



## **Purpose**

This bulletin provides revised guidance on the use of Recycled Asphalt Shingles (RAS) in Hot Mix Asphalt (HMA). These modifications are intended to strengthen our specifications to ensure non-asbestos containing material (ACM) is used in RAS mix designs.

## **Guidance**

All projects advertised after April 27, 2022 that use HMA must include the attached General Special Provisions (GSPs) for Section 5-04.2. Project offices administering construction projects that do not contain the attached GSPs on which the Contractor is requesting to use HMA with RAS must add the attached GSPs by change order. Projects that previously obtained approval to use a mix design that contains RAS will also need to incorporate these provisions.

The GSPs modify the Contract as follows:

1. Requires all RAS used in HMA paving to be from manufactured waste only.
2. Modifies the test frequency and adds a test method for determining the amount of asbestos, if any.
3. Requires the submittal of a Safety Data Sheet (SDS) for the manufactured waste shingles.

Additionally, modifications have been made to WSDOT Standard Practice QC 8 for the Development, Submittal and Approval of Hot Mix Asphalt Mix Designs. This Standard Practice is the basis for Contracting Agency approval of mix design for placement on the Qualified Products List (QPL).

## **Background**

Asbestos is a hazardous material and WSDOT is enhancing the screening process to ensure worker safety. These procedures and requirements were developed by WSDOT and have been coordinated with industry through the Washington Asphalt Paving Association.

## **Resources**

[5-04.2\(1\)A2.OPT1.2024.GR5](#)

[5-04.2\(9-03.21\(1\)A\).OPT1.2024.GR5](#)

Revised QC-8 (attached)



**Washington State  
Department of Transportation**

# CONSTRUCTION BULLETIN

State Construction Office  
Multimodal Development & Delivery

**Recycled Asphalt Shingles in Hot Mix  
Asphalt**

Bulletin #2022-02, Page 2 of 2

Date: 5/2/2022

## **Implementation Plan**

The GSPs have been published for use on all projects advertised on or after May 2, 2022. Projects with a bid opening after May 16, 2022 must incorporate the GSPs by addendum.

All mix design submitted after May 2, 2022 will be evaluated in accordance with the attached revised QC-8. The attached procedure will be incorporated into the Materials Manual in the next update.

Existing projects that previously obtained project approval for HMA mix designs containing RAS will need to incorporate the additional requirements contained in the GSPs. Project offices must coordinate with their ASCE to ensure the provisions are incorporated into the Contract.

## **Additional Information**

Asbestos testing will be performed prior to and during the mix design process to ensure that there is no asbestos in the RAS HMA. Testing according to the 5-04.2 GSP will continue during production. Recycled Asphalt Shingles do contain other fibers and testers may find fibers in the HMA. There is no need for respiratory protection during field testing.

## **Contact Information**

Kim Schofield

[schofik@wsdot.wa.gov](mailto:schofik@wsdot.wa.gov)

(360) 870-0193

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(April 27, 2022)  
For High RAP/Any RAS mix designs, comply with the following additional requirements:

1. All RAS will be manufactured waste RAS only.
2. 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.
3. For High RAP mix designs with no RAS, test the RAP stockpile in accordance with Table 3.
4. 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 RAP or RAS to the sequestered stockpiles after starting the mix design process, unless measures have been taken:
  - a. Test samples of the RAP or RAS to be added to the sequestered stockpile in accordance with Table 3. A minimum of 5 tests of the RAP or RAS will be required each time additional material is added to the sequestered stockpiles.
  - b. Evaluate and compare the test results from Section 4a to the results from the original sequestered stockpile properties from the mix design. Develop a written plan defining how the RAP/RAS will be incorporated into the sequestered stockpile without materially changing the binder grade or aggregate gradation properties of the sequestered stockpile. Submit the test results and incorporation plan to the Engineer for approval.

<b>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</b>		
<b>Test Frequency<sup>1</sup></b>	<b>Test for</b>	<b>Test Method</b>
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 and Sieve Analysis of Fine and Coarse Aggregate	FOP for AASHTO T 308 and FOP for AASHTO T 30

1/400 tons of RAS (minimum of 5 per mix design)	Asbestos content <0.1%	PLM Test Method EPA/600/R-93/116 (1000 Point Count) See Section 9- 03.21(1)A
1/200 tons of RAS (minimum of 5 per mix design)	Asbestos Containing Material (ACM) <1.0%	PLM Test Method EPA/600/R-93/116 See Section 9- 03.21(1)A
<sup>1</sup> "tons", in this table, refers to tons of the reclaimed material before being incorporated into HMA.		

