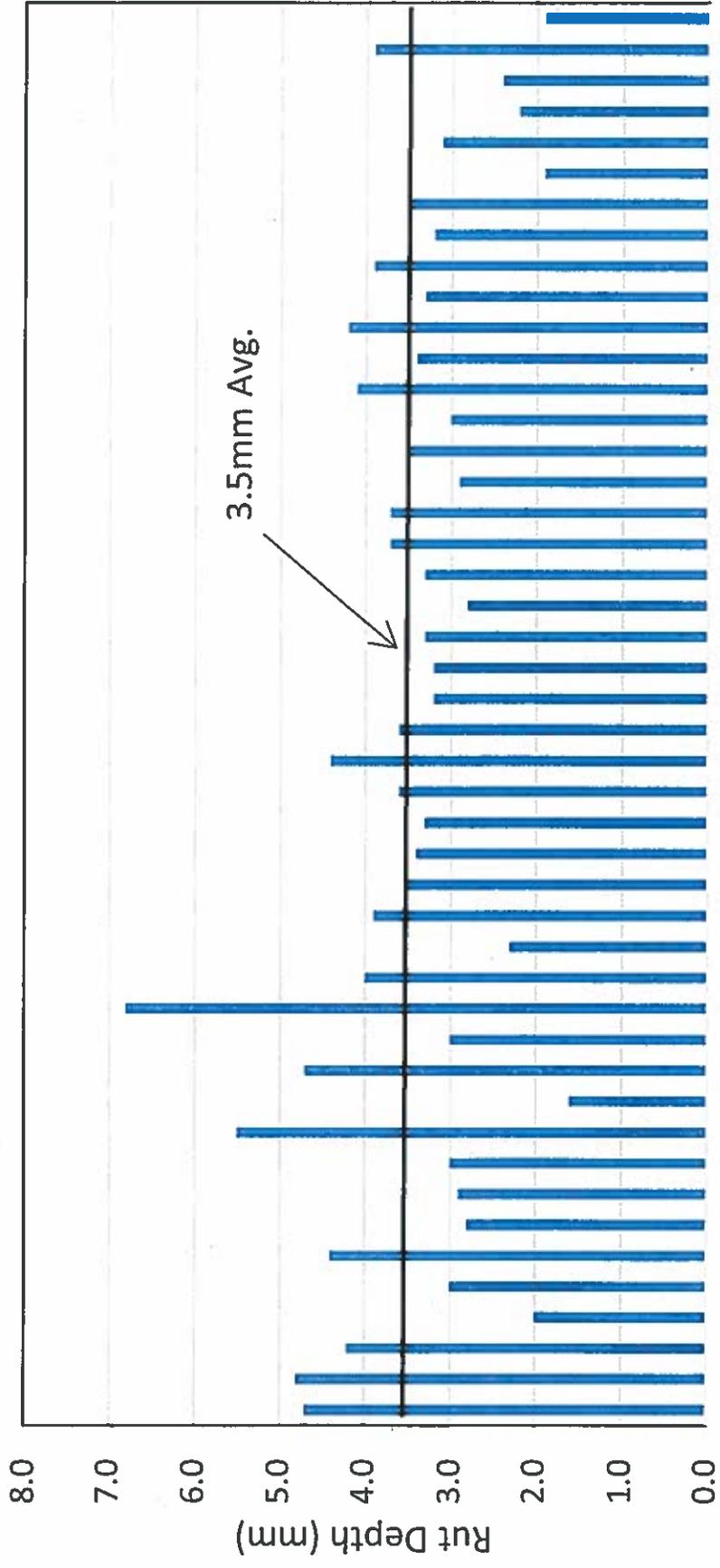
### Hamburg Testing - 75 Gyration at 15,000 Passes



2016 Mix Designs

16-18

### Hamburg Testing - 100 Gyration at 15,000 Passes



2016 Mix Designs



Washington State  
Department of Transportation

## CONSTRUCTION BULLETIN

State Construction Office  
Engineering and Regional Operations

Nuclear Gauge and Cores for HMA Compaction  
Bulletin #2017-01  
Date: January 10, 2017

### Purpose

1. To notify inspectors that nuclear gauge density testing of HMA will no longer be performed using direct transmission.
  2. To provide guidance to designers on when to include the new bid items "HMA Core – Roadway" and "HMA Core – Bridge Deck", and guidance to Construction Project Engineers in providing input to that decision.
  3. To provide guidance to Construction Project Engineers when there is no bid item for "HMA Core – Roadway" or "HMA Core – Bridge Deck".
1. For new contracts, nuclear gauge density testing of HMA will no longer allow direct transmission, but will allow backscatter as an alternative

The January 3, 2017 amendments to the Standard Specifications make a subtle but noteworthy change in how we will be using nuclear density gauges for HMA compaction testing. For contracts advertised January 3, 2017 or later, the direct transmission mode will no longer be an acceptable method of testing HMA compaction, but backscatter mode will be acceptable. The thin layer mode was and continues to be acceptable.

The test procedure cited in the January 3, 2017 Amendment to the Standard Specification is WSDOT FOP for AASHTO T355<sup>1</sup>. The test procedure says that HMA compaction testing shall be done in the "backscatter or thin layer" mode<sup>2</sup>. Thin layer mode is still the method of preference for compaction testing HMA, but backscatter mode will be acceptable for gauges that do not have thin layer capability.

The reason for this change is to bring our agency more in line with how other states test for density of HMA. Additionally, Troxler Electronics (manufacturer of the gauges we use) states that backscatter or thin layer readings provide accurate measurement of HMA density. This change also has the benefit of being easier and safer for our staff to conduct density testing of HMA because it eliminates the need for driving holes in our new pavements with a sledge hammer.

### What about HMA nuclear gauge compaction testing on contracts advertised before January 3, 2017?

Contracts advertised before January 3, 2017 require nuclear gauge density testing of HMA to follow FOP for WAQTC TM8, which requires the direct transmission or thin layer mode, but does not allow backscatter mode. For those contracts it will be acceptable to continue to use direct transmission (or thin layer mode) for density testing HMA as the contract provides. As an alternative, and only if mutually agreeable to the contractor, a no-cost change order may be executed to replace FOP for

<sup>1</sup> See Section 5-04.3(10)C2 Table 16, and 5-04.3(10)C3.

<sup>2</sup> WSDOT FOP for AASHTO T355 was updated January 5, 2017 to include use of the thin layer mode.

WAQTC TM8 with WSDOT FOP for AASHTO T355 when using the nuclear gauge for density testing of HMA - this would allow backscatter (and thin layer) mode.

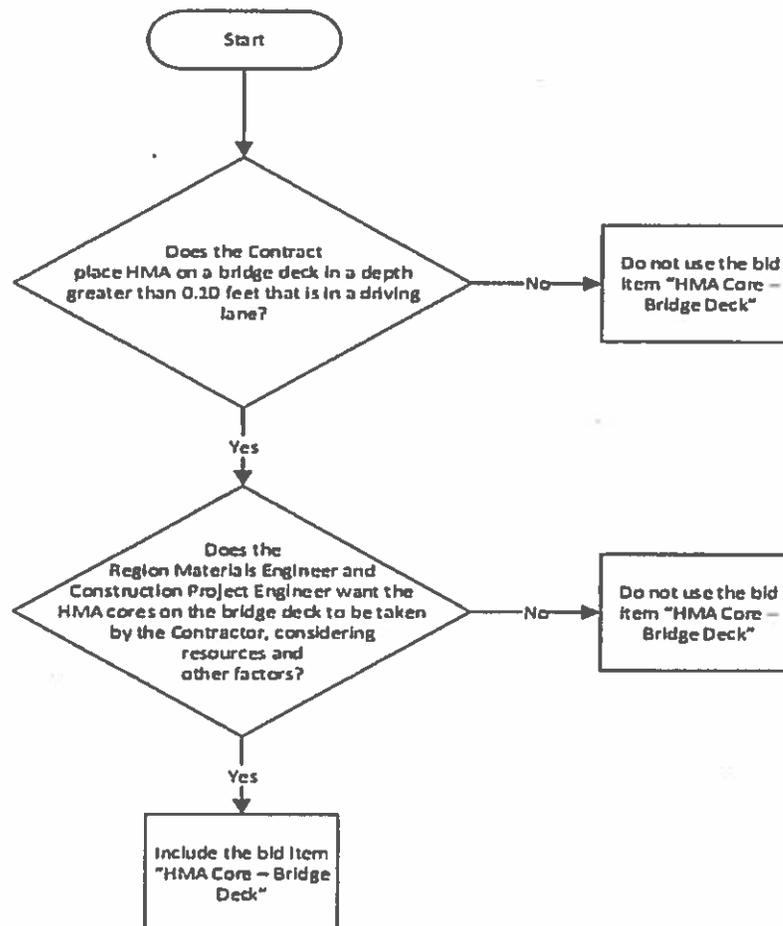
**Does This Affect Nuclear Gauge Compaction Testing of Materials Other Than HMA?**

This change only affects HMA compaction testing. The use of direct transmission for compaction testing is still appropriate when WSDOT FOP for AASHTO T 310 and WSDOT SOP 615 is the required procedure, such as for soils, crushed surfacing, ballast, etc.

**2. Use of new bid items "HMA Core – Roadway" and "HMA Core – Bridge Deck"**

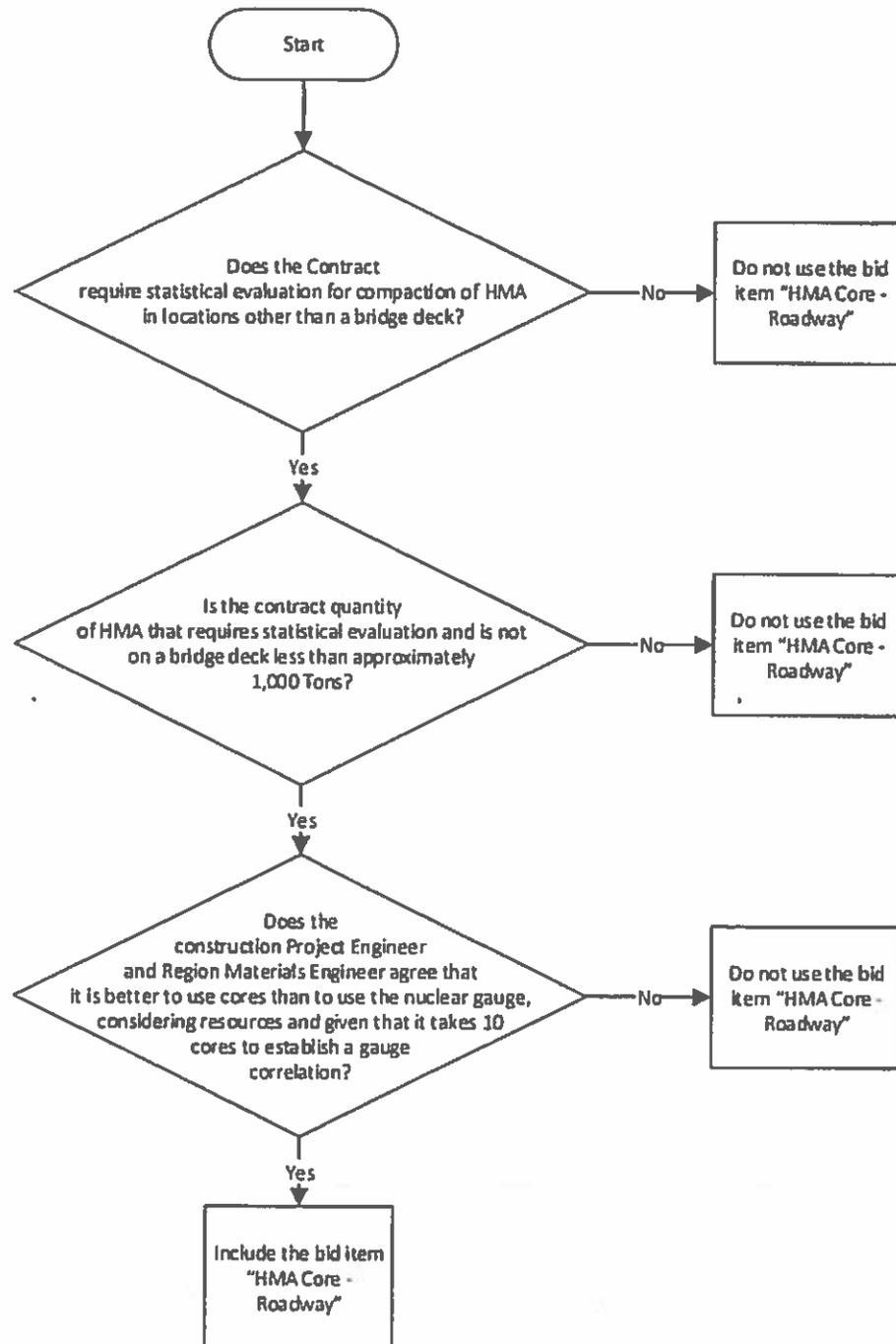
The January 3, 2017 Amendments to the Standard Specs eliminates the bid item "Roadway Core", and replaces it with "HMA Core – Roadway" and/or "HMA Core – Bridge Deck". This change is a result of the recent increased emphasis on HMA compaction on bridges<sup>3</sup>. When putting together the list of bid items during PS&E development, the decision to use these bid items (or not) should be based on two things: the nature of the project and availability of resources. Use the following flow charts.

