



Recycled Asphalt Shingles in HMAC

**TRB Waste Management and
Resource Efficiency Workshop**

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RAP Specifications

Section 00745.03

- ODOT first use of recycled asphalt pavement (RAP) is dated back to 1976
- 30% RAP by weight of mix is allowed in all lifts except for Level 4 wearing coarse
- Level 4 wearing coarse is limited to 20% RAP by weight of mix





RAS Specifications

Introduced in 00745.04

- Allows Manufactured Waste or Tear-offs
- Gradation Requirement for RAS processing
- RAS does not contain asbestos fibers in accordance with the policies and procedures established by the Department of Environmental Quality.
- Free of other materials such as nails, glass, soil, etc.



RAS Specifications

Introduced in 00745.04

- No more than 5% RAS by total weight of mixture will be allowed in HMAC mixtures.
- In addition, the maximum allowable percentage of asphalt binder replacement shall be restricted to 20% for base courses and 15% for wearing courses in HMAC containing only RAS.



RAS Specifications

Introduced in 00745.04

- When RAS is used in conjunction with RAP, no more than 20% reclaimed materials by total weight of mixture will be allowed in Level 1, Level 2, and Level 3 HMAC, and no more than 15% will be allowed in Level 4 HMAC. In addition, the maximum allowable percentage of binder replacement shall be restricted to 30% for base courses and 25% for wearing courses.



RAS Specifications

■ Example Table of Limits

RAP Pb	RAS Pb	Blend by % of total Mass				JMF Pb	Pb from RAP+RAS	Virgin Pb	%Pb replaced
		RAP	RAS	Agg	Lime				
4.85	18.82	15	5	79	1	6.9	1.67	5.23	24.2
		10	5	84	1	6.9	1.43	5.47	20.7
		30	0	69	1	6.9	1.46	5.45	21.1

RAS Projects for 2010

- US20: Purcell - Arnold Ice Cave (Bend)
 - Produced and placed by Hooker Creek
 - Project Manager: Ron Snell
- I-5: Battle Creek - N Jefferson
 - Produced by River Bend
 - Placed by Santiam Paving
 - Project Manager: Shane Ottosen
- Single shift productions



RAS Projects from 2010

- Research in progress
 - Production data comparison
 - Fatigue testing
 - Binder properties





RAS Projects from 2010 Production Data

- No changes are needed for QC/QA methods
- Density results indicate increased compaction may be required to achieve minimum target





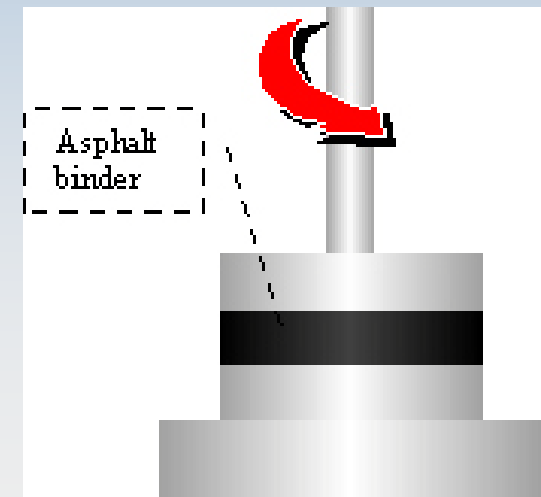
RAS Projects from 2010 Fatigue Results

- The fatigue testing for the two pilot projects indicates no difference between mix with RAS vs RAP only.



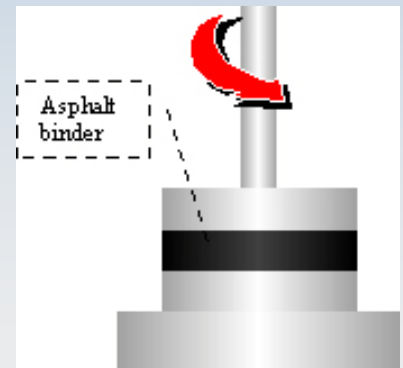
RAS Projects from 2010 Binder Properties

- Properties of blended binder did not react as anticipated
- Blended binder for projects actually became softer
- Verified through independent third party lab



RAS Projects from 2010 Binder Properties

- Third party lab verified process was removing solvent used to extract binder
- Found effect was for both RAP and RAP/RAS mix
- Softening due to compatibility of binders



RAS Projects for 2011

- Will be allowed on construction projects for 2011 through addendum or CCO process.
- City of Eugene has shared plans to place RAS this summer





Continuing work

- Updating mix design practices for RAS
- Marrying of section 00745.03 (RAP) and 00745.04 (RAS)



Thank You!

