Asphalt Shingles in Paving

SWANA Thinking Outside the Blue Box

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7 million tons of asphalt shingles disposed annually in the US.

500+ million tons of Hot Mix Asphalt (HMA) produced annually in the US.

55 tons of carbon saved by recycling 1 ton of asphalt shingles.
Establish a strong local paving end market for recycled asphalt shingles (RAS) that captures the resource value of shingles and diverts this material from landfills.

Expanding markets for recyclable and reusable materials by facilitating an interactive community of businesses, public agencies, and other stakeholders.
Asphalt Shingles

• Large quantity of shingles is generated in King County and disposed in landfills
• Limited end use markets
• Local recycling infrastructure is not firmly established (though growing)
• Shingles are recycled in other parts of the country
Hot Mix Asphalt (HMA)

Precedent
• HMA producers are already using recycled asphalt shingles (RAS) on private jobs
• 10 states have specifications and procedures that allow for RAS in HMA
• American Association of State Highway and Transportation Officials (AASHTO) offers specifications for using RAS in HMA

Cost
• Oil prices/asphalt supply – potential to save $3.50 – $7.50 per ton of HMA
• Solid waste costs and tipping fees

Push toward GREEN
• Zero Waste/C&D focus
• LEED-ND
• GHG emissions—potential to reduce GHG by 1 million metric tons annually in King County

Alabama
Georgia
Iowa
Minnesota
Missouri

Pennsylvania
South Carolina
Texas
Virginia
Wisconsin
Transportation officials need first-hand experience with RAS in HMA and local engineering and performance data to consider allowing RAS in HMA on public roads.
Shingles in Paving Demonstration

Cost-effective product that:
• Meets specifications
• Performs over time
• Minimizes risk
• Diverts significant tonnages from landfills

Design considerations:
• Minimize risk
• Performance over time
• Health, environmental and safety standards
• Recognition by industry and public agencies
• Broad application of results

• Exclusive focus on HMA
• Partner with local transportation agencies
• Pave the wear course of a major roadway
• Test RAS in HMA
Demonstration Objectives

- Reflect the interests and standards of stakeholders
- Evaluate performance of HMA with RAS with a high degree of certainty
- Capture objective engineering data to gain wide acceptance of performance test results
Laying the Groundwork

Connected with the national experience
- Specification development
- Environmental issues and regulatory protocols
- Research memos and conferences

Engaged stakeholders, kept them engaged
- 100 representatives of recyclers, paving contractors, transportation agencies, health departments, regulatory agencies and solid waste agencies
- 18-member project advisory group to guide and steer the design and development

Recruited key transportation agency partners
- King County Department of Transportation
- Washington State Department of Transportation
# Road Selection and Study Design

## Road Selection Criteria
- Overlay paving
- Two miles in length
- Consistent pavement and subsurface conditions
- Two-lane, relatively straight with limited variable surface conditions

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<thead>
<tr>
<th></th>
<th>Test Section #1</th>
<th>Test Section #2</th>
<th>Test Section #3</th>
<th>Test Section #4</th>
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<tr>
<td><strong>1000 tons/day</strong></td>
<td>½ mile</td>
<td>½ mile</td>
<td>½ mile</td>
<td>½ mile</td>
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<tr>
<td><strong>Lane 1</strong></td>
<td>HMA Mix with 15% RAP</td>
<td>HMA Mix with 3% RAS and 15% RAP</td>
<td>HMA Mix with 3% RAS and 15% RAP</td>
<td>HMA Mix with 15% RAP</td>
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<tr>
<td><strong>Lane 2</strong></td>
<td>HMA Mix with 15% RAP</td>
<td>HMA Mix with 3% RAS and 15% RAP</td>
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Specifications and Testing

Designed to ensure a high quality product that **performs** and meets *health, safety, and environmental standards*

**Collaborative process with leading transportation and regulatory agencies**

**Involvement of private industry to ground requirements in reality**
- Product samples
- Specification review
- Outcome-oriented approach

**Clear responsibilities for KCDOT, WSDOT, and contractor**

**Recycled Asphalt Shingles (RAS)**
- Accepted materials
- Gradation
- Extraneous Materials
- Moisture Content
- Asbestos
- Other regulatory (stormwater, air quality, safety, solid waste handling)

**Hot Mix Asphalt (HMA)**
- The amount of RAS to incorporate
- Virgin replacement due to RAS
- Whether to use RAP

3% RAS and 15% RAP by weight
Environmental, Health, and Safety Standards

Key agencies, regulations and rules

- Washington State Department of Ecology – solid waste handling and storage
- Washington State Department of Labor & Industries – workplace safety rules
- Puget Sound Clean Air Agency – asbestos testing and handling
- Local Health Department(s) – general compliance, notification of grinding

Took asbestos issue seriously

- Restricted supply to asphalt shingles only
- Inspections of incoming loads
- Rigorous sampling and testing standards – we had asbestos hits on other roofing products
- Presorted to remove suspect materials such as felt paper, mastic, built up roofing, and shingles with patching or aluminum coating
Paving Accomplished!

Results from extensive initial material engineering tests indicate that using RAS in HMA has no negative impact on pavement performance.

- All but one Test Section substantially met project specifications and materials standards.
- The finished roadway surface is in near perfect visual condition.
- Skid resistance testing shows no noticeable change in resistance.
- Further testing, analysis, and documentation will continue to verify the impact on using RAS on public roadways.

Four days of paving completed in September 2009 on a two mile stretch in King County
Conclusions and Next Steps

- Importance of multi-party partnerships
- Low to none probability of asbestos in shingles; suspect materials hand removed included patching and aluminum coating.
- Importance of visual inspections and presorting
- Need for additional guidance on asbestos sampling and testing

- Sharing results with local stakeholders
- Additional research
  - Costs, use of RAS on private jobs, asbestos sampling and testing
- National and regional partnerships
- Ongoing performance testing
Pioneering a Sustainable Future

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King County LinkUp  www.kingcounty.gov/linkup

Shingle Recycling.Org  www.shinglerecycling.org