Regarding the Bid Item "HMA Core – Bridge Deck"



<sup>3</sup> See Construction Bulletin 2016-05 "HMA Paving on Bridge Decks: HMA Compaction".

Regarding the Bid Item "HMA Core ~ Roadway"



**3. When There is No Bid Item for Cores: To Core or Not to Core, That Is NOT the Question**

Cores are required on every HMA paving contract that requires any amount of HMA to be accepted by statistical evaluation, so the question is: what will the cores be used for – density determination or gauge correlation? The Construction Project Engineer must provide guidance to the inspectors and testers for a contract that has no bid items for cores.

If the project places HMA on a bridge deck that is in a driving lane and thicker than 0.10 feet compacted depth, cores are required by the Standard Specifications to be the basis for evaluating compaction of that HMA. If there is no bid item "Roadway Core – Bridge Deck", the Standard Specifications require that WSDOT will take the cores and run the core density tests.

If the project places HMA in locations other than on a bridge deck, and that HMA is in a driving lane and thicker than 0.10 feet compacted depth, the Standard Specifications indicate that WSDOT decides whether to determine HMA compaction by cores or the nuclear gauge. In determining which, be guided by this question – which requires fewer cores? Remember, in order to determine HMA density with the nuclear gauge, 10 cores are required to establish a gauge correlation factor. Therefore, a project with 1000 tons of HMA is the tipping point; it would require 10 cores if cores were the basis for testing density, or 10 cores plus ten nuclear gauge tests if the nuclear gauge were the basis for determining density. Do not use cores as the basis for density testing if more than 10 cores would be required.

**Additional Information Contact:**

Joe DeVol or Bob Dyer

**Send Comments on this Construction Bulletin to:**

Bob Dyer





**Improving HMA, Bullfrog – October 27, 2017  
Meeting Minutes**

Present	Name	Company	Present	Name	Company	Present	Name	Company
	Anderson, Taj	Poe		DeVol, Joe	WSDOT		McDuffee, Steve	Watson
	Bell, Dave	Lakeside		Dyer, Bob	WSDOT		Pederson, Chris	CTL
	Byrd, Andrew	WSDOT		Erickson, Dave	WSDOT		Peterson, Don	FHWA
	Cantrell, Logan	Granite		Gent, David	WAPA		Russell, Mark	WSDOT
	Chapman, Josh	Granite		Griffith, Brad	Miles		Schofield, Dave	CWA
	Clayton, E. J.	Granite		Hill, Kentin	Granite		Shearer, Tim	ICON
	Costello, Mike	Pyramid		Johnson, Torrey	Tucci & Sons		Shippy, Ron	Inland Asphalt
	Damitio, Chris	WSDOT		Martin, Preston	Miles		Uhlmeier, Jeff	WSDOT
	Dempsey, Bill	Lakeside		Mathis, Jerome	Inland Asphalt		Williams, Kurt	WSDOT

**OLD BUSINESS**

**17-02 How can we cost-effectively increase the service life of HMA Pavements?**

- March 24, 2017 - General Discussion – Bob Dyer – brainstormed ideas were as follows:
  1. Increase binder content
  2. Don't pave as late in the year so as to improve percent compaction
  3. Expand allowable hours of lane closures
  4. Use polymer modified binder
  5. Do a better job with tack
  6. Mill and let traffic run on it for a while, rather than mill and require repaving within a few days as is our frequent practice.
  7. Eliminate the use of studded tires.

It was agreed that a task force would be formed to address this item.

- October 27, 2017 Dave Erickson discussed WSDOT's proposal for changes to HMA specs regarding compaction and related incentives/disincentives (attachment #1) Kurt or Joe will discuss changes to HMA mix design and mixture acceptance (Attachment #1, 2, and 3) The incentive/disincentive payments for compaction and mixture during calendar year 2016 were as follows:

2016 HMA Incentives/Disincentives		
	Compaction	Mixture
+payments	\$ 784,000	\$ 788,000
- deductions	\$ (195,000)	\$ (244,000)
net pay	\$ 589,000	\$ 544,000

The following tables summarize the agreed upon changes for VMA and compaction and incentives/disincentives:

Mix Design Approval					
SPEC	REGARDING	CURRENT	2018	2019	2020
9-03.8(2)	⅓ VMA Lower Spec Limit	15.0%	15.0%	15.0%	15.5%
	½ VMA Lower Spec Limit	14.0%	14.0%	14.0%	14.5%
	¾ VMA Lower Spec Limit	13.0%	13.0%	13.0%	13.5%
	1 VMA Lower Spec Limit	12.0%	12.0%	12.0%	12.5%
QC8 7.2.1	VMA Tolerance (⅓, ½, ¾, 1)	-1.5%	-1.0%	-1.0%	TBD

Field Acceptance					
SPEC	REGARDING	CURRENT	2018	2019	2020
9-03.8(7)	¾ VMA Lower Spec Limit	N/A	15.0%	15.0%	15.5%
	½ VMA Lower Spec Limit	N/A	14.0%	14.0%	14.5%
	¼ VMA Lower Spec Limit	N/A	13.0%	13.0%	13.5%
	1 VMA Lower Spec Limit	N/A	12.0%	12.0%	12.5%
9-03.8(7)	JMF VMA Tolerance	N/A	-1.5%	-1.0%	TBD
5-04.3(8)	Field Gsb test frequency for determining VMA	N/A	Use mix design Gsb, but contractor may request 2 tests per project		
	Factor "f" for statistical evaluation (of VMA)	N/A	2	2	TBD, but greater than 2
9-03.8(7)	JMF Binder Tolerance	-0.5% to +0.5%	-0.4% to +0.5%	-0.4% to +0.5%	TBD
5-04.3(10)C3	HMA compaction Lower Spec Limit - disincentive	91.0	91.0	91.5	92.0
5-04.3(10)C3	HMA compaction Lower Spec Limit - incentive	91.0	91.5	92.0	92.0
5-04.3(10)C3	Factor in Compaction Price Adjustment equation - disincentive	0.40	0.40	0.60	TBD
5-04.3(10)C3	Factor in Compaction Price Adjustment Equation - incentive	0.40	0.80	1.00	TBD

**13-07 High RAP/RAS**

- May 9, 2013 – Industry expressed concerns of not enough room for stockpiles.
- May 9, 2014 - RAP subcommittee reported that we are currently waiting for the industry members of the subcommittee to develop a draft spec for review and discussion. Primary points of discussion have been (a) timing and extent of additional testing currently required when the amount of RAP exceeds 20% or any amount of RAS, and (b) determining the type and timing of testing of RAP and RAS in stockpile needed to make prudent decisions on how variations affect the service life of the end product.
- October 9, 2014 – Update – This subcommittee is looking at increasing the threshold for not requiring the RAP oil to be blended into the mix design for approval, from its present 20%, to 30%. In order to make sure this is a decision that will not jeopardize length of service life, the committee is looking for Washington State test data to support the increase.
- May 8, 2015 – Dave Gent provided a copy (See Attachment #1) of the letter sent to WSDOT summarizing his understanding of the agreement in principle, between WSDOT and WAPA folks on the RAP Subcommittee, which creates a new RAP category for binder bumping in lieu of blending, for RAP between 20% and 25%. It was agreed that the goal is to finalize this into a spec to be published in the January 2016 Amendments.
- October 9, 2015 – Update from Kurt Williams – We need to reconvene the subcommittee to work out a few details. Need more discussion on the proposed changes to RAP between 20% and 25%. Dave Gent and Kurt will get the RAP subcommittee going on this.

- May 6, 2016 –Dave Gent handed out a draft a spec (attach #13-07a) which provides for a new “Medium RAP/No RAS” mix designation, and provided a handout of a report by Shane Buchanan titled “Washington State RAP Blending ‘What If’ Scenarios” (attach #13-07b). Further discussion of that spec will be done by the RAP/RAS subcommittee.
- November 4, 2016 – Dave Gent and Joe DeVol discussed the meeting minutes from the WSDOT/WAPA’s subcommittee on RAP meeting of October 4, 2016 (attachment #1, 13-07).
- March 24, 2017 - Update on proposed 25% RAP with binder bump spec. (Joe DeVol). WSDOT was unable to identify 4 contracts prior to advertisement to include the pilot spec. WSDOT would like to invite contractors on 4 contracts (2 east, 2 west) to propose a no cost change order on a portion of an executed contract for this study. Contractors that are interested in participating are requested to notify the Regional Construction Engineer and the ASCE.
- **October 27, 2017 We were unable to find any projects willing to volunteer to be a pilot to test 25% RAP with binder bump. Discussion on this item will be tables until U of W completes the RAP Reset study, and the HMA Reset study.**

#### **14-13 Fine Aggregate Angularity (FAA) aka Uncompacted Void Content**

- October 9, 2014 – Bob Dyer reported he is evaluating the enforcement of this spec on projects back to the 2010 spec book, but not done yet. Several contractors expressed that this test is weighted too high in the statistical evaluation and suggested that WSDOT reduce its relative importance in the future, that the test is not very reproducible, and that there is no mechanism to challenge the WSDOT test results. WSDOT responded that it is part of superpave.
- May 8, 2015 – Continued discussion, led by Dave Gent. Agreed that WAPA would develop a proposal for revisions to the spec.
- October 9, 2015 – Update from Dave Gent, who handed out a draft proposal (attached) to change the spec. The key changes Dave is seeking are a) reduce the size of the financial disincentive, which industry believes is disproportionately high, b) an ability for the contractor to challenge the WSDOT test results, and c) a sliding scale for the severity of the out-of-specness. Other test methods were discussed. Finally agreed that Granite will do some computer experimentation on the effect on the CPF of changing the statistical parameters so that the mixture CPF includes the PF for SE, coarse fracture, and FAA, and report results by next meeting.
- May 6, 2016 – Dave Gent provided a draft spec (attach #14-13a) and excerpts from NCHRP Report 539 “Aggregate Properties and the Performance of Superpave-Designed Hot Mix Asphalt” (attach #14-13b). The gist of the draft spec is to: a) move the FAA, Fracture, and SE related incentive/disincentive out of Spec 1-06 and into Spec 5-04, combine it with the statistical evaluation of the hot mixture properties, and “soften” the effect of the incentive/disincentive, and b) provide for challenges to the FAA test results possibly looking to real-time Hamburg testing as a referee in challenges. The ball is now in WSDOT court to consider the draft spec, with a target of having any resulting revisions to the Standard Specs in the January 2017 Amendments.
- November 4, 2016 –Dave Gent discussed WAPA’s proposed spec change (attachment #2, 14-13). It moves the price adjustment factors for SE, FAA, and Fracture out of Section 3-04 and into the price adjustment factors in Section 5-04. It also provides for challenge samples for failing FAA via Hamburg. The challenge samples would be taken from splits of WSDOT’s acceptance samples. Dave’s goal is to do two things – (1) make the price adjustment more equitable and (2) provide some basis for the contractor to challenge WSDOT test results. Dyer agreed to look into and respond at the next meeting.
- March 24, 2017 – Update from Dave Gent. WAPA requests that WSDOT adjust the aggregate valuation to \$15/ton in Table 1 of Section 3-04. WAPA would still like to have a challenge mechanism for FAA. WAPA would like WSDOT to update its FAA procedure to include the use of a strike off guide plate to increase testing accuracy. (attach #1, 14-13). Bob Dyer agreed to consider these requests.
- **October 27, 2017 Nothing to report. WSDOT has not responded to WAPA request to consider using a strikeoff plate for FAA test.**