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5. 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.

<b>Table 4</b>		<b>Maximum Amount of RAP and/or RAS in HMA Mixture</b>
<b>Maximum Amount of Binder Contributed from:</b>		
<b>RAP</b>	<b>RAS</b>	
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.		

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6. Develop the mix design including RAP, RAS, recycling agent, and new binder.
7. 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.
- Perform the asphalt extraction in accordance with AASHTO T 164 or ASTM D 2172 using reagent grade solvent.
  - Perform the asphalt recovery in accordance with AASHTO R 59 or ASTM D 1856.
  - 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).
  - 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.
  - 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

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exceed the performance grade of asphalt binder required by the Contract and comply with the requirements of Section 9-02.1(4).

8. Include the following test data with the mix design submittal:
  - a. All test data from RAP and RAS stockpile construction.
  - b. A Safety Data Sheet (SDS) and documentation that no asbestos has been added during production of the manufactured waste shingles as detailed in Section 9-03.21(1).
  - c. All data from testing the recovered and blended asphalt binder.
9. 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.

GSP 5-04.2(1)A2.OPT1.2024-025

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**(April 27, 2022)**  
**Recycled Asphalt Shingles**

Recycled asphalt shingles shall be manufactured waste shingles and shall be non-asbestos containing material (ACM) as defined in 40 CFR 61 Subpart M and tested in accordance with 40 CFR part 763, subpart E, appendix E, Section 1, Polarized Light Microscopy (PLM) Test Method EPA/600/R-93/116 by a certified testing laboratory. The PLM Test Method to determine ACM content will be the standard PLM Test Method to determine ACM less than 1.0%. Additionally, the PLM 1000 Point Count Test Method to determine asbestos less than 0.1% is required. At a minimum, the laboratory testing for asbestos content will be certified by one or more the following: National Voluntary Laboratory Accreditation Program (NVLAP), American Industrial Hygiene Association IH Laboratory Accreditation, or Washington State Department of Ecology for analysis of asbestos in bulk material. The Contractor shall keep all ACM and asbestos test results on file and provide copies to the Engineer when submitting a HMA mix design for approval in accordance with Section 5-04. The Contractor shall provide the testing and certification for toxicity characteristics in accordance with Section 9-03.21(1) prior to delivery and placement of the recycled asphalt shingles and use of the RAS in HMA. The Contractor shall also provide a Safety Data Sheet (SDS) of the RAS specifically detailing all ingredients of the manufactured waste shingles. The ingredients list needs to include the amount of asbestos as well as all types of fibrous materials.

GSP 5-04.2(9-03.21(1)A).OPT (REVISED)

## WSDOT Standard Practice for HMA Mix Designs QC 8

### *Standard Practice for Development, Submittal and Approval of Hot Mix Asphalt Mix Designs*

#### 1. Scope

- 1.1 This standard specifies requirements and procedures for evaluation and approval of Hot Mix Asphalt mix designs for the Qualified Products List.
- 1.2 This standard may involve hazardous materials, operations and equipment. It does not address all the safety problems associated with their use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

#### 2. Referenced Documents

- 2.1 WSDOT Standards
  - 2.1.1 [Standard Specifications for Road, Bridge, and Municipal Construction](#) M 41-10
  - 2.1.2 [Materials Manual](#) M 46-10

#### 3. Terminology

- 3.1 **AASHTO** – American Association of State Highway and Transportation Officials
- 3.2 **ASA** – Aggregate Source Approval
- 3.3 **ASTM** – American Society of Testing and Materials
- 3.4 **Bituminous Materials Section** – Testing Laboratory at the WSDOT State Materials Laboratory
- 3.5 **Business Days** – All weekdays, excluding state and federal holidays
- 3.6 **Contractor/Producer** – The Contractor, Producer or production facility that has the capacity for producing HMA meeting WSDOT [Standard Specifications](#).
- 3.7 **HMA** – Hot Mix Asphalt
- 3.8 **Materials Quality Assurance Section** – Office responsible for managing the Qualified Products List at the WSDOT State Materials Laboratory
- 3.9 **PG** – Performance Graded asphalt binder
- 3.10 **QPL** – Qualified Products List
- 3.11 **RAS** -- **Manufactured Waste** Recycled Asphalt Shingles

3.12 **RAP** – Reclaimed Asphalt Pavement

3.13 **State Materials Laboratory** – 1655 S. 2nd Avenue SW, Tumwater, WA 98512-6951

3.14 **WSDOT** – Washington State Department of Transportation

#### 4. Significance and Use

4.1 This standard specifies procedures for designing, submitting, evaluating and approving HMA mix designs for inclusion to the QPL.

