Wisconsin Department of Transportation
Wisconsin Highway Research Program

Request for Proposals

Interlayer Mixture Design

Questions submitted to research@dot.wi.gov regarding
the Content of this RFP are due no later than
4:30 PM (CST) on January 3, 2020

Responses to questions will be posted to the WisDOT Research and Library
website https://wisconsindot.gov/Pages/about-wisdot/research/researchers.aspx
by 4:30 PM (CST) by January 11, 2020

Researchers must submit a PDF version of their proposal by
4:30 PM (CST) by February 3, 2020
to: research@dot.wi.gov

Proposal Preparation Guidelines can be found at:
Proposal Preparation Guidelines

Researchers will be notified of the proposal review decision by May 1, 2020

For more information regarding this RFP contact the WisDOT Research Program at:
research@dot.wi.gov

This RFP is posted to the Internet at:
https://wisconsindot.gov/Pages/about-wisdot/research/researchers.aspx

Wisconsin Highway Research Program (WHRP)
Request for Proposals
Flexible Pavement Technical Oversight Committee (TOC)

Interlayer Mixture Design

I. Background and Problem Statement

Hot Mix Asphalt (HMA) cracking over concrete transverse joints is called reflective cracking. Reflective cracks need to be properly maintained or they can propagate and significantly reduce pavement service life. Researchers and industry professionals have worked to develop materials and construction practices to reduce the damage caused by reflective cracking. Pavement designs including "interlayers" have become popular as a promising method to reduce reflective cracking. There are many types of interlayer systems that use a combination of modified asphalt binders, fabrics, rubber membranes, geogrids, increased asphalt binder contents and other design modifications.

WisDOT has developed design requirements for interlayers, and there are multiple research test sections in service. One Wisconsin research project concluded that interlayers show minimal performance improvements compared with control sections, and another showed significant improvements relative to control sections. One of the key material properties that seems to correlate with high performing interlayer mixture designs is fatigue resistance.

The current version of WisDOT's special provision for interlayers contains a requirement to meet AASHTO T321 Flexural Bending Beam Fatigue at a strain level of 2,000 microstrain. A copy of WisDOT's interlayer special provision is attached to the Appendix of this RFP template. Although bending beam fatigue testing requirements ensure a high-quality product, WisDOT does not have the resources to perform this test and must hire a consulting laboratory to run and verify the bending beam fatigue performance for acceptance of all mixtures. For interlayer mixtures to be more widely used in Wisconsin, a testing alternative that will not sacrifice the perceived performance benefits and that is more efficient and less costly is needed.

II. Research Objectives

The objective of this research project is to develop an alternative method for accepting interlayer mixture designs without the bending beam fatigue test. Mixtures accepted that use other means are expected to maintain the same level of quality that the beam fatigue test provides. WisDOT will work with the research team to help communicate equipment restrictions for alternative acceptance testing.

III. Scope of Work

Task 1:

Literature review summarizing available techniques for quantifying the fatigue performance of asphalt materials.

Task 2:

Collection of Wisconsin aggregate and asphalt binder materials.

Task 3:

Mixture and/or binder performance testing of interlayer mixture designs. Propose the minimum amount of mixture designs required to achieve the research objectives.

Task 4:

Complete a research report that recommends an alternative method(s) for accepting interlayer fatigue performance and comment on existing test sections.

IV. Required Testing

A. AASHTO T321 Standard Method of Test for Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending.

B. (Optional) Wisconsin DOT has the following testing equipment: Asphalt Mixture Performance Tester (AMPT), Dynamic Shear rheometers, Bending Beam rheometer, screw driven tension/ compression machines (20-350 kips), Testquip SCB/DCT device and Superpave Gyratory compactors. The research team might consider testing with these devices when developing the alternative methodology for accepting interlayer mixture designs without the bending beam fatigue test. The department is open to procuring new equipment or modifying existing equipment if the research concludes that objectives cannot be met with current WisDOT testing capabilities.