#### **14-16 Concerns with SAM**

- October 9, 2014 - Dave Gent noted that SAM set-up is often cumbersome. He also suggested adding a “time stamp” for when documentation is entered (not shown currently) & add an “auto-notification” for producers / pavers (whether GC or sub.) to allow for timely review in case of challenges. Kurt Williams agreed to follow up.
- May 8, 2015 – Update from Kurt Williams. The lab has added a portal to SAM for all to use. A new field will be added to the database to record when each test data is input into SAM. “Auto-notification” to the contractor when data in SAM has been updated is in the process of being created, but has not happened yet. (MATS already has the ability to “auto-send”.)
- October 9, 2015 – Update from Kurt Williams – MATS program has the ability to auto-email results to the contractor if the Paving contractor so requests the PE, but SAM does not. Bob Dyer agreed to modify Construction Manual to require PE to email MATS results when so requested by the contractor.
- May 6, 2016 – Dave Gent noted that there are still (this spring) delays by some WSDOT offices in getting the WSDOT acceptance test data into SAM. Bob Dyer provided a copy of excerpts from the new 5-04 Standard Spec (attach #14-16) showing the aspirational timeliness goals for WSDOT to provide WSDOT’s test results to the contractor. Bill Dempsey volunteered to draft a revision to the WSDOT Construction Manual for WSDOT inspectors to directly and immediately provide test results to the Contractor.
- November 4, 2016 – Nothing to report.
- March 24, 2017 – Bill Dempsey agreed to provide a draft update to the Construction Manual at the next meeting.
- **October 27, 2017 Nothing to report.**

#### **15-09 Is WSDOT still evaluating/considering electro-magnetic asphalt density gauges.**

- October 9, 2015 - Dave Gent - Many WAPA members would like to move to new style gauges and away from nuke gauges, but would like WSDOT’s current view. Steve McDuffee reported his experience has been that they are sensitive to hot HMA and provide more accurate results when pavement is cooled. WAPA reported that small local agencies don’t have nuke gages. Current WSDOT investment in nukes will make this a difficult change, particularly because even if there was established and accepted accuracy of the electric gages, they don’t yet work on soils so WSDOT would have to use both technologies.
- May 6, 2016 – WSDOT wants to get out of the nuke gage business and is considering other technology, but given the status of alternatives to the nuke don’t expect to make any changes for at least two years. Dave Erickson and Bob Dyer agreed to provide for alternate technology as a pilot spec sometime soon.
- November 4, 2016 – Nothing to report.
- March 24, 2017 – It was pointed out that currently FHWA will not allow using an electro-magnetic gauge. Chris Pederson agreed to provide some data at the next meeting that will give an idea of its reliability.
- **October 27, 2017 Nothing to report. Item closed for now, to be reopened when technology improves.**

#### **16-04 Clarify QPL design costs / process/ rebates**

- May 6, 2016 – Discussion focused on WAPA’s concerns regarding getting Commercial HMA mix designs on the QPL. a) WSDOT review cost seems excessive. Joe DeVol agreed to review and report back. b) WSDOT’s requirement for advance payment seems antiquated and has caused delays. Dave Jones is working on developing a solution that provides more ways to pay than a check in advance. C) it was pointed out that the old system of dealing with approval of commercial mix designs was at no cost to the contractor, and frustration was expressed that the change to the QPL was what brought about the need for contractor payment. WSDOT reported that when pay is received timely, turn-around time has been 1 or 2 days.
- November 4, 2016 – Costs have been reduced. WSDOT will accept checks but will wait for the check to clear before beginning review. WSDOT is working on trying to be able to accept credit cards or PayPal but that process is not yet in place. Industry asked if WSDOT could post the rates online; Kurt Williams agreed to look into.
- March 24, 2017 – Update from Kurt Williams. – Kurt hopes to post the rates on-line soon. Also, goal is to be able to accept credit cards by January of 2018.

- **October 27, 2017 WSDOT is on track to be able to accept credit cards near the end of the year.**

#### **16-08 The MSCR test and proposed changes to binder grades**

- May 6, 2016 – Joe DeVol provided a handout (attach #16-08) and explained that MSCR grading is the direction the national standard is headed, and will likely go into effect for WSDOT contracts about 2018.
- November 4, 2016 – MSCR stands for Multiple Stress Creep Recovery. Joe DeVol is working with a multi-state task group on developing specs. Joe expects WSDOT implementation will occur in 2018. Dave Gent noted that the Paving Industry's concern is the need for extra storage tanks, and how smoothly the Oil Industry will make the transition. The question was raised on what WSDOT's expectations would be for QPL approvals of mix designs when all the binder changes. Further discussion needed.
- March 24, 2017 – Update from Joe DeVol – attached to these minutes is a Construction bulletin that describes the new process and describes most of what the new spec will do, along with a draft of the new spec. (Attach #2.5, 16-08) The question came up – what to do with mix designs on the QPL under the old binder grading system after the new grading system is implemented?
- **October 27, 2017 Joe is open for continued discussion on the MSCR spec, but the spec is complete and will be implemented on projects that go on ad after January 1, 2018.**

#### **16-11 How to allow for project generated RAP to be used in the project**

- May 6, 2016 – Dave Gent noted that the requirement for sequestering RAP stockpiles prior to mix design submittal prohibits the use of RAP generated on a project from being used in the HMA on that project and urged that this be overcome somehow. WSDOT reinforced its concern that the RAP properties in this case are unknown. Perhaps provision for real-time RAP testing? More next time.
- November 4, 2016 – Dave Gent will draft a proposed spec and present at the next meeting.
- March 24, 2017 – Update from Dave Gent. (attach #3, 16-11) Dyer will review to see if the spec currently allows what Dave is proposing.
- **October 27, 2017 Item closed.**

#### **16-13 Discussion on a process to modify the "sequestered" RAP and RAS stockpiles rules/ wording**

- May 6, 2016 – No discussion on this item. Similar to item 16-11.
- November 4, 2016 – Dave Gent provided a draft spec change (attach #7, item 16-13). Joe DeVol noted that Dave's proposed spec would provide for testing the addition to the stockpile for binder content and gradation which is good, but he also would need to know about the VMA (which means also need to test for Aggregate sp.gr.). That puts the ball back in WAPA court to provide a draft spec that addresses testing for VMA and aggregate specific gravity.
- March 24, 2017 – Update from Dave Gent. (attach #4, 16-13) Dave presented proposed spec changes. It was pointed out that the proposed spec change does not address the possibility that binder properties could change as the contractor adds to the stockpile, and therefore the questions were asked – What about testing binder properties?, and How will changes in binder properties manifest themselves in the mix being placed on the road, and how will this be addressed?
- **October 27, 2017 – Dave Gent provided a handout (attach #4, item #16-13), but no discussion.**

#### **16-14 WAQTC – Implementation Plan**

- May 6, 2016 – Joe DeVol provided a handout (attach 16-14) regarding approximate dates for implementing the requirement for testers to be WAQTC certified. This will initially apply to all WSDOT folks and eventually to Contractor QA personnel. WSDOT has set a target that by 2020 industry will be trained and doing QA, with WSDOT doing QV.
- November 4, 2016 – Kurt Williams noted that the target date for getting all WSDOT testers certified is January of 2018. Also, he is working with ACEC to develop the mechanism to qualify folks that are not WSDOT employees.
- March 24, 2017 – Nothing to report.
- **October 27, 2017 Kurt reports we are on schedule for implementation.**

#### **16-18 Proposal to Vary Number of Hamburg Passes Based on Number of Gyration**

- May 6, 2016 – Dave Gent handed out a proposal (attach 16-18). Joe DeVol will look at it and provide feedback at the next meeting.
- November 4, 2016 – Joe DeVol noted that Hamburg results have improved since eliminating blend sand and implementing elastic recovery. He will review Dave Gent’s proposal, and Dave Gent will provide supporting data.
- March 24, 2017 – Update from Joe DeVol. (attach #5, 16-18) Joe needs more time to review with Chris Pedersen and Granite. However, it seemed agreeable that we could consider taking the 50 gyration out of the spec because it is used so infrequently.
- **October 27, 2017 No discussion.**

#### **16-23 Revise retesting specification to reflect 2008 procedure:**

- November 4, 2016 - Kentin Hill of Granite - There appears to have been a lot of issues this year (as well as in the past) with the state’s initial testing of mix samples. When we think that the states testing isn’t correct and challenge that test, there is no time frame for the retest to be completed. Some retests have taken over a week to get results back. The majority of the retests have come back in our favor (in Granite’s experience) indicating that the test wasn’t run correctly initially. Since we have to make plant changes based on the state’s test results, this lag time isn’t acceptable. We propose reinstating a turnaround time frame on retests? Also, if the samples come back in our favor we propose that WSDOT pay for the cost of the retest. Proposal: In the 2008 spec book there was language that evaluated a retest sample and if it was outside of the tolerances then the state would pay for the extra testing. We propose that we return to this standard. Bob Dyer responded that he will look at the aspirational language currently in the specs regarding turn-around time for test results and make sure it addresses retests.
- March 24, 2017 –No discussion.
- **October 27, 2017 No discussion.**

#### **17-03 Trackless tack –**

- March 24, 2017 – Dave Gent asked what steps would be required to get Nanotac on the QPL as an acceptable trackless tack additive? The answer is that we need a specification. Kurt Williams will look into. Dave Gent agreed to provide a proposal.
- **October 27, 2017 Dave Gent agreed to provide a draft spec.**

#### **17-04 Dual Gyration Design Validation Process Proposal --**

- March 24, 2017 – Information/ proposal provided by Logan Cantrell (Granite). Logan will bring a written proposal to the next meeting.
- **October 27, 2017 – Logan Cantrell lead discussion on the handout he provided (attachment #5, Item 17-04). WSDOT will evaluate and report back at the next meeting.**

