



MEMO

DATE: September 23, 2019

SUBJECT: Use Guidelines for 9.5 mm Warm Mix Asphalt High RAP Mixtures for Low Volume Roadways

TO: District Executives

FROM: Christine Reilly, P.E., Chief /s/
Construction and Materials Division
Bureau of Project Delivery

The Department has worked with the Pennsylvania Asphalt Pavement Association to develop a standard special provision (SSP) facilitating the use of higher amounts of reclaimed asphalt pavement (RAP) into 9.5 mm asphalt mixtures for use on low volume roadways. This SSP was developed in support of the Department's RoadMaP initiative to expand the cost-effective use of RAP on our roadways. The attached SSP allows alternative modified high RAP mix design requirements for asphalt mixtures containing >15% to 40% RAP by weight in the asphalt mixture; however, existing approved Job Mix Formulas (JMFs) with lesser quantities of RAP (including mixture with 15% or less RAP) or existing approved JMFs under Section 411 containing >15% RAP may also be used under this SSP.

Currently this SSP is provisional. Therefore, districts are limited to use this SSP on up to two (2) ECMS projects per calendar year until further notice.

This memo outlines the use guidelines for contracting the paving work via ECMS using the SSP. The Department is also working on separate mechanisms to use this specification for Department force paving, which will be addressed separately from this memo.

Index or Category: Provisional Specification Related

Sequence ID: _____

Version: A

Provision Name: c0411 ITEM 9000-XXXX SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG64-22, <0.3 MILLION ESALS, 9.5 MM MIX – MODIFIED HIGH RAP REQUIREMENTS

Status: Active

District: CO

The SSP is available for use immediately on projects, with the following instructions for usage:

- **Only use in 100% state funded projects (No federal funds).**

- **Do not use on NHS Roadways.**
- **Only use for low volume roads that meet the following criteria:**
 - **Maximum Average Daily Traffic (ADT) \leq 2000 vehicles and,**
 - **Maximum Average Daily Truck Traffic (ADTT) \leq 300.**
- **Minimum design pavement thickness shall be \geq 1.5”.**
- **The asphalt mixture’s coarse aggregate Skid Resistance Level (SRL) shall comply with Bulletin 14.**
- **Do not use in conjunction with PWT-LTS or PWT-HOLA Standard Special Provisions (SSPs).**
- **Adhere to the location-specific Performance Graded Binder requirements indicated in the SSP, considering I-80 to be the borderline.**
- **This SSP is not mandatory for Districts to include in ECMS contracts for projects meeting the use guidelines. It is optional for use.**

eCAMMS Job Mix Formula (JMF) Submission/Approval and Electronic State Book (ESB):

Note the SSP includes alternative modifications to the existing asphalt Superpave Volumetric Mix Design process for mixtures with >15% to 40% RAP. New asphalt Job Mix Formulas (JMFs) designed to specifically meet the alternative modifications for high RAP (>15% to 40% RAP) for low volume roadways under this SSP must be submitted and approved through eCAMMS using the following eCAMMS Bituminous JMF field designations:

- JMF Material Class: WR9.5M
- JMF Design ESAL Range:
 - $N_{des}=50$ RAP>15-25%, or
 - $N_{des}=50$ RAP>25-40%

Asphalt mixture producers will be required to document production quality control testing and shipment information of these mixtures in the eCAMMS ESB the same as other Superpave mixtures.

Mixture Acceptance and Density Acceptance:

Mixture acceptance will be according to the appropriate level in Table C of Section 409.2(f) for asphalt mixtures constructed under this SSP and the work is contracted through ECMS.

Density acceptance will be according to Section 409.3(j) for asphalt mixtures constructed under this SSP and the work is contracted through ECMS.