V. WisDOT/TOC Contribution

A. Work will be conducted with project oversight by the WisDOT Bureau of Technical Services and WHRP Flexible Pavements Technical Oversight Committee (TOC). The TOC members will appoint a Project Oversight Committee (POC) to support the successful completion of the project.

B. WisDOT Project Oversight Committee (POC) will provide information regarding existing test sections for interlayer pavements.

C. WisDOT POC will communicate any equipment restrictions throughout the research project that may preclude methods identified by the research team.

D. The research team will not assume the availability of WisDOT staff or equipment during the development of the research project. If WisDOT or another entity donates equipment or staff time, a letter of commitment must be included in the proposal.

E. Expected level of support by Technical Oversight Committee (TOC) and POC members will be a maximum of 40 hours over the duration of the project. The research team will consult with POC members in the selection of plants and mixture for testing.

F. The TOC and POC will coordinate access to WisDOT aggregates used in laboratory test programs. The research team must arrange and cover cost of transporting the aggregates and materials to their laboratory test facilities as needed.

G. If field work on or around in-service facilities is anticipated by the researcher, the proposal will need to discuss the nature and extent of needed traffic control and specify the support assistance that will be requested from WisDOT. The researcher will need to closely coordinate with WisDOT regional personnel and possibly the county personnel where project fieldwork is being conducted. For WisDOT planning purposes, the research team shall specify in the proposal, as practical, what specific traffic control will be required for this project, such as traffic flagging, signage, barricades, etc., as well as the duration (hours/day/location). It should not be assumed that WisDOT would fund the traffic control apart from the research project budget.

VI. Required Travel

The Principal Investigator is required to travel to Madison to deliver the Close-Out Presentation in person.

VII. Deliverables

Submission of a PDF of the final report is required.

VIII. Schedule and Budget

A. Project budget shall not exceed **$175,000**. Matching funds will not be considered in the proposal evaluation process.
B. Proposed project duration is **24 months** and is expected to start around October 1, 2020.

IX. Implementation

A. The research report and the final presentation document will be used to develop training materials for industry professionals and WisDOT engineers. Training should highlight mixture design changes required to meet new specifications and testing procedures.

B. The report will include an interlayer mixture design specification framework as an appendix in the research report.

References

[1] D. Bischoff, "Evaluation of Strata® Refelective Crack Relief System," Wisconsin Department of Transportation, Madison, WI, USA, Report Number FEP-01-07, December 2007.

[2] L. Makowski, D. Bischoff, P. Blankenship, D. Sobczak, F. Haulter. "Wisconsin Experiences with Reflective Crack Relief Projects," Transportation Research Record: Journal of the Transportation Research Board, Washington D.C., USA, No. 1905, pp. 44-55, 2005.

See Appendix C on page 6 - Wisconsin DOT Interlayer Special Provision.

The attached special provision is a working draft. Do not include this draft in any paving contract documents.

Appendix C

460-XXX DELETE ALL DESIGNER NOTES FROM YOUR SPECIAL PROVISIONS

Use the Interlayer to mitigate reflective cracking in HMA overlays on existing PCC pavement. Use as a lower layer of a multi-layer system in applications where lower maintenance is beneficial. Repair unstable slabs and joints with a lack of load transfer indicated by pumping. For roadways requiring cross slope correction, a leveling layer can be placed below the Interlayer.

Each project should include a reference section to evaluate the performance of the pavement without an Interlayer. All layers placed on the reference section will be of the HMA mix design used on the surface of the project unless otherwise approved by the engineer. If the surface course is SMA, an alternate HMA mix type with No. 4 or No. 5 gradation must be used for the lower layer of the reference section.

Use this STSP for Interlayer pavements. It covers the following:

1. ***Materials***
2. ***Aggregate Gradations and VMA Requirements***
3. ***Mixture Requirements***
4. ***Base Patching for HMA Interlayer***
5. ***Density Testing and Control Strip Requirements***

Delete bid items not used on your project from the title and from the table in subsection "E Payment".

1. HMA Pavement Interlayer, Item 460.XXXX

A Description

Conform to standard spec 450 and 460 except as modified in this special provision.

Replace standard spec 460.1 with the following to describe Interlayer:

(1) This section describes HMA mixture design for Interlayer applications, providing and maintaining a quality management program for HMA mixtures, and constructing Interlayers. Unless specifically indicated otherwise, references within 460 to HMA also apply to Interlayers.

B Materials

Replace standard spec 460.2.2.1(1) with the following to specify that all aggregates used in Interlayer mixes are from department-approved sources.

(1) Provide all aggregates used in the Interlayer mix from a department-approved source as specified under standard spec 106.3.4.2. Obtain the engineer's approval of the aggregates before producing HMA mixtures.

Replace standard spec table 460-1 with the following to specify gradation master range and additional sieves for interlayer mixtures.

TABLE 460-1 AGGREGATE GRADATION MASTER RANGE AND VMA REQUIREMENTS

Sieve	% PASSING DESIGNATED SIEVES
	NOMINAL SIZE
9.5-mm	100
4.75-mm	80 - 100
2.36-mm	60 - 85
1.18-mm	40 - 70
0.60-mm	25 - 55
0.30-mm	15 – 35
0.15-mm	8 - 20
0.075-mm	6 - 14
% MINIMUM VMA	16.0

Replace standard spec 460.2.3 with the following to specify asphalt binders to be used:

(1) Furnish PG 58-34 asphalt binder with a designation of V (Very Heavy) or E (Extremely Heavy) as necessary to satisfy the Flexural Beam Fatigue Test (AASHTO T321) requirement of Table 460-2 as modified herein. Do not change the PG binder grade without the engineer's written approval. The department will designate the grade of modified asphaltic binder in the contract.

Replace standard spec 460.2.5 with the following to describe Recycled Asphaltic Material use in Interlayers:

(1) No recycled asphaltic materials (FRAP, RAP, and RAS) shall be permitted in Interlayer mixtures.

Replace standard spec 460.2.7 with the following to specify design limits and requirements for Interlayer mixtures.

(1) For each HMA mixture type used under the contract, develop and submit an asphaltic mixture design according to CMM 8-66 and conforming to the requirements of table 460-1 and table 460-2. The department will review mixture designs and report the results of that review to the designer according to CMM 8-66.

(2) For each asphaltic mixture design, conduct Hamburg Wheel-Track testing according to AASHTO T324 and indirect tensile cracking test at intermediate temperature (CT-Index) according to ASTM D8225. Submit test results to the department with mix design submittal.

TABLE 460-2 MIXTURE REQUIREMENTS

Mixture type	Interlayer
LA Wear (AASHTO T96) 500 revolutions(max % loss)	13 40
Soundness (AASHTO T104) (sodium sulfate, max % loss)	12
Freeze/Thaw (AASHTO T103) (specified counties, max % loss)	15
Fractured Faces (ASTM 5821) (one face/2 face, % by count)	75/60
Flat & Elongated (ASTM D4791) (max %, by weight)	5 (5:1 ratio)
Fine Aggregate Angularity (AASHTO T304, method A, min)	45
Sand Equivalency (AASHTO T176, min)	40
Clay Lumps and Friable Particle in Aggregate (AASHTO T112)	<= 1%
Plasticity Index of Material Added to Mix Design as Mineral Filler (AASHTO T89/90)	<= 4
Gyrations for Ndes	50
Air Voids, %Va (%Gmm Ndes)	2.0 (98.0)
Dust to Binder Ratio (% passing 0.075mm/Pbe)	0.8 - 1.6

Voids filled with Binder (VFB or VFA, %)	70 - 95
Flexural Beam Fatigue Test, average cycles (AASHTO T321) [1]	>100,000

[1] The failure criterion for the Flexural Beam Fatigue Test (AASHTO T321) is 50% of the initial flexural stiffness measured at the 200th load cycle at 2,000 microstrain. Test two samples and average the two results for each mix design.