### **NEW BUSINESS**

#### **17-06**

- **October 27, 2017 This is Dave Erickson’s last meeting. He is retiring.**

**NEXT MEETING – April 28, 2018, 9AM to noon, Bullfrog.**

# Item 17-02 attach #1

WAPA/WSDOT Improving HMA Meetings	WSDOT October ?? Response																																																																																																																																																																																																																												
<p><b>WAPA October 11<sup>th</sup> Counter Proposal</b></p> <p><b>1 Increase Percent Binder (Pb)</b></p> <p>a. VMA Design Tolerance currently 1.5% below to Spec's</p> <p style="margin-left: 20px;">i. WAPA: - 1.0 in 2018, -0.5 in 2019, -0.5 (Thereafter)</p> <p>b. VMA Field Action:</p> <p style="margin-left: 20px;">i. WAPA: Utilize SAM</p> <p style="margin-left: 40px;">a. VMA -1.5 in 2018, -1.0 in 2019, -0.8 (Thereafter)</p> <p style="margin-left: 40px;">b. Utilize Factor "F" at 2</p> <p>c. AC Production Tolerance Limit currently <math>\pm 0.5</math></p> <p style="margin-left: 20px;">i. WAPA: - 0.4 to + 0.5 (All Years)</p> <p>d. Eliminate the use of 125 N-design gyration mixes except by special consideration of the State Pavement Design &amp; State Hqtr. Lab teams</p> <p>e. Use binder bump as the preferred alternate to 125 N-design, as needed.</p> <p><b>2. Density</b></p> <p>WAPA:</p> <p>a. Step Increase Lower Spec Limit in 0.5% increments</p> <p>b. Decrease Disincentive going forward to eliminate "fines doubling in the work zone" - See cell notes</p> <p>c. Maintain a Disincentive <math>\Delta</math> vs. Incentive 2020 and beyond</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th></th> <th>2018</th> <th>2019</th> <th>There-after</th> </tr> </thead> <tbody> <tr> <td>Lower spec. limit (LSL) for density</td> <td>91.5</td> <td>92.0</td> <td>92.0</td> </tr> <tr> <td>Lower spec. limit for Disincentive <math>\Delta</math></td> <td>91.0</td> <td>91.5</td> <td>92.0</td> </tr> <tr> <td><b>Do Not Alter *</b></td> <td colspan="3" style="background-color: #ffff00;"><b>Disincentive Calc. Factor Stays as is</b></td> </tr> <tr> <td></td> <td>0.4</td> <td>0.4</td> <td>0.4</td> </tr> <tr> <td><b>Increase *</b></td> <td colspan="3" style="background-color: #ffff00;"><b>Incentive Calc. Factor</b></td> </tr> <tr> <td></td> <td>0.8</td> <td>1.0</td> <td>1.0</td> </tr> </tbody> </table> <p>d. Allow compaction aid additives as requested for high RAP and RAS mixes (plant temps. in line with virgin binder temp. vis. curve production temperatures). Currently "warm mix" additives are not allowed for high RAP/RAS mix.</p> <p>e. Alternate Incentive Pay Factor Path: Adjusted Pay Factors strategy in lieu of adjusted Calculation Factor (5-04.5(1)B) for ease of programming</p> <p>f. * If the different Calc. Factor for the CPF is not readily "programmable", wouldn't the result be approximately the same</p> <div style="text-align: right; margin-top: 10px;"> <p><i>Control of Material</i> <span style="float: right;">1-06</span></p> </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <caption style="text-align: center;">Table 2 Pay Factors</caption> <thead> <tr> <th rowspan="2">Pay Factor</th> <th colspan="16">Required Quality Level for a Given Sample Size (n) and a Given Pay Factor</th> </tr> <tr> <th>n=3</th><th>n=4</th><th>n=5</th><th>n=6</th><th>n=7</th><th>n=8</th><th>n=9</th><th>n=10</th><th>n=12</th><th>n=15</th><th>n=18</th><th>n=23</th><th>n=30</th><th>n=43</th><th>n=67</th> </tr> </thead> <tbody> <tr> <td>1.05</td><td>1.12</td><td></td><td></td><td></td><td></td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td> </tr> <tr> <td>1.04</td><td>1.10</td><td></td><td></td><td></td><td>100</td><td>99</td><td>97</td><td>95</td><td>96</td><td>96</td><td>96</td><td>97</td><td>97</td><td>97</td><td>97</td> </tr> <tr> <td>1.03</td><td>1.08</td><td></td><td></td><td>100</td><td>98</td><td>96</td><td>94</td><td>92</td><td>93</td><td>93</td><td>94</td><td>95</td><td>95</td><td>96</td><td>96</td> </tr> <tr> <td>1.02</td><td>1.04</td><td></td><td></td><td>99</td><td>97</td><td>94</td><td>91</td><td>89</td><td>90</td><td>91</td><td>92</td><td>93</td><td>93</td><td>94</td><td>94</td> </tr> <tr> <td>1.01</td><td>1.02</td><td>100</td><td>100</td><td>100</td><td>98</td><td>95</td><td>92</td><td>89</td><td>87</td><td>88</td><td>89</td><td>90</td><td>91</td><td>92</td><td>93</td> </tr> <tr> <td>1.00</td><td>69</td><td>75</td><td>78</td><td>80</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td><td>91</td><td>92</td> </tr> <tr> <td>0.99</td><td>66</td><td>72</td><td>76</td><td>78</td><td>80</td><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>89</td><td>90</td><td>91</td> </tr> <tr> <td>0.98</td><td>64</td><td>70</td><td>74</td><td>76</td><td>78</td><td>79</td><td>80</td><td>81</td><td>82</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>90</td> </tr> <tr> <td>0.97</td><td>63</td><td>68</td><td>72</td><td>74</td><td>76</td><td>77</td><td>78</td><td>79</td><td>81</td><td>82</td><td>83</td><td>84</td><td>86</td><td>87</td><td>88</td> </tr> <tr> <td>0.96</td><td>61</td><td>67</td><td>70</td><td>72</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>81</td><td>82</td><td>83</td><td>84</td><td>86</td><td>87</td> </tr> </tbody> </table>		2018	2019	There-after	Lower spec. limit (LSL) for density	91.5	92.0	92.0	Lower spec. limit for Disincentive $\Delta$	91.0	91.5	92.0	<b>Do Not Alter *</b>	<b>Disincentive Calc. Factor Stays as is</b>				0.4	0.4	0.4	<b>Increase *</b>	<b>Incentive Calc. Factor</b>				0.8	1.0	1.0	Pay Factor	Required Quality Level for a Given Sample Size (n) and a Given Pay Factor																n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10	n=12	n=15	n=18	n=23	n=30	n=43	n=67	1.05	1.12					100	100	100	100	100	100	100	100	100	100	1.04	1.10				100	99	97	95	96	96	96	97	97	97	97	1.03	1.08			100	98	96	94	92	93	93	94	95	95	96	96	1.02	1.04			99	97	94	91	89	90	91	92	93	93	94	94	1.01	1.02	100	100	100	98	95	92	89	87	88	89	90	91	92	93	1.00	69	75	78	80	82	83	84	85	86	87	88	89	90	91	92	0.99	66	72	76	78	80	81	82	83	84	85	86	87	89	90	91	0.98	64	70	74	76	78	79	80	81	82	84	85	86	87	88	90	0.97	63	68	72	74	76	77	78	79	81	82	83	84	86	87	88	0.96	61	67	70	72	74	75	76	77	78	81	82	83	84	86	87	<p><b>WSDOT October ?? Response</b></p> <p><b>1 Increase Percent Binder (Pb)</b></p> <p>a. VMA Mix Design Tolerance currently 1.5% below to Spec's</p> <p style="margin-left: 20px;">ii. WSDOT VMA Tolerance Below Spec:</p> <p style="margin-left: 40px;">a. - 1.0 in 2018, -1.0 in 2019</p> <p style="margin-left: 40px;">b. Raise VMA Lower Spec Limit by 0.5 in 2020</p> <p style="margin-left: 40px;"><u>Monitor for Future Adjustments</u></p> <p>b. VMA Field Testing Action:</p> <p style="margin-left: 20px;">ii. WSDOT: Utilize SAM Program to address Action and Suspend.</p> <p style="margin-left: 40px;">a. VMA -1.5 below Spec in 2018 and -1.0 in 2019</p> <p style="margin-left: 40px;">b. Raise VMA Lower Spec Limit by 0.5 in 2020</p> <p style="margin-left: 40px;">c. Factor "F" at "2" for 2018, "10" for 2019, "15" for 2020</p> <p style="margin-left: 40px;"><u>Monitor for Future Adjustments</u></p> <p>c. AC Production Tolerance Limit currently <math>\pm 0.5</math></p> <p style="margin-left: 20px;">ii. WSDOT: -0.4 to + 0.5 (<u>Monitor for Potential Adjustments</u>)</p> <p>d. Delete 125 N-design gyration mixes from Specifications.</p> <p>e. If used 125N-design would be a Special Provision with Mix Design.</p> <p><b>2. Density</b></p> <p><b>WSDOT</b></p> <p>Increase the lower specification limit (LSL) from 91% to 92%.</p> <p>To provide an HMA pavement that will last longer the LSL will be increased by one percent. Implementation of the LSL increase will be over a 1-2 year period with the changes for 2018 as specified below. Along with the increase in the LSL for compaction will be a modification to the formula for calculation of the Compaction Price Adjustment (CPA). Currently, a "Factor" of 0.4 is used in the calculation for incentives and disincentives. The factor will be modified to increase the incentive payment calculation as a shared benefit between WSDOT and the paving contractor for the longer lasting pavement. The disincentive factor may also be adjusted to improve pavement quality.</p> <p>WSDOT and WAPA will review the HMA quality annually. WSDOT will determine if an adjustment to the LSL or the CPA factors for incentive/disincentive payments is necessary to produce long lasting HMA.</p> <p><b>2018:</b></p> <p style="margin-left: 20px;">Incentive: LSL = 91.5% and Factor of 0.8</p> <p style="margin-left: 20px;">Disincentive and rejection: LSL = 91% and Factor of 0.4</p> <p style="margin-left: 20px;">If the CPF calculation is (1) not an incentive using an LSL of 91.5% or (2) not a disincentive or rejection using a LSL of 91% the CPF will be 1.00</p> <p><b>2019:</b></p> <p style="margin-left: 20px;">Incentive: LSL = 92% and the Factor is TBD</p> <p style="margin-left: 20px;">Disincentive: LSL and Factor TBD</p> <p style="margin-left: 20px;">If the CPF calculation is (1) not an incentive using an LSL of 92.0% or (2) not a disincentive or rejection using a LSL TBD the CPF will be 1.00</p> <p><b>2020 and beyond (same for both options):</b></p> <p style="margin-left: 20px;">LSL = 92 for incentive and disincentive</p> <p style="margin-left: 20px;">Factors for incentive and disincentive TBD</p>
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<p><b>3. 3/8 Inch HMA</b></p> <p>1. Encourage expanded use of 3/8" HMA. Continue to education Regions on 3/8"HMA advantages.</p> <p>2. Discourage/ eliminate use of different HMA types on projects with bridge decks. Use 3/8" HMA on the entire job.</p>	<p><b>3. 3/8 Inch HMA</b></p> <p>a. Increase use of 3/8 Inch HMA. – WSDOT Expand Use</p>																																																																																																																																																																																																																												

attach #2

## 5-04 Hot Mix Asphalt

This Section 5-04 is written in a style which, unless otherwise indicated, shall be interpreted as direction to the Contractor.

### 5-04.1 Description

This Work consists of providing and placing one or more layers of plant-mixed hot mix asphalt (HMA) on a prepared foundation or base, in accordance with these Specifications and the lines, grades, thicknesses, and typical cross-sections shown in the Plans. The manufacture of HMA may include additives that reduce the optimum mixing temperature or serve as a compaction aid ~~warm mix asphalt (WMA) processes~~ in accordance with these Specifications.

HMA shall be composed of asphalt binder and mineral materials as required, and may include reclaimed asphalt pavement (RAP) or reclaimed asphalt shingles (RAS), mixed in the proportions specified to provide a homogeneous, stable, and workable mix.

### 5-04.2 Materials

Provide materials as specified in these sections:

Asphalt Binder	9-02.1(4)
Cationic Emulsified Asphalt	9-02.1(6)
Anti-Stripping Additive	9-02.4
<del>Warm Mix Asphalt (WMA)</del> Additive	9-02.5
Aggregates	9-03.8
Reclaimed Asphalt Pavement (RAP)	9-03.8(3)B
Reclaimed Asphalt Shingles (RAS)	9-03.8(3)B
Mineral Filler	9-03.8(5)
Recycled Material	9-03.21
Joint Sealants	9-04.2
Closed Cell Foam Backer Rod	9-04.2(3)A

#### 5-04.2(1) How to Get an HMA Mix Design on the QPL

Comply with each of the following:

- Develop the mix design in accordance with WSDOT SOP 732.
- Develop a mix design that complies with Sections 9-03.8(2) and 9-03.8(6).
- Develop a mix design no more than 6 months prior to submitting it for QPL evaluation.
- Submit mix designs to the WSDOT State Materials Laboratory in Tumwater, including WSDOT Form 350-042.
- Include representative samples of the materials that are to be used in the HMA production as part of the mix design submittal.
- Identify the brand, type, and percentage of anti-stripping additive in the mix design submittal.
- Include with the mix design submittal a certification from the asphalt binder supplier that the anti-stripping additive is compatible with the crude source and the formulation of asphalt binder proposed for use in the mix design.
- Do not include ~~warm mix asphalt (WMA)~~ HMA additives that reduce the optimum mixing temperature or serve as a compaction aid when developing a mix design or submitting a mix design for QPL evaluation. The use of ~~warm mix asphalt (WMA)~~ HMA additives is not part of the process for obtaining approval for listing a mix design on the QPL. Refer to Section 5-04.2(2)B.

The Contracting Agency's basis for approving, testing, and evaluating HMA mix designs for approval on the QPL is dependent on the contractual basis for acceptance of the HMA mixture, as shown in Table 1.

Table 1

Basis for Contracting Agency Evaluation of HMA Mix Designs for Approval on the QPL		
Contractual Basis for Acceptance of HMA Mixture [see Section 5-04.3(9)]	Basis for Contracting Agency Approval of Mix Design for Placement on QPL	Contracting Agency Materials Testing for Evaluation of the Mix Design
Statistical Evaluation	WSDOT Standard Practice QC-8	The Contracting Agency will test the mix design materials for compliance with Sections 9-03.8(2) and 9-03.8(6).
Visual Evaluation	Review of Form 350-042 for compliance with Sections 9-03.8(2) and 9-03.8(6)	The Contracting Agency may elect to test the mix design materials, or evaluate in accordance with WSDOT Standard Practice QC-8, at its sole discretion.

If the Contracting Agency approves the mix design, it will be listed on the QPL for 12 consecutive months. The Contracting Agency may extend the 12 month listing provided the Contractor submits a certification letter to the Qualified Products Engineer verifying that the aggregate source and

job mix formula (JMF) gradation, and asphalt binder crude source and formulation have not changed. The Contractor may submit the certification no sooner than three months prior to expiration of the initial 12 month mix design approval. Within 7 calendar days of receipt of the Contractor's certification, the Contracting Agency will update the QPL. The maximum duration for approval of a mix design and listing on the QPL will be 24 months from the date of initial approval or as approved by the Engineer.

**5-04.2(1)A Mix Designs Containing RAP and/or RAS**

Mix designs are classified by the RAP and/or RAS content as shown in Table 2.

Table 2

Mix Design Classification Based on RAP/RAS Content	
RAP/RAS Classification	RAP/RAS Content <sup>1</sup>
Low RAP/No RAS	0% ≤ RAP% ≤ 20% and RAS% = 0%
High RAP/Any RAS	20% < RAP% ≤ Maximum Allowable RAP <sup>2</sup> and/or 0% < RAS% ≤ Maximum Allowable RAS <sup>2</sup>

<sup>1</sup>Percentages in this table are by total weight of HMA  
<sup>2</sup>See Table 4 to determine the limits on the maximum amount RAP and/or RAS.