If you have any questions related to this SSP, please contact Cenk “Jay” Sengoz, LTS Bituminous Testing Lab Unit Manager at (717) 346-1548 or at csengoz@pa.gov

Attachments

4446/4814/CS/lgb

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STANDARD SPECIAL PROVISION

Detail

Index or Category: Provisional Specification Related

Status: **Active**

Sequence ID: 1

District: CO

Version: A

Provision Name: c0411 ITEM 9000-XXXX SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG 64-22, <0.3 MILLION ES

Usage Information

Measurement: English-IP

Edit Body: No

Include on all projects: No

Edit Header: Yes

Include on all federally funded projects: No

Edit Project Specific Details: No

Include on all 100% State funded projects: No

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Do not use on NHS Roadways.

Only use for low volume roads that meet the following criteria:

Maximum Average Daily Traffic (ADT) = 2000 vehicles and,

Maximum Average Daily Truck Traffic (ADTT) = 300

Minimum design pavement thickness shall be = 1.5".

The asphalt mixture's coarse aggregate Skid Resistance Level (SRL) shall comply with Bulletin 14.

Do not use in conjunction with PWT-LTS or PWT-HOLA Standard Special Provisions (SSPs).

Adhere to the location-specific Performance Graded Binder requirements indicated in the SSP, considering I-80 to be the borderline.

This SSP is not mandatory for Districts to include in ECMS contracts for projects meeting the use guidelines. It is optional for use.

eCAMMS Job Mix Formula (JMF) Submission/Approval and Electronic State Book (ESB):

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JMF Material Class: WR9.5M

JMF Design ESAL Range:

Ndes = 50 RAP >15-25%, or

Ndes = 50 RAP >25-40%

Asphalt mixture producers will be required to document production quality control testing and shipment information of these mixtures in the eCAMMS ESB the same as other Superpave

mixtures.

Mixture Acceptance and Density Acceptance:

Mixture acceptance will be according to the appropriate level in Table C of Section 409.2(f) for asphalt mixtures constructed under this SSP and the work is contracted through ECMS.

Density acceptance will be according to Section 409.3(j) for asphalt mixtures constructed under this SSP and the work is contracted through ECMS.

If you have any questions related to this SSP, please contact Cenk "Jay" Sengoz, LTS Bituminous Testing Lab Unit Manager at (717) 346-1548 or at csengoz@pa.gov.

Use Work Class Code - F

408 Section: 411

Effective From: 09/25/2019

To: 01/01/2199

Associated Items

Item Number	Description
<i>No records found.</i>	

Header

ITEM 9000-XXXX SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG 64-22, <0.3 MILLION ESALS, 9.5 MM MIX - MODIFIED HIGH RAP REQUIREMENTS

Provision Body

I. DESCRIPTION—This work is the Standard construction of a plant-mixed, dense-graded, WMA Wearing Course on a prepared surface using a volumetric asphalt mixture design developed with the Superpave Gyrotory Compactor (SGC), using prescribed manufactured additives, modifiers, or plant process modifications and including alternative modifications to volumetric mix design requirements for mixtures containing a high proportion (>15% by weight of total mixture) of Reclaimed Asphalt Pavement (RAP).

II. MATERIAL—Section 411.2 with additional Section 409.2 additions and modifications as follows:

(a) Bituminous Material. Revise Section 409.2(a)2 completely to read as follows:

2. Mix Containing More than 15% RAP or Mix Containing Both 5% RAS and 5% or More RAP.

When furnishing asphalt mixture meeting the requirements of Section 411, the LTS will evaluate the asphalt cement in the RAP and, if applicable, the RAS source material. The LTS will determine the class (grade) of virgin asphalt cement that the Contractor is required to use in the mixture.

When furnishing asphalt mixture meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, utilize the class (grade) of virgin asphalt cement in the mixture as specified in Table HR. LTS evaluation of the asphalt binder in the RAP is not required. When furnishing asphalt mixture meeting the alternate modified high RAP requirements of this special provision, do not use Reclaimed Asphalt Shingles (RAS) in the asphalt mixture.