Replace standard spec 460.2.8.2.1.5 with the following to update JMF and warning limits for Interlayers:

(1) Conform to the following control limits for the JMF and warning limits based on a running average of the last 4 data points:

ITEM	JMF LIMITS	WARNING LIMITS
Percent passing given sieve:		
4.75-mm	+/- 5.0	+/- 4.0
2.36-mm	+/- 5.0	+/- 4.0
1.18-mm	+/- 4.0	+/- 3.0
0.60-mm	+/- 4.0	+/- 3.0
0.30 mm	+/- 4.0	+/- 3.0
0.15 mm	+/- 4.0	+/- 3.0
0.075-mm	+/- 2.0	+/- 1.5
Asphaltic content in percent	- 0.3	- 0.2
Air voids in percent	+/- 1.0	+/- 0.8
VMA in percent[1]	- 0.5	- 0.2

[1] VMA limits based on minimum requirement for mix design nominal maximum aggregate size in table 460-1.

(2) Warning bands are defined as the area between the JMF limits and the warning limits.

C Construction

Replace standard spec 390.3.1 with the following to specify general construction guidance for asphaltic base patching for HMA Interlayer:

(1) Unless the contract provides otherwise, keep the road open to traffic during construction. If possible, restrict operations to one lane at a time. Perform work to cause the least possible inconvenience to traffic.

(2) Remove areas of existing concrete pavement, including existing patching or surfacing materials, at locations the plans show or the engineer directs in the field. Saw the connecting edges as true and perpendicular as possible as specified for sawing pavement in standard spec 690. Plunge mill joints and transverse cracks with loose concrete or concrete with developing spalling 2 inches from the opposing joint face or wider to a minimum depth of 2 inches, unless otherwise directed by the engineer. Remove the pavement without injury to the remaining pavement. Dispose of removed material as specified in 204.3.1.3.

(3) Prepare the foundation as specified in standard spec 211 using engineer-approved hand methods. Place the patch to the thickness of the contiguous pavement, including the existing asphaltic pavement or surfacing.

(4) For plunge milled areas, fill voids with asphaltic base patch according to standard spec 390.3.3, as modified herein. For all other base patching use the material the engineer directs.

Replace standard spec 390.3.3 to specify asphaltic base patching of plunge milled areas for HMA Interlayer:

(1) Construct as specified for asphaltic base under 315 except as modified here.

(2) Furnish 12.5 mm (No. 4) or 9.5 mm (No. 5) nominal size aggregate graded as specified in standard spec 460.2.2.3 and conform to the other material and mixture requirements specified for asphaltic surface in standard spec 465.

(2) Dump material outside the patch area, fill the patch in successive layers with shovels, and shape to the required grade and contour with rakes and lutes. Do not rake dumped material into the patch. The engineer will not require forms unless necessary to provide the required edge, grade, or alignment.

(3) Compact each layer with engineer-approved compaction equipment. Unless the engineer directs otherwise, compact each layer to a thickness of 6 inches or less. Roll the top layer until flush with the adjacent surface. Patching material that extends more than 1/4 inch above the milled surface shall be corrected before the leveling layer or Interlayer is placed.

(4) Do not open patches to traffic until they are hard enough to prevent rutting or displacement.

Replace standard spec 450.3.2.1.1 with the following to specify minimum paving temperature:

(1) Interlayer asphaltic mixture shall only be placed when the air temperature approximately 3 feet above grade, in shade, and away from artificial heat sources is at least 50° F and the forecast is for rising temperatures. The contractor should place HMA pavement for projects in the northern asphalt zone between May 1 and October 15 inclusive and for projects in the southern asphalt zone between April 15 and November 1 inclusive. CMM 4-53 figure 2 defines asphalt zones. Notify the engineer at least one business day before paving.

