Pavement Preservation

WAPA Annual Conference

November 27th, 2018
Pavement Management

- Pavements must be routinely inspected/monitored
- Maintenance actions must be performed in a *timely* manner
What-Why-When

- **Type of distress** - indicates what the problem is
- **Level of severity** - indicates how bad the problem is
- **Amount of distress** - indicates how much repair must be done
PASER Manual

Pavement Surface Evaluation and Rating
PASER Manual

“This manual is intended to assist local officials in understanding and rating the surface condition of asphalt pavement. It describes types of defects and provides a simple system to visually rate pavement condition.”

Transportation Resource Center
University of Madison
Pavement Deterioration Curve

In addition to indicating the surface condition of a road, a given rating also includes a recommendation for needed maintenance or repair. This feature of the rating system facilitates its use and enhances its value as a tool in ongoing road maintenance.

<table>
<thead>
<tr>
<th>RATING</th>
<th>RECOMMENDATION</th>
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<tbody>
<tr>
<td>9 &amp; 10</td>
<td>Routine maintenance</td>
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<tr>
<td>6 - 8</td>
<td>Preservation treatments</td>
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<tr>
<td>5</td>
<td>Rehabilitation</td>
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<tr>
<td>3 &amp; 4</td>
<td>Structural improvement</td>
</tr>
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<td>1 &amp; 2</td>
<td>Reconstruction</td>
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**WAPA Recommendations**
Rating 9 or 10 [Very Good to Excellent]

Crack fill the year the crack forms
Crack Fill

• Timely Maintenance Saves Money
  – The first line of defense against water intrusion is crack sealing
  – Proper crack filling can prevent costly water damage and greatly increase the life of your pavement
  – Cracks should be filled in the first year they form
What Causes Pavements to Crack?

- This environment will prematurely crack and age roadway surface
- Leaving the deterioration untreated leads to costly rehabilitation and reconstruction repairs
  - Quality of the pavement
  - Traffic (quantity/type)
  - Climate (freeze-thaw cycles)
Crack Fill

- Water Penetration
  - Water penetrates through the cracks in the pavement and into the sub base
  - The base is then softened which leads to cracks working their way up to the surface
  - Then to “alligatored” areas and eventually potholes
Crack Fill

• When’s the Best Time to Apply?
  – Late spring – after moisture is out
    ▪ Want cracks at mid-range of opening/closing
  – Fall – before salt use – keeps salt solution on surface during winter
  – Winter – too wide – excessive material
  – Summer – too tight – can’t get material in
Crack Routing Procedures

- **OLD**
  - Photo Above: No Dust Suppression System

- **NEW**
  - Photo Above: New OSHA Required Routing, Effective Dust Suppression System
Crack Neglect
Rating 6 - 8 [Good to Moderate]

Routine maintenance, crack filling and minor patching
Preservation treatments (thin asphalt overlays, sealcoats)
Patching
Asphalt Pavement Surface Treatments
Surface Treatments

- Very thin 1/4” to 1+” thick

**Used for:**
- Raveled and polished surfaces
- Oxidized pavement surfaces
- Bleeding and flushing
- Slight to moderate cracking
- Slight-moderate surface irregularities
- PASER rating of 6 through 8

**NOT used for:**
- Severe Cracking
- Severely deteriorated surfaces
- Base and subbase problems
- Drainage problems
Surface Treatment Benefits

- Seal pavement surface
- Provide a new wearing (driving) surface
- Improve pavement surface friction
- Slow pavement weathering and aging
- Improve the surface appearance
Surface Treatment Types

- Chip Seal (w/ Fog Seal)
- Scrub Seals
- Slurry Seal
- Micro Surfacing
- Cape Seal
  - Chip covered with Micro
- Combinations
- Thin asphalt overlays
Chip Seal
Chip Seal

- Application of asphalt emulsion covered with aggregate then compacted
  - Seal narrow cracks and bind together cracked pavement
- Fog seal spray application locks down chips and absorbs any excess asphalt emulsion providing a black pavement surface color
Chip Seals
Chip Seal

• When to apply a chip seal?