Furnish material conforming to the requirements of Standard Specifications for Performance-Graded Asphalt Binder, AASHTO M 320, except as revised in Bulletin 25. Obtain material from a source listed in Bulletin 15 for the specified grade. Provide QC testing and certification as specified in Sections 106.03(b) and 702.1(b)1. Provide the Representative a copy of a signed Bill of Lading for bituminous material on the first day of paving and when the batch number changes.

(c) Recycled Asphalt Material. Section 409.2(c) except as modified below:

2. Manufacturer Waste Recycled Asphalt Shingles (RAS). Add a new paragraph at end of subsection as follows:

When furnishing asphalt mixture meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, do not propose RAS material for use in the mixture when proposing RAP material for use in the mixture.

(e) Mixture Composition for Standard Construction.

1.d.1 Apparent Moisture Content. Revise Section 409.2(e)1.d.1 completely to read as follows:

When furnishing asphalt mixture meeting the requirements of Section 411, if the water absorption of a coarse aggregate, as determined by AASHTO T 85, exceeds 2.0%, sample the mixture according to PTM No. 1 and at the frequency in the producer QC Plan. Determine the apparent moisture content in the mixture according to PTM No. 749. Produce a mixture with the apparent moisture content not to exceed 0.5%.

When furnishing asphalt mixture meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, sample the mixture according to PTM No. 1 daily. Determine the apparent moisture content in the mixture according to PTM No. 749. Produce a mixture with the apparent moisture content not to exceed 0.5%. If moisture exceeds 0.5%, slow the rate of production operations and perform a subsequent PTM No. 749 test.

1.d.5 Volumetric Analysis of Compacted Specimens. Revise Section 409.2(e)1.d.5 completely to read as follows:

Sample the completed mixture according to PTM No. 1 and at the frequency in the producer QC Plan. Prepare a minimum of two specimens from each sample according to AASHTO T 312.

When furnishing asphalt mixture meeting the requirements of Section 411, produce a mixture with volumetric properties conforming to the tolerances of Table B. Determine the bulk specific gravity of the specimens as specified in AASHTO T 312 and calculate air voids (V_a) and Voids in Mineral Aggregate (VMA) at N_{design} according to AASHTO R 35 and as specified in Bulletin 27. Determine compliance with the multiple specimen tolerances using the average of the results for all specimens prepared from the sample.

When furnishing asphalt mixture meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, produce a mixture with volumetric properties conforming to the tolerances of Table B except as revised for air voids at N_{design} (V_a) in Table B1. Determine the bulk specific gravity of the specimens as specified in AASHTO T 312 and calculate air voids (V_a) and Voids in Mineral Aggregate (VMA) at N_{design} according to AASHTO R 35 and as specified in Bulletin 27. Determine compliance with the multiple specimen tolerances using the average of the results for all specimens prepared from the sample.

TABLE B1
Job-Mix Formula
Volumetric Tolerance Requirements of the Laboratory Compacted Mix for
Mixtures Meeting the Alternate Modified High RAP Requirements of this Special Provision

Property	Each Specimen	Multiple Specimens
Air Voids at N_{design} (V_a)	($\pm 2\%$) ⁽¹⁾	($\pm 1.5\%$)

1. The $\pm 2\%$ tolerance only applies down to a minimum Air Voids at N_{design} (V_a) of 1.5%.

1.e Corrective Action. Section 409.2(e)1.e except add a new bullet point to read as follows:

- QC test results on each specimen or on multiple specimens are not within the tolerances and Note in Table B1 for asphalt mixtures furnished to meet the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision.

2. Mixtures with RAM, 15% or More RAP, or RAM and 15% or More RAP. Section 409.2(e)1 except replace the first paragraph with the following:

When furnishing asphalt mixtures meeting the requirements of Section 411, size, uniformly grade, and combine aggregate fractions, RAM, RAP, bituminous material, and either WMA Technology additive(s) or modifier(s) in proportions to produce a JMF that conforms to the material, gradation, and volumetric Superpave Asphalt Mixture Design requirements as specified in Bulletin 27, Chapter 2A, for the specified nominal maximum aggregate size and design ESALs except as procedurally modified by the WMA Technology Manufacturer Technical Representative (Technical Representative) to address laboratory procedures when preparing, compacting and testing WMA mixtures and to achieve a uniform blend.