(2) Unless the contract specifies otherwise, conform to the following:

- Keep the road open to all traffic during construction.
- Prepare the existing foundation for treatment as specified in 211.
- Incorporate loose roadbed aggregate as a part of preparing the foundation, in shoulder construction, or dispose of as the engineer approves.

(3) Place asphaltic mixture only on an existing pavement free of loose and foreign material. Do not place over frozen pavement, or where the roadbed is unstable.

(4) The surface shall be dry for at least 24 hours, and clean, prior to placement of the mixture. Work shall not begin when local conditions indicate rain is imminent.

Delete standard spec 450.3.2.1.2 to eliminate cold weather paving operations for Interlayer pavement.

Replace standard spec 455.3.2.1 with the following to specify Interlayer tack coat application requirements:

(1) Apply tack coat only when the air temperature is 45° F or more unless the engineer approves otherwise in writing. Before applying tack coat ensure that the surface is reasonably free of loose dirt, dust, or other foreign matter. Do not apply to surfaces with standing water. Do not apply if weather or surface conditions are unfavorable or before impending rains.

(2) Use tack material of the type and grade the contract specifies. The contractor may, with the engineer's approval, dilute tack material as allowed under 455.2.4. Provide calculations using the asphalt content as-received from the supplier and subsequent contractor dilutions to show that as-placed material has 50 percent or more residual asphalt content. Apply at 0.070 to 0.100 gallons per square yard, after dilution, unless the contract designates otherwise. The engineer may adjust the application rate based on surface conditions. Limit application each day to the area the contractor expects to pave during that day.

Replace standard spec 450.3.2.6.3 to specify compaction roller pattern determined by growth curve and subsequent coring for Interlayer mixes:

(1) Compact Interlayer mix using the roller pattern established during construction of a control strip. Use 2 or more rollers per paver if placing more than approximately 165 tons of mixture per hour.

(2) On the first day of production, construct a control strip under the direct observation of department personnel. After compacting the control strip with a minimum of 3 passes, mark the gauge outline and take a one-minute wet density measurement using a nuclear density gauge in back scatter mode at a single location. Take a density measurement at the same location after each subsequent pass. Continue compacting and testing until the increase in density is less than 1 pcf for 3 consecutive passes. Submit the final roller pattern to the engineer in writing. Once the roller pattern is established do not change the pattern or decrease the number, type, or weight of rollers without the engineer's written approval.

(3) After establishing the roller pattern, and under the direct observation of the engineer, cut at least one 4-inch diameter or larger core from the control strip density gauge outline. Prepare cores and determine density according to AASHTO T166. Dry cores after testing. Fill core holes and obtain engineer approval before opening to traffic. The department will maintain custody of cores throughout the entire sampling and testing process. The department will label cores, transport cores to testing facilities, witness testing, store dried cores, and provide subsequent verification testing.

(4) Collect 1 nonrandom three-part mix volumetric sample during construction of the control strip to be tested by the contractor with one split provided to the department. This contractor's test will be recorded on the control charts and the Gmm from this split sample will be used to determine the core density. If contractor test results for this split sample are not within the JMF limits presented in 460.2.8.2.1.5, as modified herein, take immediate corrective action.

(5) A minimum of one core per 3,000 lane feet or one per day will be collected and tested for density by the contractor. Add one core for each additional 3,000 lane feet or portion thereof per day. Report core density results to the engineer and BTS daily. The density of each sample during production will be determined by dividing the bulk specific gravity of each core sample by the four-point running average maximum specific gravity (Gmm according to CMM 8.36.6.6) from the previous day's production.

