



**DEVELOPMENTAL SPECIFICATIONS
FOR
RECYCLED ASPHALT SHINGLES (RAS)**

**Effective Date
January 20, 2010**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Add the following to Article 2303.02, Materials:

F. Recycled Asphalt Shingles (RAS)

1. Pre-consumer or post-consumer shingles that have been processed, sized, and ready for incorporation into an asphalt mixture constitute RAS material. Other than explicitly stated in this subsection and Appendix A, use RAS according to the same requirements as prescribed for RAP material.
2. Use between 2% and 5% RAS by weight of total aggregate. Consider the percentage of RAS used part of the maximum allowable RAP percentage.
3. RAS shall come from an approved supplier designated in Materials I.M. 506 Appendix A.

Add the following to Article 2303.04, Method of Measurement:

I. Recycled Asphalt Shingles (RAS)

Two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture will be included in the quantity of asphalt binder used.

Replace item 2 of Article 2303.05, B, Asphalt Binder:

2. Payment for asphalt binder will be for new asphalt binder, ~~and~~ the asphalt binder in the RAP which is incorporated in the mixture, ~~and two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture.~~ The quantity of asphalt binder in ~~classified or unclassified~~ RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

Appendix A – Instructions for RAS in HMA Mixtures

GENERAL

This Appendix describes requirements for processing, storing, documenting, and sampling & testing of RAS intended for use in asphalt mixtures.

All notifications and documentation shall be submitted to the District Materials Engineer based on the District responsible for the location of the initial RAS stockpile.

PROCESSING

End users of RAS which also receive raw, unprocessed shingles and process the material for incorporation into an asphalt mixture, shall be considered a shingle Supplier and must adhere to Materials I.M. 506.

STORAGE

Stockpiles shall be placed on a base with adequate drainage sufficient to prevent contamination.

Separately stockpile pre-consumer RAS from post-consumer (tear-off) RAS. RAS may be pre-blended with RAP under the direction of the Engineer. Notify the Engineer and District Materials Engineer 48 hours prior to blending RAS materials with other materials or adding to a RAS stockpile. The Engineer may require verification testing for asphalt content, gradation, aggregate specific gravity, aggregate absorption, and fine aggregate angularity before the pile may be used.

All RAS stockpiles shall be identified by maps of stockpile areas and signs placed in or near each stockpile.

STOCKPILE DOCUMENTATION

The following documentation is required for owners of stockpiled RAS:

- Form 82009ras (see Appendix B) is completed by the stockpile owner and a copy is forwarded to the District Materials Engineer within 10 calendar days of completing the stockpile.
- Any special handling, treatment or conditions of the RAS should be described on this form.
- A record of addition and consumption of the RAS stockpile should be documented on this form.
- Maps shall provide details that depict the stockpile site, including adjacent stockpiles of RAP or aggregates, permanent plant equipment, and landmarks.
- Maps and signs shall identify the stockpile by RAP Identification Number.

The District Materials Engineer will review forms for accuracy. Portions of the form including assigning the stockpile identification number, average values for extracted aggregate gradation, aggregate bulk specific gravity, aggregate absorption and asphalt binder content will be completed by the District Materials Engineer.

Notify the District Materials Engineer at least 48 hours before relocating or reprocessing a RAS stockpile for future use (not intended for a specific project). The notification shall include the estimated quantity of RAS being relocated or reprocessed and the new location of the stockpile. Relocation of RAS shall be reported on the appropriate Form (820009ras) and submitted to the District Materials Engineer within 10 calendar days of completing the relocation. Reprocessing a RAS stockpile may require additional sampling, testing, and a new Form (820009ras) with reassignment of a RAS Identification Number.

Before January 1st of each year, the Contractor shall update Form 820009ras on the status of each RAS stockpile. Report the estimated quantity of RAS removed for the construction season completed and the available RAS in each stockpile for future use.

SAMPLING AND TESTING

Mix Design

A certified Level I Aggregate Technician shall obtain the samples. Samples for mix design testing shall be obtained from at least 3 locations. A sampling plan shall be developed by the Contractor and approved by the District Materials Engineer prior to sampling.

Obtain sufficient material for contractor mix design testing and owner agency extraction testing as recommended in Materials I.M. 510. A representative 30 pound (15 kg) sample split from the total sample shall be delivered to the District Materials Laboratory for extraction testing. Results of the extraction test will be provided to the Contractor within 4 weeks of sample delivery.

Include asphalt content, gradation, aggregate specific gravity, fine aggregate angularity and absorption of the RAS material in testing.

In lieu of a sieve analysis, the following gradation may be assumed for the RAS aggregate:

Shingle Aggregate Gradation	
Sieve Size	Percent Passing by Weight
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95
No. 8 (2.36 mm)	85
No. 16 (1.18 mm)	70
No. 30 (600 μ m)	50
No. 50 (300 μ m)	45
No. 100 (150 μ m)	35
No. 200 (75 μ m)	25