When furnishing asphalt mixtures meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, size, uniformly grade, and combine aggregate fractions, RAM, RAP, bituminous material, and either WMA Technology additive(s) or modifier(s) in proportions to produce a JMF that conforms to the material, gradation, and volumetric Superpave Asphalt Mixture Design requirements as specified in Bulletin 27, Chapter 2A, for the specified nominal maximum aggregate size and design ESALs except as modified in Table HR, except as specified herein, and except as procedurally modified by the WMA Technology Manufacturer Technical Representative (Technical Representative) to address laboratory procedures when preparing, compacting and testing WMA mixtures and to achieve a uniform blend.

Special additive(s) or modifier(s) need not be used if mixture temperature, workability, and compaction can be achieved solely through plant mechanical modification to produce foamed asphalt. Develop a Hot Mix Asphalt (HMA) JMF and incorporate the WMA Technology additive, modifier, or process into that JMF during production. Do not develop a volumetric WMA JMF based on incorporating the WMA Technology additive, modifier or process during the volumetric asphalt mixture design process. For tracking purposes, create a separate WMA JMF cover sheet (TR-448A) for approval containing the WMA Technology used, additive dosage rate or percent water added for foaming, material code, and the TSR data from the WMA moisture sensitivity testing.

TABLE HR
Gradation and Volumetric Superpave Asphalt Mixture Design Requirement for
9.5 mm Nominal Maximum Aggregate Size (NMAS) Meeting the
Alternate Modified High RAP Requirements of this Special Provision

RAP Percent by Weight of Mixture, %	Number of Gyration at Ndesign	Percent Air Voids at Ndesign, %	Virgin PG Asphalt Binder Grade	Aggregate Gradation Control Points for the No. 8 (2.36 mm) Sieve Size Min. – Max.	F/A (Dust-to-Binder) Ratio Range	Voids Filled with Asphalt (VFA) Range, %
>15 to =25	50	3.5 – 4.0	PG 64-22 or PG 58-28*	42 – 67	0.6 – 1.2	73–80
>25 to =40	50	3.0 – 3.5	PG 58-28**	42 – 67	0.6 – 1.3	77–83

* Contractor may elect to use either PG 64-22 or PG 58-28 virgin binder grade in the mix for roadways that are located south of I-80; considering I-80 corridor to be a borderline from East (New Jersey) to West (Ohio). PG 58-28 virgin binder is required for roadways that are located north of I-80, including projects that may span or cross the I-80 border. No blending evaluation is needed for RAP up to 25% by weight of mixture.

** A different grade of virgin asphalt may be approved if the contractor chooses to have the asphalt binder in the RAP evaluated by LTS, and that evaluation shows that blending will achieve a PG 64-22 grade at the proportions in the JMF.

When designing asphalt mixtures meeting the alternate modified high RAP requirements, including the requirements in Table HR, of this special provision, the following revisions to Bulletin 27, Chapter 2A, 2., related to the Department Revisions to AASHTO R 35 are also specified:

Section 6.8 The Department will eliminate the need for three trial blends based on a Producer's previous Superpave mix design work with specific aggregate blends.

Section 10.1 Prepare replicate mixtures (Note 8) containing the selected design aggregate structure at each of the following three binder contents: (1) the estimated design binder content, P_b (design); (2) 0.5 percent below P_b (design); and (3) 0.5 percent above P_b (design).

III. CONSTRUCTION—Section 411.3.

IV. MEASUREMENT AND PAYMENT—Section 411.4.

Project Specific Details

Audit Information

Created By	Created On	Modified By	Modified On
Richard A Schmeck/PennDOT	07/01/2019 02:11:20 PM	William J Warden/PennDOT	09/25/2019 10:19:39 AM

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