Replace standard spec 460.2.8.2.1.7(7) to further define conforming material and pay reduction based on individual test results for Interlayer mixes:

(7) If the air voids running average of 4 exceeds the JMF limits, the material is nonconforming. Remove and replace unacceptable material. The engineer will determine the quantity of material to replace based on the testing data using the methods in CMM 8-36 and an inspection of the completed pavement. If the engineer allows the mixture to remain in place, the department will pay for the mixture and asphaltic material as specified in standard spec 460.5.2.1, as modified herein. For Interlayer mix types, if one QC air voids test falls outside of the JMF limits, notify the department and consider corrective action. If two or more individual QC air voids tests within the four-point running average exceed the JMF limits, the material is nonconforming and subject to pay adjustment as specified in standard spec 460.5.2.1.

Replace standard spec 460.2.8.3.1.6 with the following to specify volumetric verifiction requirements:

(1) The engineer will provide test results to the contractor within 2 mixture-production days after obtaining the sample. The quality of the product is acceptably verified if it meets the following limits:

- Va is within a range of 1.0 to 3.0 percent.
- VMA is within minus 0.5 of the minimum requirement for the mix design nominal maximum aggregate size.
- Asphalt content is within minus 0.3 percent of the JMF.

(2) If QV test results are outside the specified limits, the engineer will investigate immediately through dispute resolution procedures. The engineer may stop production while the investigation is in progress if the potential for a pavement failure is present.

(3) If production continues for that mixture design, the engineer will provide additional retained sample testing at the frequency provided for in CMM 8-36. This supplemental testing will continue until the material meets allowable differences or as the engineer and contractor mutually agree.

Replace standard spec 460.3.1 with the following to remove standard bid item encoding:

(1) Construct Interlayer pavement of the type the bid item indicates encoded as follows:

HMA Pavement Interlayer

(2) Construct HMA pavement conforming to the general provisions of 450.3.

Replace standard spec 460.3.2 with the following to specify Interlayer plan thickness:

(1) Provide the plan thickness for Interlayer mixtures at 1.0 inch.

Replace standard spec 460.3.3.1 and 460.3.3.2 with the following to specify density requirements for Interlayers:

(1) Compact Interlayer mixture according to standard spec 450.3.2.6.3, as modified herein.

Delete standard spec 460.5.2.2 and 460.5.2.3 to remove density incentives and disincentives for Interlayer pavement.

D Measurement

Replace standard spec 390.4 with the following:

(1) The department will measure Base Patching Asphaltic for HMA Pavement Interlayer as each acceptably completed project.

Replace standard spec 460.4 with the following:

(1) The department will measure the HMA Pavement Interlayer bid items acceptably completed by the ton as specified in standard spec 450.4.

E Payment

Replace standard spec 390.5 with the following:

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
390.XXXX	Base Patching Asphaltic for HMA Interlayer	LS

(2) Payment for Base Patching Asphaltic for HMA Interlayer is full compensation for removing old pavement; for preparing the foundation; for providing and compacting asphaltic mixture, including the asphaltic material.

Replace standard spec 460.5.1 with the following:

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
460.XXXX	HMA Pavement Interlayer	TON

(2) Payment for HMA Pavement Interlayer is full compensation for providing mixture designs; for preparing foundation; for performance testing, for volumetric and density testing and aggregate source testing; for establishing the compaction roller pattern; for asphalt binder modification or processes, and addition of fibers, fines, or filler.

(3) Material placed in the lower layer of the reference section will be paid with the same bid item as the surface mix unless the surface mix is SMA. If the surface mix is SMA an alternative mix type with a No. 4 or No. 5 gradation will be used as the lower layer for the control strip.

Replace standard spec 460.5.2.1 with the following to modify mixture pay adjustments for Interlayer pavements:

(1) The department will pay for HMA Interlayer bid items at the contract unit price subject to one or more of the following adjustments:
Reduced payment for nonconforming QMP HMA mixtures as specified in standard spec 460.2.8.2.1.7, as modified herein.

(2) Payment for the HMA Pavement bid items is full compensation for providing HMA pavement including the binder; mixture design; preparation of the foundation; and QMP and aggregate source testing.