**5-04.2(1)A1 Low RAP/No RAS – Mix Design Submittals for Placement on QPL**

For Low RAP/No RAS mix designs, comply with the following additional requirements:

1. Develop the mix design with or without the inclusion of RAP.
2. The asphalt binder grade shall be the grade indicated in the Bid item name or as otherwise required by the Contract.
3. Submit samples of RAP if used in development of the mix design.
4. Testing RAP or RAS stockpiles is not required for obtaining approval for placing these mix designs on the QPL.

**5-04.2(1)A2 High RAP/Any RAS – Mix Design Submittals for Placement on QPL**

For High RAP/Any RAS mix designs, comply with the following additional requirements:

1. For mix designs with any RAS, test the RAS stockpile (and RAP stockpile if any RAP is in the mix design) in accordance with Table 3.
2. For High RAP mix designs with no RAS, test the RAP stockpile in accordance with Table 3.
3. For mix designs with High RAP/Any RAS, construct a single stockpile for RAP and a single stockpile for RAS and isolate (sequester) these stockpiles from further stockpiling before beginning development of the mix design. Test the RAP and RAS during stockpile construction as required by item 1 and 2 above. Use the test data in developing the mix design, and report the test data to The Contracting Agency on WSDOT Form 350-042 as part of the mix design submittal for approval on the QPL. Account for the reduction in asphalt binder contributed from RAS in accordance with AASHTO PP 78. Do not add to these stockpiles after starting the mix design process.

Table 3

Test Frequency of RAP/RAS During RAP/RAS Stockpile Construction For Approving a High RAP/Any RAS Mix Design for Placement on the QPL		
Test Frequency <sup>1</sup>	Test for	Test Method
<ul style="list-style-type: none"> <li>• 1/1000 tons of RAP (minimum of 10 per mix design) and</li> <li>• 1/100 tons of RAS (minimum of 10 per mix design)</li> </ul>	Asphalt Binder Content and Sieve Analysis of Fine and Coarse Aggregate	FOP for AASHTO T 308 and FOP for WAQTC T 27/T 11

<sup>1</sup>"tons", in this table, refers to tons of the reclaimed material before being incorporated into HMA.

4. Limit the amount of RAP and/or RAS used in a High RAP/Any RAS mix design by the amount of binder contributed by the RAP and/or RAS, in accordance with Table 4.

Table 4

Maximum Amount of RAP and/or RAS in HMA Mixture	
Maximum Amount of Binder Contributed from:	
RAP	RAS
40% <sup>1</sup> minus contribution of binder from RAS	20% <sup>2</sup>

<sup>1</sup>Calculated as the weight of asphalt binder contributed from the RAP as a percentage of the total weight of asphalt binder in the mixture.

<sup>2</sup>Calculated as the weight of asphalt binder contributed from the RAS as a percentage of the total weight of asphalt binder in the mixture.

5. Develop the mix design including RAP, RAS, recycling agent, and new binder.
6. Extract, recover, and test the asphalt residue from the RAP and RAS stockpiles to determine the percent of recycling agent and/or grade of new asphalt binder needed to meet but not exceed the performance grade (PG) of asphalt binder required by the Contract.
  - a. Perform the asphalt extraction in accordance with AASHTO T 164 or ASTM D 2172 using reagent grade solvent.
  - b. Perform the asphalt recovery in accordance with AASHTO R 59 or ASTM D 1856.
  - c. Test the recovered asphalt residue in accordance with AASHTO R 29 to determine the asphalt binder grade in accordance with Section 9-02.1(4).
  - d. After determining the recovered asphalt binder grade, determine the percent of recycling agent and/or grade of new asphalt binder in accordance with ASTM D 4887.
  - e. Test the final blend of recycling agent, binder recovered from the RAP and RAS, and new asphalt binder in accordance with AASHTO R 29. The final blended binder shall meet but not exceed the performance grade of asphalt binder required by the Contract and comply with the requirements of Section 9-02.1(4).
7. Include the following test data with the mix design submittal:
  - a. All test data from RAP and RAS stockpile construction.
  - b. All data from testing the recovered and blended asphalt binder.
8. Include representative samples of the following with the mix design submittal:
  - a. RAP and RAS.
  - b. 150 grams of recovered asphalt residue from the RAP and RAS that are to be used in the HMA production.

#### 5-04.2(1)B Commercial HMA – Mix Design Submittal for Placement on QPL

For HMA used in the Bid item Commercial HMA, in addition to the requirements of 5-04.2(1) identify the following in the submittal:

1. Commercial HMA
2. Class of HMA
3. Performance grade of binder
4. Equivalent Single Axle Load (ESAL)

The Contracting Agency may elect to approve Commercial HMA mix designs without evaluation.

#### 5-04.2(1)C Mix Design Resubmittal for QPL Approval

Develop a new mix design and resubmit for approval on the QPL when any of the following changes occur. When these occur, discontinue using the mix design until after it is reapproved on the QPL.

1. Change in the source of crude petroleum used in the asphalt binder.
2. Changes in the asphalt binder refining process.
3. Changes in additives or modifiers used in the asphalt binder.
4. Changes in the anti-strip additive, brand, type or quantity.
5. Changes to the source of material for aggregate.
6. Changes to the job mix formula that exceed the amounts as described in item 2 of Section 9-03.8(7), unless otherwise approved by the Engineer.
7. Changes in the percentage of material from a stockpile, when such changes exceed 5% of the total aggregate weight.
  - a. For Low RAP/No RAS mix designs developed without RAP, changes to the percentage of material from a stockpile will be calculated based on the total aggregate weight not including the weight of RAP.
  - b. For Low RAP/No RAS mix designs developed with RAP, changes to the percentage of material from a stockpile will be calculated based on the total aggregate weight including the weight of RAP.
  - c. For High RAP/Any RAS mix designs, changes in the percentage of material from a stockpile will be based on total aggregate weight including the weight of RAP (and/or RAS when included in the mixture).

Prior to making any change in the amount of RAS in an approved mix design, notify the Engineer for determination of whether a new mix design is required, and obtain the Engineer's approval prior to implementing such changes.

#### 5-04.2(2) Mix Design – Obtaining Project Approval

Use only mix designs listed on the Qualified Products List (QPL). Submit WSDOT Form 350-041 to the Engineer to request approval to use a mix design from the QPL. Changes to the job mix formula (JMF) that have been approved on other contracts may be included. The Engineer may reject a request to use a mix design if production of HMA using that mix design on any contract is not in compliance with Section 5-04.3(1)D, E, F, and G for mixture or compaction.

#### 5-04.2(2)A Changes to the Job Mix Formula

The approved mix design obtained from the QPL will be considered the starting job mix formula (JMF) and shall be used as the initial basis for acceptance of HMA mixture, as detailed in Section 5-04.3(9).

During production the Contractor may request to adjust the JMF. Any adjustments to the JMF will require approval of the Engineer and shall be made in accordance with ~~item 2 of~~ Section 9-03.8(7). After approval by the Engineer, such adjusted JMF's shall constitute the basis for acceptance of the HMA mixture.

#### 5-04.2(2)B Using ~~Warm-Mix Asphalt Processes~~ HMA Additives

The Contractor may, at the Contractor's discretion, elect to use additives that reduce the optimum mixing temperature or serve as a compaction aid ~~warm mix asphalt (WMA) processes~~ for producing HMA. ~~WMA processes~~ Additives include organic additives, chemical additives, and foaming ~~processes~~. The use of ~~WMA~~ Additives is subject to the following:

- Do not use additives that reduce the optimum mixing temperature ~~WMA processes~~ in the production of High RAP/Any RAS mixtures.
- Before using additives ~~WMA processes~~, obtain the Engineer's approval using WSDOT Form 350-076 to describe the proposed additive ~~WMA~~ and process.

### 5-04.3 Construction Requirements

#### 5-04.3(1) Weather Limitations

Do not place HMA for wearing course on any Traveled Way beginning October 1<sup>st</sup> through March 31<sup>st</sup> of the following year, without written concurrence from the Engineer.

Do not place HMA on any wet surface, or when the average surface temperatures are less than those specified in Table 5, or when weather conditions otherwise prevent the proper handling or finishing of the HMA.

Table 5

Minimum Surface Temperature for Paving		
Compacted Thickness (Feet)	Wearing Course	Other Courses
Less than 0.10	55°F	45°F
0.10 to 0.20	45°F	35°F
More than 0.20	35°F	35°F

#### 5-04.3(2) Paving Under Traffic

These requirements apply when the Roadway being paved is open to traffic.

In hot weather, the Engineer may require the application of water to the pavement to accelerate the finish rolling of the pavement and to shorten the time required before reopening to traffic.

During paving operations, maintain temporary pavement markings throughout the project. Install temporary pavement markings on the Roadway prior to opening to traffic. Temporary pavement markings shall comply with Section 8-23.

#### 5-04.3(3) Equipment

##### 5-04.3(3)A Mixing Plant

Equip mixing plants as follows:

1. **Use tanks for storage and preparation of asphalt binder which:**
  - Heat the contents by means that do not allow flame to contact the contents or the tank, such as by steam or electricity.
  - Heat and hold contents at the required temperatures.
  - Continuously circulate contents to provide uniform temperature and consistency during the operating period.
  - Provide an asphalt binder sampling valve, in either the storage tank or the supply line to the mixer.
2. **Provide thermometric equipment:**
  - In the asphalt binder feed line near the charging valve at the mixer unit, capable of detecting temperature ranges expected in the HMA and in a location convenient and safe for access by Inspectors.
  - At the discharge chute of the drier to automatically register or indicate the temperature of the heated aggregates, and situated in full view of the plant operator.
3. **When heating asphalt binder:**

- Do not exceed the maximum temperature of the asphalt binder recommended by the asphalt binder supplier.
  - Avoid local variations in heating.
  - Provide a continuous supply of asphalt binder to the mixer at a uniform average temperature with no individual variations exceeding 25°F.
4. **Provide a mechanical sampler for sampling mineral materials that:**
    - Meets the crushing or screening requirements of Section 1-05.6.
  5. **Provide HMA sampling equipment that complies with WSDOT T168.**
    - Use a mechanical sampling device installed between the discharge of the silo and the truck transport, approved by the Engineer, or
    - Platforms or devices to enable sampling from the truck transport without entering the truck transport for sampling HMA.
  6. **Provide for setup and operation of the Contracting Agency's field testing:**
    - As required in Section 3-01.2(2).
  7. **Provide screens or a lump breaker:**
    - When using any RAP or any RAS, to eliminate oversize RAP or RAS particles from entering the pug mill or drum mixer.

#### **5-04.3(3)B Hauling Equipment**

Provide HMA hauling equipment with tight, clean, smooth metal beds and a cover of canvas or other suitable material of sufficient size to protect the HMA from adverse weather. Securely attach the cover to protect the HMA whenever the weather conditions during the work shift include, or are forecast to include, precipitation or an air temperature less than 45°F.

Prevent HMA from adhering to the hauling equipment. Spray metal beds with an environmentally benign release agent. Drain excess release agent prior to filling hauling equipment with HMA. Do not use petroleum derivatives or other coating material that contaminate or alter the characteristics of the HMA. For hopper trucks, operate the conveyor during the process of applying the release agent.

#### **5-04.3(3)C Pavers**

Use self-contained, power-propelled pavers provided with an internally heated vibratory screed that is capable of spreading and finishing courses of HMA in lane widths required by the paving section shown in the Plans.

When requested by the Engineer, provide written certification that the paver is equipped with the most current equipment available from the manufacturer for the prevention of segregation of the coarse aggregate particles. The certification shall list the make, model, and year of the paver and any equipment that has been retrofitted to the paver.

Operate the screed in accordance with the manufacturer's recommendations and in a manner to produce a finished surface of the required evenness and texture without tearing, shoving, segregating, or gouging the mixture. Provide a copy of the manufacturer's recommendations upon request by the Contracting Agency. Extensions to the screed will be allowed provided they produce the same results, including ride, density, and surface texture as obtained by the primary screed. In the Travelled Way do not use extensions without both augers and an internally heated vibratory screed.

Equip the paver with automatic screed controls and sensors for either or both sides of the paver. The controls shall be capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing automatic signals that operate the screed to maintain the desired grade and transverse slope. Construct the sensor so it will operate from a reference line or a mat referencing device. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

Equip the paver with automatic feeder controls, properly adjusted to maintain a uniform depth of material ahead of the screed.

Manual operation of the screed is permitted in the construction of irregularly shaped and minor areas. These areas include, but are not limited to, gore areas, road approaches, tapers and left-turn channelizations.