Chip seals can be applied at any time until the distresses become too severe

- Chip seals can be applied multiple times over the pavement’s life cycle
Scrub Seals
Scrub Seals

Wave of Oil
Scrub Seal

- Similar to chip seal application of asphalt emulsion covered with aggregate
- Asphalt sprayed through a series of brooms placed at different angles into small cracks
- Chip spreader applies sand and other fine aggregate, which is broomed into the surface, forcing the sand into the emulsion-filled cracks
- Rolled with a rubber tire roller
Slurry Seal
Micro Surfacing
Slurry Seal
Slurry Seal

- Mixture of emulsified asphalt, well graded fine aggregates, mineral filler and water
- Used to renew pavement surfaces and retard moisture/air intrusion into underlying pavement
- Applied from 1/8” to 3/8” thick and will fill minor cracks, restore a uniform texture and restore friction loss
Micro Surfacing
Micro Surfacing

- Mixture of polymer modified asphalt emulsion, crushed dense graded aggregate, mineral filler, additives, and water
- Flows out of box containing an auger to uniformly distribute mixture
- Screed like drag produces smooth driving surface
- Provides resurfacing from 3/8” to 3/4” thick and returns traffic use in a couple hours
Micro Surfacing

• Slurry seal’s uncle, chemically driven
  – Difference in how they “break” or harden
  – Slurry relies on evaporation while microsurfacing contains chemical additives which allow it to break without relying on sun or heat for evaporation to occur
  – Micro application hardens quicker and can be used when conditions wouldn’t allow slurry to be placed
Micro Surfacing
Thin Asphalt Overlays
Thin Asphalt Overlays

• What is a Thin Asphalt Overlay?
  – A fine graded asphalt mixture ≤ 1½” thick
  – Fine graded mixtures like 12.5mm (#4), 9.5mm (#5), or 4.75mm (#6)

• Can be dense-graded, hot mix, warm mix, or stone matrix asphalt
Project Selection

- Visual Survey
- Structural Assessment
  - No structural improvement required
- Drainage Evaluation
  - What changes are needed
- Functional Evaluation
  - Ride quality
  - Skid resistance

- Discussion with Maintenance Personnel
When to Use Thin Asphalt Overlays

- Raveling
- Polishing
When to Use Thin Asphalt Overlays

- Longitudinal Cracking in wheel path
- Longitudinal Cracking outside of wheel path
When to Use Thin Asphalt Overlays

- Low Severity Thermal Cracking
- Low Severity Rutting
When Not to Use Thin Asphalt Overlays

- Roads with unrepaired structural damage and/or insufficient structural capacity
- Bottom-up cracking
- Stripped layers
- Alligator Cracking
- Reflective Cracking
- Excessive rutting
- Excessive thermal cracking
Materials for Thin Asphalt Overlays

- Quality aggregates must be used
- Polymerized binders may be specified depending on application and condition of existing pavement
Construction – Paving and Compacting

• Paving
  – Best to move continuously
  – MTV or windrow can help
  – Cooling can be an issue
    ▪ 1” cools 2X faster than 1.5”
  – Warm mix can help

• Compaction
  – Seal voids & increase stability
  – Low permeability
  – No vibratory on < 1”
Conclusions

• Thin Asphalt Overlays for Pavement Preservation
  – Improve Ride Quality
  – Reduce Distresses
  – Maintain Road Geometrics
  – Reduce Noise
  – Reduce Life Cycle Costs
  – Provide Long Lasting Service
  – Provide Structure

• Place before extensive rehab required
Example/Scenario
Step by Step Process

• Identify pavement distress
• PASER Rating score
  – Recommended practices/option
  – What are my expectations
  – What is my budget
• Core if necessary
• Discuss, partner, collaborate and ensure proper application for the project
Example

• What is the PASER rating?
  – 6

• What are the treatment options?
  – Surface treatments or thin asphalt overlay
## