PAVEMENT MANAGEMENT & USING RECYCLED RUBBER TIRES IN PAVING

GREENROADS WORKSHOP

Presented by: Margot Yapp, P.E.
What is Pavement Management?

- A decision-making tool to answer questions:
  - What do I have? What condition is it in?
  - What repair strategies should I select? Are they working?
  - How much money do I need?
  - When should I spend it?
  - What if ....???
What do I Have/Condition?

- Inventory
  - How many miles? How old?
  - Functional classes? Federal aid eligible?
  - Bus or truck routes?

- Condition
  - Collect pavement distress data
  - Measure “health” of network
Typical Pavement Distresses

- Alligator cracking
- Block cracking
- Longitudinal or transverse cracking
- Distortions
- Rutting
- Patches
- Weathering & raveling
Pavement Preservation Strategies

- Philosophy - keep good roads good!
- Examples of typical strategies
  - Rubber modified chip and cape seals
  - ARAM
  - Rubberized AC

Slurry Seal

Chip Seal
Rubberized Chip Seals

- **Definition**
  - Application of asphalt, rubber and aggregate chips rolled onto the pavement

- **Purpose**
  - Seal the surface of a pavement with non load-associated cracks
  - Improve surface friction
  - Wearing course
Rubberized Chip Seals

**Pros:**
- Equipment is common
- Can quickly open to low-speed traffic

**Cons:**
- Application process needs attention
- Requires frequent adjustments on application rates, chip loss, bleeding etc.
- Windshield damage
- Dust problems

<table>
<thead>
<tr>
<th>Distress Type</th>
<th>Distress severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue Cracking</td>
<td>Major</td>
</tr>
<tr>
<td>Linear &amp; Block Cracking</td>
<td>Major</td>
</tr>
<tr>
<td>Rutting</td>
<td>Major</td>
</tr>
<tr>
<td>Raveling</td>
<td>Major</td>
</tr>
<tr>
<td>Flushing/Bleeding</td>
<td>Major</td>
</tr>
<tr>
<td>Roughness</td>
<td>Major</td>
</tr>
<tr>
<td>Friction Loss</td>
<td>Major</td>
</tr>
<tr>
<td>Moisture Damage</td>
<td>Major</td>
</tr>
<tr>
<td>Shoving</td>
<td>Major</td>
</tr>
</tbody>
</table>

- Effective
- Marginal
- No Impact
Cape Seals

- **Definition**
  - Combines chip seal and slurry seal (or microsurfacing) to form a single, more durable surface

- **Purpose**
  - Retard reflection cracking
  - Durability against snowplow blades
  - Improve surface friction
Cape Seals

- **Pros:**
  - Increases the life of a chip seal by enhancing binding of the chips and by protecting the surface.
  - Cape seal surface does not have any loose aggregate and creates a dense mat.

- **Cons:**
  - Requires both chip-seal and slurry-seal equipment.
  - The construction process is longer than either a chip-seal or a slurry-seal treatment.

### Distress Type

- Fatigue Cracking
- Linear/Block Cracking
- Rutting
- Raveling
- Flushing/Bleeding
- Roughness
- Friction Loss
- Moisture Damage
- Shoving

### Effectiveness

- **Minor**
- **Major**
Asphalt Rubber Aggregate Membrane (ARAM)

- 3/8” asphalt rubber membrane made out of asphalt cement & crumb rubber

Pros
- Extended service life
- Reduced reflection cracking
- Different application alternatives
  - Cape seal
  - Interlayer between pavement layers (retards reflection cracking)

Cons
- High temperature application
- High initial cost
Rubberized Asphalt Concrete (RAC)

- **Pros**
  - Resistance to reflective cracking
  - Higher thickness equivalency than HMA for reflective crack retardation (Caltrans)
  - Environmentally friendly

- **Cons**
  - Higher cost (average 18%)
  - Rutting concerns (Max thickness limited to 0.20 foot)
  - Temperature sensitive
HMA vs. RAC

Dense graded

Gap or open-graded
Does Rubber *Really* Help Performance?

- Find out using your pavement management system to:
  - Monitor performance
  - Establish custom performance curves
  - Determine cost-effectiveness
PMS Software in California (by City)

92% of total local road miles are included in a PMS

- StreetSaver: 39%
- MicroPaver: 18%
- Cartegraph: 15%
- Other: 24%
- No PMS: 4%
First, Record Construction Activity

- Identify types of treatments
- Identify streets and locations of work
- Enter into PMS regularly (e.g. quarterly)
- Determine changes in pavement condition

<table>
<thead>
<tr>
<th>Maintenance Date</th>
<th>Treatment</th>
<th>Thickness</th>
<th>Area</th>
<th>Cost</th>
<th>New PCI</th>
<th>Old PCI</th>
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</thead>
<tbody>
<tr>
<td>8/1/1996</td>
<td>SHALLOW PATCH</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>64</td>
<td>57</td>
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<tr>
<td>9/1/1997</td>
<td>THIN OVERLAY w/FABRIC</td>
<td>4</td>
<td>0</td>
<td>$0</td>
<td>100</td>
<td>61</td>
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</table>
Performance Curves Tell the Story

Conventional HMA

RAC?
Second, Add Rubber Treatments to PMS

- M&R decision tree must have treatments identified
- Make sure it’s in the right treatment for the right street
- Need unit costs
Third, Develop Work Plan

- Determine paving budget
- Perform budgetary analyses
- Fine-tune and develop work plan
- Re-inspect periodically after construction
Questions?

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