(3) If provided for in the plan quantities, the department will pay for a leveling layer, placed to correct irregularities in an existing paved surface before overlaying, under the pertinent paving bid item. Absent a plan quantity, the department will pay for a leveling layer as extra work.

(4) The department will administer pay reduction for nonconforming QMP mixture under the Nonconforming QMP HMA Mixture administrative item. The department will reduce pay based on the contract unit price for the HMA Pavement bid item.

(5) The department will reduce pay for nonconforming QMP HMA mixtures as specified in standard spec 460.2.8.2.1.7, starting from the stop point until the running average of 4 is back inside the warning limits. The engineer will determine the quantity of material subject to pay reduction based on the testing data and an inspection of the completed pavement. The department will reduce pay as follows:

PAYMENT FOR MIXTURE[1] [3] [4]

ITEM	PRODUCED WITHIN WARNING BANDS	PRODUCED OUTSIDE JMF LIMITS
Gradation	90%	75%
Asphalt Content[5]	——	——
Air Voids	70%	50%
VMA	90%	75%

[1] For projects or plants where the total production of each mixture design requires less than 4 tests refer to CMM 8-36.

[2] If Interlayer material is nonconforming for air voids as defined in standard spec 460.2.8.2.1.7(7) as modified herein, the department will pay 80% of the contract unit price for the material from the individual point(s) where a test is outside the JMF limit until another individual QV or QC test is within the JMF limits.

[3] Payment is represented in percent of the contract unit price for the HMA Pavement bid item. The department will reduce the pay based on the nonconforming property with the lowest percent pay. If the quantity of material subject to pay adjustment based on the running average of 4, it will also subject to pay adjustment resulting from dispute resolution under standard spec 460.2.8.3.1.7,

or is nonconforming for air voids as defined in standard spec 460.2.8.2.1.7(7) as modified herein, the department will apply the single pay adjustment resulting in the lowest percent pay.

[4] In addition to any pay adjustment listed in the table above, the department will adjust pay for nonconforming binder under the Nonconforming QMP Asphaltic Material administrative item. The department will deduct 25 percent of the contract unit price of the HMA Pavement bid item per ton of pavement placed with nonconforming PG binder the engineer allows to remain in place.

[5] The department will not adjust pay based on a running average of 4 asphalt content tests; however, corrective action will be applied to nonconforming material according to standard spec 460.2.8.2.1.7.

(6) When using CMM 8-36 for QV dispute resolution of HMA Pavement Interlayer material apply the following:

- Interlayer 100% pay requires: Va = 1.0 - 3.0%, VMA below minimum ≤ 0.5%, and AC% below JMF ≤0.3%.

Interlayer Prorated Pay Factors (between 50 and 100% pay) are as follows:

Description	Criteria	Pay Factor
High Air Voids Pay Factor	3.0% < Va ≤ 3.5	= 100 * [1 - (Va – 3.0)]
Low Air Voids Pay Factor	0.5% ≤ Va < 1.0%	= 100 * [1 - (1.0 - Va)]
Low VMA Pay Factor	0.5% < VMA below min ≤ 1.0%	= 100 * [1 - (percent below min. - 0.5)]
Low AC% Pay Factor	0.3% < AC below JMF < 0.5%	= 75

If during a QV dispute resolution investigation, the department discovers unacceptable mixture defined by one or more of the following:

- Va less than 0.5 or greater than 3.5 percent.
- VMA more than 1.0 percent below the minimum allowed in table 460-1.
- AC% more than 0.5 % below the JMF target.

Remove and replace the material, or if the engineer allows the mixture to remain in place, the department will pay for the quantity of affected material at 50 percent of the contract price.

(7) Restore the surface after cutting density samples as specified in standard spec 460.3.3.1(1) and standard spec 460.3.3.2(4) at no additional cost to the department.

stp-460-XXX (Date)