When specified in the Contract, provide reference lines for vertical control. Place reference lines on both outer edges of the Traveled Way of each Roadway. Horizontal control utilizing the reference line is permitted. Automatically control the grade and slope of intermediate lanes by means of reference lines or a mat referencing device and a slope control device. When the finish of the grade prepared for paving is superior to the established tolerances and when, in the opinion of the Engineer, further improvement to the line, grade, cross-section, and smoothness can best be achieved without the use of the reference line, a mat referencing device may be substituted for the reference line. Substitution of the device will be subject to the continued approval of the Engineer. A joint matcher may be used subject to the approval of the Engineer. The reference line may be removed after completion of the first course of HMA when approved by the Engineer. Whenever the Engineer determines that any of these methods are failing to provide the necessary vertical control, the reference lines will be reinstalled by the Contractor.

Furnish and install all pins, brackets, tensioning devices, wire, and accessories necessary for satisfactory operation of the automatic control equipment.

If the paving machine in use is not providing the required finish, the Engineer may suspend Work as allowed by Section 1-08.6.

#### **5-04.3(3)D Material Transfer Device or Material Transfer Vehicle**

Use a material transfer device (MTD) or material transfer vehicle (MTV) to deliver the HMA from the hauling equipment to the paving machine for any lift in (or partially in) the top 0.30 feet of the pavement section used in traffic lanes. However, an MTD/V is not required for HMA placed in irregularly shaped and minor areas such as tapers and turn lanes, or for HMA mixture that is accepted by Visual Evaluation. At the Contractor's request the Engineer may approve paving without an MTD/V; the Engineer will determine if an equitable adjustment in cost or time is due. If a windrow elevator is used, the Engineer may limit the length of the windrow in urban areas or through intersections.

To be approved for use, an MTV:

1. Shall be self-propelled vehicle, separate from the hauling vehicle or paver.
2. Shall not be connected to the hauling vehicle or paver.
3. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
4. Shall mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
5. Shall mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

To be approved for use, an MTD:

1. Shall be positively connected to the paver.
2. May accept HMA directly from the haul vehicle or pick up HMA from a windrow.
3. Shall mix the HMA after delivery by the hauling equipment and prior to placement into the paving machine.
4. Shall mix the HMA sufficiently to obtain a uniform temperature throughout the mixture.

#### 5-04.3(3)E Rollers

Operate rollers in accordance with the manufacturer's recommendations. When requested by the Engineer, provide a Type 1 Working Drawing of the manufacturer's recommendation for the use of any roller planned for use on the project. Do not use rollers that crush aggregate, produce pickup or washboard, unevenly compact the surface, displace the mix, or produce other undesirable results.

#### 5-04.3(4) Preparation of Existing Paved Surfaces

Before constructing HMA on an existing paved surface, the entire surface of the pavement shall be clean. Entirely remove all fatty asphalt patches, grease drippings, and other deleterious substances from the existing pavement to the satisfaction of the Engineer. Thoroughly clean all pavements or bituminous surfaces of dust, soil, pavement grindings, and other foreign matter. Thoroughly remove any cleaning or solvent type liquids used to clean equipment spilled on the pavement before paving proceeds. Fill all holes and small depressions with an appropriate class of HMA. Level and thoroughly compact the surface of the patched area.

Apply a uniform coat of asphalt (tack coat) to all paved surfaces on which any course of HMA is to be placed or abutted. Apply tack coat to cover the cleaned existing pavement with a thin film of residual asphalt free of streaks and bare spots. Apply a heavy application of tack coat to all joints. For Roadways open to traffic, limit the application of tack coat to surfaces that will be paved during the same working shift. Equip the spreading equipment with a thermometer to indicate the temperature of the tack coat material.

Do not operate equipment on tacked surfaces until the tack has broken and cured. Repair tack coat damaged by the Contractor's operation, prior to placement of the HMA.

Unless otherwise approved by the Engineer, use cationic emulsified asphalt CSS-1, CSS-1h, ~~STE-1~~, or Performance Graded (PG) asphalt for tack coat. The CSS-1 and CSS-1h may be diluted with water at a rate not to exceed one part water to one part emulsified asphalt. Do not allow the tack coat material to exceed the maximum temperature recommended by the asphalt supplier.

When shown in the Plans, prelevel uneven or broken surfaces over which HMA is to be placed by using an asphalt paver, a motor patrol grader, or by hand raking, as approved by the Engineer.

#### 5-04.3(4)A Crack Sealing

##### 5-04.3(4)A1 General

When the Proposal includes a pay item for crack sealing, seal all cracks  $\frac{1}{4}$  inch in width and greater.

**Cleaning:** Ensure that cracks are thoroughly clean, dry and free of all loose and foreign material when filling with crack sealant material. Use a hot compressed air lance to dry and warm the pavement surfaces within the crack immediately prior to filling a crack with the sealant material. Do not overheat pavement. Do not use direct flame dryers. Routing cracks is not required.

**Sand Slurry:** For cracks that are to be filled with sand slurry, thoroughly mix the components and pour the mixture into the cracks until full. Add additional CSS-1 cationic emulsified asphalt to the sand slurry as needed for workability to ensure the mixture will completely fill the cracks. Strike off the sand slurry flush with the existing pavement surface and allow the mixture to cure. Top off cracks that were not completely filled with additional sand slurry. Do not place the HMA overlay until the slurry has fully cured.

**Hot Poured Sealant:** For cracks that are to be filled with hot poured sealant, apply the material in accordance with these requirements and the manufacturer's recommendations. Furnish a Type 1 Working Drawing of the manufacturer's product information and recommendations to the Engineer prior to the start of work, including the manufacturer's recommended heating time and temperatures, allowable storage time and temperatures after initial heating, allowable reheating criteria, and application temperature range. Confine hot poured sealant material within the crack. Clean any overflow of sealant from the pavement surface. If, in the opinion of the Engineer, the Contractor's method of sealing the cracks with hot poured sealant results in an excessive amount of material on the pavement surface, stop and correct the operation to eliminate the excess material.

##### 5-04.3(4)A2 Crack Sealing Areas Prior to Paving

In areas where HMA will be placed, use sand slurry to fill the cracks.

#### 5-04.3(4)A3 Crack Sealing Areas Not to be Paved

In areas where HMA will not be placed, fill the cracks as follows:

1. Cracks ¼ inch to 1 inch in width - fill with hot poured sealant.
2. Cracks greater than 1 inch in width – fill with sand slurry.

#### 5-04.3(4)B Soil Residual Herbicide

Where shown in the Plans, apply one application of an approved soil residual herbicide. Comply with Section 8-02.3(3)B. Complete paving within 48 hours of applying the herbicide.

Use herbicide registered with the Washington State Department of Agriculture for use under pavement. Before use, obtain the Engineer's approval of the herbicide and the proposed rate of application. Include the following information in the request for approval of the material:

1. Brand Name of the Material,
2. Manufacturer,
3. Environmental Protection Agency (EPA) Registration Number,
4. Material Safety Data Sheet, and
5. Proposed Rate of Application.

#### 5-04.3(4)C Pavement Repair

Excavate pavement repair areas and backfill these with HMA in accordance with the details shown in the Plans and as staked. Conduct the excavation operations in a manner that will protect the pavement that is to remain. Repair pavement not designated to be removed that is damaged as a result of the Contractor's operations to the satisfaction of the Engineer at no cost to the Contracting Agency. Excavate only within one lane at a time unless approved otherwise by the Engineer. Do not excavate more area than can be completely backfilled and compacted during the same shift.

Unless otherwise shown in the Plans or determined by the Engineer, excavate to a depth of 1.0 feet. The Engineer will make the final determination of the excavation depth required.

The minimum width of any pavement repair area shall be 40 inches unless shown otherwise in the Plans. Before any excavation, sawcut the perimeter of the pavement area to be removed unless the pavement in the pavement repair area is to be removed by a pavement grinder.

Excavated materials shall be the property of the Contractor and shall be disposed of in a Contractor-provided site off the Right of Way or used in accordance with Sections 2-02.3(3) or 9-03.2f.

Apply a heavy application of tack coat to all surfaces of existing pavement in the pavement repair area, in accordance with Section 5-04.3(4).

Place the HMA backfill in lifts not to exceed 0.35-foot compacted depth. Thoroughly compact each lift by a mechanical tamper or a roller.

#### 5-04.3(5) Producing/Stockpiling Aggregates, RAP, & RAS

Produce aggregate in compliance with Section 3-01. Comply with Section 3-02 for preparing stockpile sites, stockpiling, and removing from stockpile each of the following: aggregates, RAP, and RAS. Provide sufficient storage space for each size of aggregate, RAP and RAS. Fine aggregate or RAP may be uniformly blended with the RAS as a method of preventing the agglomeration of RAS particles. Remove the aggregates, RAP and RAS from stockpile(s) in a manner that ensures minimal segregation when being moved to the HMA plant for processing into the final mixture. Keep different aggregate sizes separated until they have been delivered to the HMA plant.

#### 5-04.3(5)A Stockpiling RAP or RAS for High RAP/Any RAS Mixes

Do not place any RAP or RAS into a stockpile which has been sequestered for a High RAP/Any RAS mix design. Do not incorporate any RAP or RAS into a High RAP/Any RAS mixture from any source other than the stockpile which was sequestered for approval of that particular High RAP/Any RAS mix design.

RAP that is used in a Low RAP/No RAS mix is not required to come from a sequestered stockpile.

#### 5-04.3(6) Mixing

The asphalt supplier shall introduce recycling agent and anti-stripping additive, in the amount designated on the QPL for the mix design, into the asphalt binder prior to shipment to the asphalt mixing plant.

Anti-strip is not required for temporary work that will be removed prior to Physical Completion.

Use asphalt binder of the grade, and from the supplier, in the approved mix design.

Prior to introducing reclaimed materials into the asphalt plant, remove wire, nails, and other foreign material. Discontinue use of the reclaimed material if the Engineer, in their sole discretion, determines the wire, nails, or other foreign material to be excessive.

Size RAP and RAS prior to entering the mixer to provide uniform and thoroughly mixed HMA. If there is evidence of the RAP or RAS not breaking down during the heating and mixing of the HMA, immediately suspend the use of the RAP or RAS until changes have been approved by the Engineer.

After the required amount of mineral materials, RAP, RAS, new asphalt binder and recycling agent have been introduced into the mixer, mix the HMA until complete and uniform coating of the particles and thorough distribution of the asphalt binder throughout the mineral materials, RAP and RAS is ensured.

Upon discharge from the mixer, ensure that the temperature of the HMA does not exceed the optimum mixing temperature shown on the approved Mix Design Report by more than 25°F, or as approved by the Engineer. When an WMA additive is included in the manufacture of HMA,

do not heat the ~~WMA~~ additive (at any stage of production including in binder storage tanks) to a temperature higher than the maximum recommended by the manufacturer of the ~~WMA~~ additive.

A maximum water content of 2 percent in the mix, at discharge, will be allowed providing the water causes no problems with handling, stripping, or flushing. If the water in the HMA causes any of these problems, reduce the moisture content.

During the daily operation, HMA may be temporarily held in approved storage facilities. Do not incorporate HMA into the Work that has been held for more than 24 hours after mixing. Provide an easily readable, low bin-level indicator on the storage facility that indicates the amount of material in storage. Waste the HMA in storage when the top level of HMA drops below the top of the cone of the storage facility, except as the storage facility is being emptied at the end of the working shift. Dispose of rejected or waste HMA at no expense to the Contracting Agency.

**5-04.3(7) Spreading and Finishing**

Do not exceed the maximum nominal compacted depth of any layer in any course, as shown in Table 6, unless approved by the Engineer:

Table 6

Maximum Nominal Compacted Depth of Any Layer		
HMA Class	Wearing Course	Other than Wearing Course
1 inch	0.35 feet	0.35 feet
¾ and ½ inch	0.30 feet	0.35 feet
⅝ inch	0.15 feet	0.15 feet

Use HMA pavers complying with Section 5-04.3(3) to distribute the mix. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the paving may be done with other equipment or by hand.

When more than one JMF is being utilized to produce HMA, place the material produced for each JMF with separate spreading and compacting equipment. Do not intermingle HMA produced from more than one JMF. Each strip of HMA placed during a work shift shall conform to a single JMF established for the class of HMA specified unless there is a need to make an adjustment in the JMF.

**5-04.3(8) Aggregate Acceptance Prior to Incorporation in HMA**

Sample aggregate for meeting the requirements of Section 3-04 prior to being incorporated into HMA. (The acceptance data generated for the Section 3-04 acceptance analysis will not be commingled with the acceptance data generated for the Section 5-04.3(9) acceptance analysis.) Aggregate acceptance samples shall be taken as described in Section 3-04. Aggregate acceptance testing will be performed by the Contracting Agency. Aggregate contributed from RAP and/or RAS will not be evaluated under Section 3-04.

Prior to or at the beginning of production, the Contractor may request aggregate specific gravity (Gsb) testing be performed once per project by the Contracting Agency. The Gsb of the combined stockpiles will be used to calculate voids in mineral aggregate (VMA) of any HMA produced after the new Gsb is determined.