#### 5. Mix Design Development

5.1 The Contractor/Producer or designee shall develop a HMA mix design in accordance with Section 5-04.2(1) of the *Standard Specifications*. The HMA mix design aggregate structure, asphalt binder content, anti-stripping additive, rutting susceptibility and indirect tensile strength shall be determined in accordance with WSDOT SOP 732, FOP for AASHTO T 324 and WSDOT FOP for ASTM D 6931 and meet the requirements of Sections 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*.

5.1.1 The Contractor/Producer's mix design %Gmm Ndesign must be  $96.0 \pm 0.2\%$  at the optimum percent binder (Pb).

#### 6. Submission to the WSDOT Qualified Products List

6.1 Once the HMA mix design has been developed, the Contractor/Producer shall contact the Bituminous Materials Section at [HMAMD@wsdot.wa.gov](mailto:HMAMD@wsdot.wa.gov) or 360-709-5419 to initiate the HMA mix design submittal process.

6.2 To initiate the mix design submittal process, the Contractor/Producer shall provide the following:

- Company contact and billing information
- A completed copy of WSDOT Form 350-042
- A completed WSDOT Product Submittal Application Form
- ASA Report for the aggregate source(s)
- QPL Contractor/Producer Product Information page(s) for the PG asphalt binder and the anti-stripping additive
- Certification on the source of the recycled materials and applicable documentation per Standard Specifications Sections 5-04.2 and 9-03.21(1) for mix designs containing RAP and/or RAS.
- Provide the testing and certification for toxicity characteristics in accordance with Standard Specification Section 9-03.21(1) for the RAS and RAP submitted with the mix



design. The testing and certification shall be no older than 30 calendar days from when the mix design samples are received at the State Materials Laboratory.

- 6.3 Once the information from Step 6.2 is received the Bituminous Materials Section will assign a QPL evaluation tracking number. This will initiate the timeline associated with each step of the mix design evaluation process in Section 6 of this plan, as shown in Table 1.
- 6.4 The Bituminous Materials Section will review the mix design submittal (WSDOT Form 350-042) and all documentation provided to ensure it is complete and meets specification requirements. If the mix design submittal is complete and meets specification, the Bituminous Materials Section will prepare the initial letter with Cost estimate and email to the State Materials Laboratory Business Office. Mix design submittals that are incomplete or do not meet the specification requirements will be rejected and require resubmittal in accordance with Section 6.2 of this plan. All timelines in Table 1 will restart with resubmittal of mix designs.
- 6.5 The State Materials Laboratory Business Office will provide the following to the Contractor/Producer:
  - QPL evaluation tracking number
  - Initial letter detailing mix design evaluation
  - Cost sheet for mix design evaluation detailing submittal requirements and associated charges
  - Reimbursable Agreement and Statewide Vendor Forms (if needed)
- 6.6 After Reimbursable Agreement and Statewide Vendor Forms are returned for the mix design evaluation, the Bituminous Materials Section will contact the Contractor/Producer to schedule the mix design materials delivery date.
  - 6.6.1 The Contractor shall submit representative samples of aggregate, RAP and RAS (if required), totaling 700 pounds proportioned to match the Contractor's proposal to the State Materials Laboratory for testing.

For example, if the Contractor's proposal consists of five stockpiles with the following blending ratio:

Material	Ratio
3/4" – #4	20%
1/2" – #8	30%
#4 – 0	30%
RAP	15%
RAS*	5%

Calculate the amount of aggregate needed from each stockpile in the following manner:

Material		Pounds of Aggregate Needed Per Stockpile
3/4" – #4	700 lbs x 0.20	140 pounds
1/2" – #8	700 lbs x 0.30	210 pounds
#4 – 0	700 lbs x 0.30	210 pounds
RAP	700 lbs x 0.15	105 pounds
RAS*	700 lbs x 0.05	35 pounds

- 6.6.2 Transport aggregate in bags or other containers so constructed as to preclude loss or contamination of any part of the sample, or damage to the contents from mishandling during shipment. The weight limit for each bag or container of aggregate is 30 pounds maximum.
- 6.6.3 Each aggregate bag or container shall be clearly marked or labeled with suitable identification including the contract number, aggregate source identification and size of stockpile material.

