Recycled Asphalt Pavement used in Pavement Maintenance

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What We Know

- Asphalt has always been recyclable
- Valuable material in Hot Mix Asphalt
- Used when and where feasible

RAP –typical usages – non HMA

- RAP Base
- Shoulder Backing
- CIR
- Road Bed Stabilization
- Hot in place recycle
- On site Cold Mix

RAP History

Pavement Maintenance

Pavement Maintenance Products

Chip Seals

Pavement Maintenance Products

Slurry Seal and Micro Surfacing
**RAP – Caution !!!!!**

- Not all HMA aggregates are good for PM
- History on Binder would be good homework

**Common Pavement Maintenance Aggregate Testing**

- LA Abrasion
- Sodium Soundness
- Specific Gravity
- SE
- Fines Durability
- Gradation
- Absorption

**RAP Chip and RAP Slurry Aggregates Produced Simultaneously**

**RAP Slurry Material**

- Consistent Residual Asphalt
  - Slurry Dust
  - Very few conglomerations
  - Residual asphalt remains very consistent

**RAP Slurry Seal**

<table>
<thead>
<tr>
<th>RAP Slurry Seal</th>
<th>ISSA Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Amount</td>
</tr>
<tr>
<td>Emulsion</td>
<td>10% - 14%</td>
</tr>
<tr>
<td>Residual AC</td>
<td>12.5% Min.</td>
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</tbody>
</table>

**Mixing RAP aggregates**

- Residue AC affects mix design
- Need emulsion
- % of blend with virgin Aggregates

Minimum
12.0% Residual @ 10% Emulsion
7.5% Residual @ 12% Emulsion
RAP Utilization example

Crushing Utilization
- Chip Seal 48%
- Slurry Dust 40%
- 12% waste

RAP Chip Material
Residual Asphalt

Chips
- Single stones and conglomerations
- Residual asphalt content will vary by sample

3/8” Chips

Some RAP crushing operations can create excess dust, which will contain asphalt residue

RAP Chips are lighter
Adjust for the lighter material
- Typical
  - 5/16 chip – 14 to 20 lbs per SY
  - 3/8 chip – 20 to 24 lbs per SY
  - ½ chip – 24 to 30 lbs per SY

Tests on Emulsion Compatibility
- Penetration
- Ductility
- Elastic Recovery
- Stripping
- Sweep Test - cohesion

RAP Management - Embedment

Multiple Sizes

Single Size
Spreading Emulsion

Determine proper application rate for road surface and traffic conditions and climatic conditions

RAP Chip Seal

RAP chip seals will have lower absorption rates
Slower Cohesion

Scrub Seals

Remember
- Not all RAP is created equal
- Do your homework
- Utilize RAP management
- RAP material will have lower Absorption Rates
- RAP material is lighter than Virgin Aggregate
- Step out slow – consider your climate