For aggregate that will be used in HMA mixture which will be accepted by Statistical Evaluation, the Contracting Agency's acceptance of the aggregate will be based on:

1. Samples taken prior to mixing with asphalt binder, RAP, or RAS;
2. Testing for the materials properties of fracture, uncompacted void content, and sand equivalent;
3. Evaluation by the Contracting Agency in accordance with Section 3-04, including price adjustments as described therein.

For aggregate that will be used in HMA which will be accepted by Visual Evaluation, evaluation in accordance with items 1, 2, and 3 above is at the discretion of the Engineer.

**5-04.3(9) HMA Mixture Acceptance**

The Contracting Agency will evaluate HMA mixture for acceptance by one of two methods as determined from the criteria in Table 7.

Table 7

Basis of Acceptance for HMA Mixture		
	Visual Evaluation	Statistical Evaluation
Criteria for Selecting the Evaluation Method	<ul style="list-style-type: none"> <li>• Commercial HMA placed at any location</li> <li>• Any HMA placed in:               <ul style="list-style-type: none"> <li>• sidewalks</li> <li>• road approaches</li> <li>• ditches</li> <li>• slopes</li> <li>• paths</li> <li>• trails</li> <li>• gores</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• All HMA mixture other than that accepted by Visual Evaluation</li> </ul>

	<ul style="list-style-type: none"> <li>• prelevel</li> <li>• temporary pavement<sup>1</sup></li> <li>• pavement repair</li> <li>• Other nonstructural applications of HMA as approved by the Engineer</li> </ul>	
<sup>1</sup> Temporary pavement is HMA that will be removed before Physical Completion of the Contract.		

**5-04.3(9)A Test Sections**

This Section applies to HMA mixture accepted by Statistical Evaluation. A test section is not allowed for HMA accepted by Visual Evaluation.

The purpose of a test section is to determine whether or not the Contractor's mix design and production processes will produce HMA meeting the Contract requirements related to mixture. Construct HMA mixture test sections at the beginning of paving, using at least 600 tons and a maximum of 1,000 tons or as specified by the Engineer. Each test section shall be constructed in one continuous operation.

**5-04.3(9)A1 Test Section – When Required, When to Stop**

Use Tables 8 and 9 to determine when a test section is required, optional, or not allowed, and to determine when performing test sections may end. Each mix design will be evaluated independently for the test section requirements.

If more than one test section is required, each test section shall be evaluated separately by the criteria in table 8 and 9.

Table 8

Criteria for Conducting and Evaluating HMA Mixture Test Sections (For HMA Mixture Accepted by Statistical Evaluation)		
	High RAP/Any RAS	Low RAP/No RAS
Is Mixture Test Section Optional or Mandatory?	Mandatory <sup>1</sup>	At Contractor's Option <sup>1</sup>
Waiting period after paving the test section.	4 calendar days <sup>2</sup>	4 calendar days <sup>2</sup>
What Must Happen to Stop Performing Test Sections?	Meet "Results Required to Stop Performing Test Sections" in Table 9 for High RAP/Any RAS.	Provide samples and respond to WSDOT test results required by Table 9 for Low RAP/No RAS.

<sup>1</sup>If a mix design has produced an acceptable test section on a previous contract (paved in the same calendar year, from the same plant, using the same JMF) the test section may be waived if approved by the Engineer.  
<sup>2</sup>This is to provide time needed by the Contracting Agency to complete testing and the Contractor to adjust the mixture in response to those test results. Paving may resume when this is done.

Table 9

Results Required to Stop Performing HMA Mixture Test Sections <sup>1</sup> (For HMA Mixture Accepted by Statistical Evaluation)		
Test Property	Type of HMA	
	High RAP/Any RAS	Low RAP/No RAS
Gradation	Minimum PF, of 0.95 based on the criteria in Section 5-04.3(9)B4 <sup>2</sup>	None <sup>4</sup>
Asphalt Binder	Minimum PF, of 0.95 based on the criteria in Section 5-04.3(9)B4 <sup>2</sup>	None <sup>4</sup>
VMA	<u>Minimum PF, of 0.95 based on the criteria in Section 5-04.3(9)B4<sup>2</sup></u>	<u>None<sup>4</sup></u>
V <sub>s</sub>	Minimum PF, of 0.95 based on the criteria in Section 5-04.3(9)B4 <sup>2</sup>	None <sup>4</sup>
Hamburg Wheel Track Indirect Tensile Strength	Meet requirements of Section 9-03.8(2) <sup>3</sup>	These tests will not be done as part of Test Section.

Aggregates Sand Equivalent Uncompacted Void Content Fracture	Nonstatistical Evaluation in accordance with the requirements of Section 3-04 <sup>3</sup>	None <sup>3</sup>
<sup>1</sup> In addition to the requirements of this table, acceptance of the HMA mixture used in each test section is subject to the acceptance criteria and price adjustments for Statistical Evaluation (see Table 9a). <sup>2</sup> Divide the test section lot into three sublots, approximately equal in size. Take one sample from each sublot, and test each sample for the properties in the first column. <sup>3</sup> Take one sample for each test section lot. Test the sample for the property in the first column. <sup>4</sup> Divide the test section lot into three sublots, approximately equal in size. Take one sample from each sublot, and test each sample for the property in the first column. There are no criteria for discontinuing test sections for these mixes; however, the contractor must comply with Section 5-04.3(11)F before resuming paving.		

#### 5-04.3(9)A2 Test Section – Evaluating the HMA Mixture in a Test Section

The Engineer will evaluate the HMA mixture in each test section for rejection, acceptance, and price adjustments based on the criteria in Table 9a using the data generated from the testing required by Table 9. Each test section shall be considered a separate lot.

Table 9a

Acceptance Criteria for HMA Mixture Placed in a Test Section (For HMA Mixture Accepted by Statistical Evaluation)		
Test Property	Type of HMA	
	High RAP/Any RAS	Low RAP/No RAS
Gradation, Asphalt Binder, VMA and V <sub>a</sub> V <sub>s</sub>	Statistical Evaluation	Statistical Evaluation
Hamburg Wheel Track Indirect Tensile Strength	Pass/Fail for the requirements of Section 9-03.8(2) <sup>1</sup>	N/A
HMA Aggregate Sand Equivalent Uncompacted Void Content	Nonstatistical Evaluation in accordance with the requirements of Section 3-04	Nonstatistical Evaluation in accordance with the requirements of Section 3- 04
<sup>1</sup> Failure to meet the specifications for Hamburg and/or IDT will cause the mixture in the test section to be rejected. Refer to Section 5-04.3(11).		

#### 5-04.3(9)B Mixture Acceptance – Statistical Evaluation

##### 5-04.3(9)B1 Mixture Statistical Evaluation – Lots and Sublots

HMA mixture which is accepted by Statistical Evaluation will be evaluated by the Contracting Agency dividing that HMA tonnage into mixture lots, and each mixture lot will be evaluated using stratified random sampling by the Contracting Agency sub-dividing each mixture lot into mixture sublots. All mixture in a mixture lot shall be of the same mix design. The mixture sublots will be numbered in the order in which the mixture (of a particular mix design) is paved.

Each mixture lot comprises a maximum of 15 mixture sublots, except:

- The final mixture lot of each mix design on the Contract will comprise a maximum of 25 sublots.
- A mixture lot for a test section will consist of three sublots.

Each mixture subplot shall be approximately uniform in size with the maximum mixture subplot size as specified in Table 10. The quantity of material represented by the final mixture subplot of the project, for each mix design on the project, may be increased to a maximum of two times the mixture subplot quantity calculated.

Table 10

Maximum HMA Mixture Sublot Size For HMA Accepted by Statistical Evaluation	
HMA Original Plan Quantity (tons) <sup>1</sup>	Maximum Sublot Size (tons) <sup>2</sup>
< 20,000	1,000
20,000 to 30,000	1,500
>30,000	2,000
<sup>1</sup> Plan quantity* means the plan quantity of all HMA of the same class and binder grade which is accepted by Statistical Evaluation.	
<sup>2</sup> The maximum subplot size for each combination of HMA class and binder grade shall be calculated	

separately

- For a mixture lot in progress with a mixture CPF less than 0.75, a new mixture lot will begin at the Contractor's request after the Engineer is satisfied that material conforming to the Specifications can be produced. See also Section 5-04.3(11)F.
- If, before completing a mixture lot, the Contractor requests a change to the JMF which is approved by the Engineer, the mixture produced in that lot after the approved change will be evaluated on the basis of the changed JMF, and the mixture produced in that lot before the approved change will be evaluated on the basis of the unchanged JMF; however, the mixture before and after the change will be evaluated in the same lot. Acceptance of subsequent mixture lots will be evaluated on the basis of the changed JMF.

#### 5-04.3(9)B2 Mixture Statistical Evaluation – Sampling

Comply with Section 1-06.2(1).

Samples of HMA mixture which is accepted by Statistical Evaluation will be randomly selected from within each subplot, with one sample per subplot. The Engineer will determine the random sample location using WSDOT Test Method T 716. The Contractor shall obtain the sample when ordered by the Engineer. The Contractor shall sample the HMA mixture in the presence of the Engineer and in accordance with FOP for WAQTC T 168.

#### 5-04.3(9)B3 Mixture Statistical Evaluation – Acceptance Testing

Comply with Section 1-06.2(1).

The Contracting Agency will test the mixture sample from each subplot (including sublots in a test section) for the properties shown in Table 11.

Table 11

Testing Required for each HMA Mixture Sublot		
Test	Procedure	Performed by
VMA and $V_v$	WSDOT SOP 731	Engineer
Asphalt Binder Content	FOP for AASHTO T 308	Engineer
Gradation: Percent Passing 1½", 1", ¾", ½", ¾", No. 4, No. 8, No. 200	FOP for WAQTC T 27/T 11	Engineer

The mixture samples and tests taken for the purpose of determining acceptance of the test section (as described in Section 5-04.3(9)A) shall also be used as the test results for acceptance of the mixture described in 5-04.3(9)B3, 5-04.3(9)B4, 5-04.3(9)B5, and 5-04.3(9)B6.

#### 5-04.3(9)B4 Mixture Statistical Evaluation – Pay Factors

Comply with Section 1-06.2(2).

The Contracting Agency will determine a pay factor (PF<sub>i</sub>) for each of the properties in Table 11, for each mixture lot, using the quality level analysis in Section 1-06.2(2)D. For Gradation, a pay factor will be calculated for each of the sieve sizes listed in Table 11 which is equal to or smaller than the maximum allowable aggregate size (100 percent passing sieve) of the HMA mixture. The USL and LSL shall be calculated using the Job Mix Formula Tolerances (for Statistical Evaluation) in Section 9-03.8(7).

If a constituent is not measured in accordance with these Specifications, its individual pay factor will be considered 1.00 in calculating the Composite Pay Factor (CPF).

#### 5-04.3(9)B5 Mixture Statistical Evaluation – Composite Pay Factors (CPF)

Comply with Section 1-06.2(2).

In accordance with Section 1-06.2(2)D4, the Contracting Agency will determine a Composite Pay Factor (CPF) for each mixture lot from the pay factors calculated in Section 5-04.3(9)B4, using the price adjustment factors in Table 12. Unless otherwise specified, the maximum CPF for HMA mixture shall be 1.05.

Table 12

HMA Mixture Price Adjustment Factors	
Constituent	Factor "F"
All aggregate passing: 1½", 1", ¾", ½", ¾" and No.4 sieves	2
All aggregate passing No. 8 sieve	15
All aggregate passing No. 200 sieve	20
Asphalt binder	40
Voids in Mineral Aggregate (VMA)	2

Air Voids ( $V_a$ )	20
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**5-04.3(9)B6 Mixture Statistical Evaluation – Price Adjustments**

For each HMA mixture lot, a Job Mix Compliance Price Adjustment will be determined and applied, as follows:

$$JMCPA = [0.60 \times (CPF - 1.00)] \times Q \times UP$$

Where

JMCPA = Job Mix Compliance Price Adjustment for a given lot of mixture (\$)

CPF = Composite Pay Factor for a given lot of mixture (maximum is 1.05)

Q = Quantity in a given lot of mixture (tons)

UP = Unit price of the HMA in a given lot of mixture (\$/ton)

**5-04.3(9)B7 Mixture Statistical Evaluation – Retests**

The Contractor may request that a mixture subplot be retested. To request a retest, submit a written request to the Contracting Agency within 7 calendar days after the specific test results have been posted to the website or emailed to the Contractor, whichever occurs first. The Contracting Agency will send a split of the original acceptance sample for testing by the Contracting Agency to either the Region Materials Laboratory or the State Materials Laboratory as determined by the Engineer. The Contracting Agency will not test the split of the sample with the same equipment or by the same tester that ran the original acceptance test. The sample will be tested for a complete gradation analysis, asphalt binder content, VMA and  $V_a$ , and the results of the retest will be used for the acceptance of the HMA mixture in place of the original mixture subplot sample test results. The cost of testing will be deducted from any monies due or that may come due the Contractor under the Contract at the rate of \$250 per sample.