When RAS will be used in the HMA mix design the contractor shall provide 40 dried RAS samples proportioned into individual 24-ounce aluminum containers (See Pictures of acceptable container in Figure 1). The RAS samples shall be representative of the RAS stockpile being reduced per WSDOT Errata to FOP for AASHTO R 47 in the WSDOT Materials Manual. In addition to the sample identification outlined in 6.6.3, the RAS containers shall be marked with indelible markings noting the weight of the material to the 0.1 grams. The required weights of the RAS containers will be given to the contractor at the time of mix design submittal acceptance. RAS samples that do not meet the above requirements will result in rejection of the RAS mix design.

The RAS materials shall be accompanied by a test report from a certified testing laboratory verifying that the RAS materials submitted for mix design testing is non detect for asbestos utilizing Polarized Light Microscopy (PLM) 1000 point count test. The laboratory testing for asbestos content shall meet the certification requirements of Standard Specifications Section 9-03.21(1)A Reclaimed Asphalt Shingles and provide a copy of their laboratory certification along with the test results. The RAS materials shall also be accompanied by the Safety Data Sheet as outlined in Standard Specifications Section 9-03.21(1)A Recycled Asphalt Shingles.

WSDOT may independently test mix design samples for asbestos containing materials.

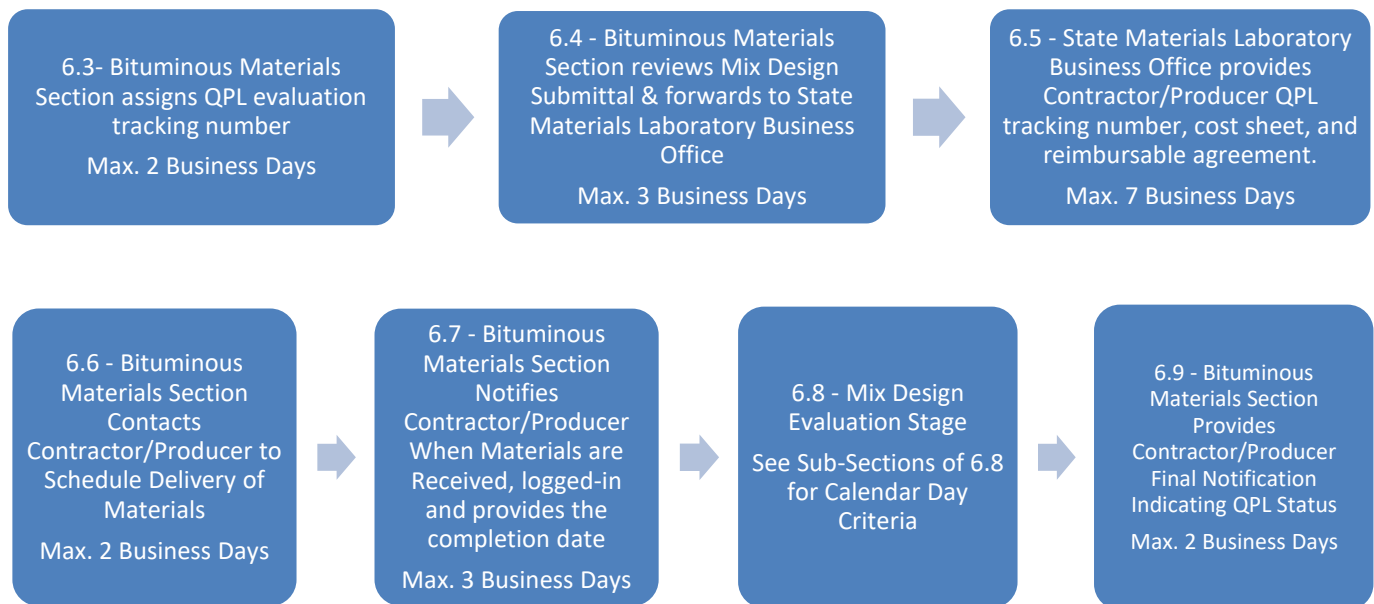
Figure 1: Pictures of acceptable 24-ounce aluminum container with lid off and on