**5-04.3(9)C Vacant**

**5-04.3(9)D Mixture Acceptance – Visual Evaluation**

Visual Evaluation of HMA mixture will be by visual inspection by the Engineer or, in the sole discretion of the Engineer, the Engineer may sample and test the mixture.

**5-04.3(9)D1 Mixture Visual Evaluation – Lots, Sampling, Testing, Price Adjustments**

HMA mixture accepted by Visual Evaluation will not be broken into lots unless the Engineer determines that testing is required. When that occurs, the Engineer will identify the limits of the questionable HMA mixture, and that questionable HMA mixture shall constitute a lot. Then, the Contractor will take samples from the truck, or the Engineer will take core samples from the roadway at a minimum of three random locations from within the lot, selected in accordance with WSDOT Test Method T 716, taken from the roadway in accordance with WSDOT SOP 734, and tested in accordance with WSDOT SOP 737. The Engineer will test one of the samples for all constituents in Section 5-04.3(9)B3. If all constituents from that test fall within the Job Mix Formula Tolerances (for Visual Evaluation) in Section 9-03.8(7), the lot will be accepted at the unit Contract price with no further evaluation.

When one or more constituents fall outside those tolerance limits, the other samples will be tested for all constituents in Section 5-04.3(9)B3, and a Job Mix Compliance Price Adjustment will be calculated in accordance with Table 13.

Table 13

Visual Evaluation – Out of Tolerance Procedures	
Comply with the Following <sup>1</sup>	
Pay Factors <sup>1</sup>	Section 5-04.3(9)B4
Composite Pay Factors <sup>2</sup>	Section 5-04.3(9)B5
Price Adjustments	Section 5-04.3(9)B6
<sup>1</sup> The Visual Evaluation tolerance limits in Section 9-03.8(7) will be used in the calculation of the PF.	
<sup>2</sup> The maximum CPF shall be 1.00.	

**5-04.3(9)E Mixture Acceptance – Notification of Acceptance Test Results**

The results of all mixture acceptance testing and the Composite Pay Factor (CPF) of the lot after three sublots have been tested will be available to the Contractor through The Contracting Agency’s website.

The Contracting Agency will endeavor to provide written notification (via email to the Contractor’s designee) of acceptance test results through its web-based materials testing system Statistical Analysis of Materials (SAM) within 24 hours of the sample being made available to the Contracting Agency. However, the Contractor agrees:

1. Quality control, defined as the system used by the Contractor to monitor, assess, and adjust its production processes to ensure that the final HMA mixture will meet the specified level of quality, is the sole responsibility of the Contractor.
2. The Contractor has no right to rely on any testing performed by the Contracting Agency, nor does the Contractor have any right to rely on timely notification by the Contracting Agency of the Contracting Agency’s test results (or statistical analysis thereof), for any part of quality control and/or for making changes or correction to any aspect of the HMA mixture.

No. 200	2.0-7.0	2.0-7.0	2.0-7.0	1.0-7.0
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**9-03.8(7) HMA Tolerances and Adjustments**

1. **Job Mix Formula Tolerances** – The constituents of the mixture at the time of acceptance shall conform to the following tolerances:

Aggregate, Percent Passing	Statistical Evaluation		Visual Evaluation
1", ¾", ½" and ¾" sieves	± 6%		± 8%
No. 4 sieve	± 5%		± 8%
No. 8 sieve	± 4%		± 8%
No. 200 sieve	± 2.0%		± 3.0%
Asphalt binder	<del>-0.4%</del> ± to +0.5%		± 0.7%
<u>Voids in Mineral Aggregate, VMA</u>	<u>-1.5%</u>		
Air Voids, Va	2.5% minimum and 5.5% maximum		

These tolerance limits constitute the allowable limits as described in Section 1-06.2. The tolerance limit for aggregate shall not exceed the limits of the control points, except the tolerance limits for sieves designated as 100 percent passing will be 99-100.

2. **Job Mix Formula Adjustments** – An adjustment to the aggregate gradation or asphalt binder content of the JMF requires approval of the Project Engineer. Adjustments to the JMF will only be considered if the change produces material of equal or better quality and may require the development of a new mix design if the adjustment exceeds the amounts listed below.

- a. ~~Aggregates~~ – ~~The maximum adjustment from the approved mix design shall be 2 percent for the aggregate passing the 1½", 1", ¾", ½", ¾", and the No. 4 sieves, 1 percent for aggregate passing the No. 8 sieve, and 0.5 percent for the aggregate passing the No. 200 sieve. The adjusted JMF shall be within the range of the control points in Section 9-03.8(6).~~
- b. ~~Asphalt Binder Content~~ – ~~The Project Engineer may order or approve changes to asphalt binder content. The maximum adjustment from the approved mix design for the asphalt binder content shall be 0.3 percent.~~

**9-03.9 Aggregates for Ballast and Crushed Surfacing**

**9-03.9(1) Ballast**

Ballast shall consist of crushed, partially crushed, or naturally occurring granular material from approved sources manufactured in accordance with the provisions of Section 3-01.

The material from which ballast is to be manufactured shall meet the following test requirements:

Los Angeles Wear, 500 Rev	40 percent max.
Degradation Factor	15 min.

Ballast shall meet the following requirements for grading and quality when placed in hauling vehicles for delivery to the roadway or during manufacture and placement into a temporary stockpile. The exact point of acceptance will be determined by the Engineer.

The portion of ballast retained on No. 4 sieve shall not contain more than 0.2 percent wood waste.

Sieve Size	Percent Passing
2½"	99-100
2"	65-100
1"	50-85
No. 4	26-44
No. 40	16 max.
No. 200	9.0 max.
Dust Ratio:	¾ max.
Sand Equivalent	35 min.

All percentages are by weight.

completed and retained in the materials file when Reducing Frequency of Testing, Sampling and Testing for Small Quantities of Materials and Project Engineer Discretionary Materials Approval/Acceptance are invoked. All information requested on the checklist shall be filled in completely. Any items that do not require approval from the State Materials Laboratory and the State Construction Office may be approved at the Project Engineer level.

The maximum adjustment from an approved HMA mix design shall be 2 percent for the aggregate passing the 1½", 1", ¾", ½", ¼", and the No. 4 sieves, 1 percent for aggregate passing the No. 8 sieve, and 0.5 percent for the aggregate passing the No. 200 sieve. The adjusted JMF shall be within the range of the control points in *Standard Specifications* Section 9-03.8(6).

For approval of changes beyond the Project Engineer's authority (items marked with a "yes" and an "x" on DOT Form 350-120), a request must be transmitted to the State Materials Laboratory and may require approval from the State Construction Office as well. The completed checklist shall accompany the request and represents the minimum information required to process the modification. The State Materials Laboratory and the State Construction Office have final authority to approve or reject any request for modification. Written approval by the State Materials Laboratory and State Construction Office constitutes agreement with the proposal. The signed checklist and all supporting documentation are to be placed in the project Materials File.

For approval contact the following:

- **State Materials Laboratory** – Areas of responsibility: All changes to materials approval and acceptance, and to *Standard Specifications* Division 9. Initial contact: Materials Quality Assurance Engineer
- **State Construction Office** – Areas of responsibility: *Standard Specifications* Divisions 1, 2, 3, 4, 5, 6, 7, 8, 10, and 11.

#### **9-1.1A Sampling and Testing for Small Quantities of Materials**

The Project Engineer may elect to accept small quantities of materials without meeting minimum sampling and testing frequencies using the following criteria. The use of this process is to be implemented prior to work being performed and not to retroactively justify deficiencies discovered after the completion of work.

An item can be accepted as a small quantity if the proposed quantity for a specific material is less than the minimum required testing frequency

Materials that will not be considered under the small quantity definition are:

- Concrete with a 28-day compressive strength of 4000 psi or greater.

Some issues that the Project Engineer may consider prior to use of small quantity acceptance are:

- Has the material been previously approved?
- Is the material certified?
- Do we have a mix design or reference mix design?

Attach # 4  
Revised 10.18.2017  
(DRAFT # 3)

**CURRENT SPECIFICATION**

**5-04.2(1)A2 High RAP/Any RAS - Mix Design Submittals for Placement on QPL**

For High RAP/Any RAS mixes, comply with the requirements of Section 5-04.2(1) and all of the following that apply:

1. For mixes with any RAS, test the RAS stockpile (and RAP stockpile if any RAP is in the mix) in accordance with Table 4.
2. For mixes with no RAS, test the RAP stockpile in accordance with Table 4.
3. For mixes with High RAP/Any RAS, complete constructing a single stockpile for RAP and a single stockpile for RAS and isolate these stockpiles from further stockpiling before beginning development of the mix design. Test the RAP and RAS stockpile during their construction as required by item 1) or 2) above. Use the test data in developing the mix design, and report the test data to WSDOT as part of the mix design submittal for approval on the QPL. Do not add to these stockpiles after starting the mix design process.
4. Comply with 5-04.3(5)A for stockpiling RAP and/or RAS after sequestering the RAP/RAS stockpiles for mix design approval on the QPL.

**Table 4  
Test Frequency of RAP and RAS During RAP and RAS Stockpile Construction  
For the Purpose of Approving a Mix Design for Placement in the QPL**

Test Frequency	Test for	Test method
• 1/1000 tons of RAP (minimum of 10 per mix design) and • 1/100 tons of RAS (minimum of 10 per mix design)	Asphalt Binder content	FOP for AASHTO T 308
	Aggregate Gradation	FOP for WAQTC T 27/T 11

**SUPPLEMENTAL LANGUAGE**

5. The initial RAP or RAS stockpile(s), as defined above, may be supplemented in volume with additional RAP or RAS when:
  - a. The RAP or RAS is processed in the same manner as the original stockpile(s) resulting in RAP or RAS of the same general quality as in the initial stockpile(s) and
  - b. Testing of the supplemental RAP or RAS, as outlined in Table 4 and above, is certified to have been performed at a minimum of 1/2 the frequency defined in the Table. Testing documentation shall be maintained and be available for review.
  - c. The supplemental RAP or RAS has been tested for specific gravity for every 5,000 tons for RAP and every 500 tons for RAS to document variance in the RAP/ RAS that would lead to projected lower VMA.
  - d. The supplemental RAP or RAS has been tested for true binder grade characterization a the frequency of 1 test per every 5,000 tons for RAP and 1 test for every 1,000 tons for RAS to verify that the virgin binder grade and/or rejuvenating agent used in the job mix formula (JMF) will remain appropriate for use with the added stockpiled material.

Item 17-04  
attach #5

For WSDOT/ WAPA Improving HMA meeting – 10/27/2017

Item 17-04 (New Business) – Proposal for Dual Design Validation when requested.

Dual Design Proposal

As we seem to be submitting more and more specialized designs to WSDOT, there is a way to simplify the process for identical gradation designs at different design gyrations.

For the change from a 100 gyration to 75 gyration  $N_{design}$ , we would propose that the Contractor be allowed to submit the mix as a dual design. This would only work one way, submitting a 100 gyration  $N_{design}$  and also getting it approved as a 75 gyration  $N_{design}$  (or getting a 125  $N_{design}$  also approved at the 100  $N_{design}$  gyration level). The height data from the gyratory can be used to determine what the Gmb would have been for a the lower gyration design point. Then the only extra tests needing to be run would be Hamburg and IDT. The procedure would be as follows in the 100 / 75  $N_{design}$  gyration scenario):

1. Dual design requested – gyratory pucks and Rice density run as normal except that 7, 8, 75, and 100 gyration numbers are recorded for additional calculations.
2. The 100 gyration  $N_{design}$  mix is checked against the submitted design and the 75 gyration  $N_{design}$  is checked after increasing the target binder content by 0.2%.
3. Hamburgs and IDTs are then run for both sets with the Rice calculated at 0.2% higher binder content used to determine air voids for the 75 gyration  $N_{design}$  mix.

This gets two designs done by essentially just running added Hamburgs and IDTs, saving money and making less needless work constructing new designs when all that needs to be done is to add 0.2% oil to our designs to make it 75  $N_{design}$  valid mix.

Author: Logan Cantrell, P.E.  
Granite Construction

This is Vancouver results from 2 designs that were similar 75 pred comes from height data on 100 gyration mix

	Pb	Va	VMA
75 Actual	4.9	6.82	16.04
75 Pred	5.4	4.61	15.38
75 pred	5.9	2.99	14.87
75 pred	5.2	5.58	15.8
75 pred	5.7	3.92	15.26

Vancouver

75 Actual	5.57
75 Pred	5.68
100 Actual	5.39

Vancouver