- 6.7 The Bituminous Materials Section will notify the Contractor/Producer when the mix design materials have been received, logged-in and a calendar day completion will be provided to the Contractor/Producer as specified in Section 6.9.
- 6.7.1 Mix design materials that are non-representative and/or out of specification will be rejected and require resubmittal of all mix design material. Mix design materials that are rejected and not picked up by the Contractor/Producer within 2 working days of the receipt of rejection will be disposed of. All timelines in Table 1 will restart with resubmittal of mix design materials. When WSDOT elects to independently test mix design samples for asbestos containing materials, the mix design will not be accepted until WSDOT receives the results of its independent laboratory testing.
- 6.8 A priority queue will be established by the Bituminous Materials Section for HMA mix design evaluations.
- 6.8.1 Preference will be given to mix designs submitted for WSDOT contracts.
- 6.8.2 HMA mix design evaluations for WSDOT contracts will be completed within 25 calendar days after the notification in Section 6.7.
- 6.8.3 HMA mix design evaluations that are not for WSDOT contracts, or HMA mix design evaluations containing RAS materials will be completed approximately 40 calendar days after the notification in Section 6.7.
- 6.8.4 The Bituminous Materials Section reserves the right to limit the number of HMA mix design evaluations accepted for non WSDOT contracts at any time. Workload and staffing will dictate the number of HMA mix design evaluations accepted at one time.
- 6.9 After the mix design evaluation is complete the Bituminous Materials Section will provide the status of the evaluation to the following:

- Final notification to the Contractor/Producer indicating QPL status after completion of the mix design evaluation.
- Notification to the Materials Quality Assurance Section, QPL Engineer, that the evaluation is complete, and direction to add the HMA Mix Design to the QPL if applicable.

Table 1: Timelines Associated with Each Step of the Mix Design Evaluation Process



## 7. Mix Design Evaluation

- 7.1 The HMA mix design submitted by the Contractor/Producer will be evaluated by the Bituminous Materials Section in accordance with Section 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*. All communication from the Bituminous Materials Section will be to the Contractor's/Producer's contact as specified on WSDOT Form 350-042.
- 7.2 HMA mix designs will be placed on the QPL provided they meet the requirements of Section 9-03.8(2) and 9-03.8(6) of the *Standard Specifications*.
- 7.2.1 Voids in Mineral Aggregate (VMA) must be within 0.5% of the minimum specification in accordance with Section 9-03.8(2) of the *Standard Specifications* for the class of HMA evaluated.
- 7.2.2 % Gmm at N design must be within 1.5% of the specification in Section 9-03.8(2) of the *Standard Specifications* for the class of HMA evaluated.
- 7.2.3 Voids Filled with Asphalt (VFA) in Section 9-03.8(2) will not be part of the mix design evaluation.

- 7.3 A mix design that fails to meet the requirements listed in Section 7.2, 7.2.1 and 7.2.2 will not be accepted or placed on the QPL.
- 7.4 Adjustments to mix designs will not be allowed once they have been evaluated.
- 7.5 The Contractor/Producer will be issued a QPL mix design record providing the mix design is in compliance with Section 9 of this Standard Practice.
- 7.6 The QPL listing for HMA mix designs will show the following information:
- Company name
  - HMA Class
  - Aggregate Source(s)
  - PG Grade
  - PG Supplier

Anti-stripping additive brand and quantity (if applicable)

## 8. Referencing Mix Designs From The QPL

- 8.1 Requests for reference HMA mix designs for non WSDOT projects will be completed on WSDOT Form 350-041 and emailed to [HMAMD@wsdot.wa.gov](mailto:HMAMD@wsdot.wa.gov).
- 8.2 Reference HMA mix design reports will be issued for new mix designs on active and awarded WSDOT contracts once accepted and placed on the QPL.
- 8.3 Reference HMA mix design reports will be issued for current mix designs on active and awarded WSDOT contracts provided the HMA production history is in compliance with [Standard Specifications](#) Section 5-04.3(11)F.

## 9. Removal From The QPL

- 9.1 HMA mix designs will be automatically removed from the QPL in accordance with [Standard Specifications](#) Section 5-04.2(1).
- 9.2 HMA mix designs may be removed from the QPL if found in nonconformance with the [Standard Specifications](#) or this Standard Practice. Causes for removal from the QPL may include, but are not limited to the following:
- Failure to comply with requirements of Standard Practice QC 8.
  - HMA mix designs that are out of compliance in accordance with [Standard Specifications](#) Section 5-04.3(11)F.
  - Failure to notify WSDOT of changes in HMA production.
  - Removal at the request of the Contractor/Producer

## 10. Ignition Furnace Calibration Factor (IFCF) Samples

- 10.1 Each HMA mix design submitted for evaluation will have 12 IFCF samples produced for WSDOT as part of the QPL evaluation process.
- 10.2 The Contractor/Producer may elect to have 4 IFCF samples produced as part of the QPL evaluation process.

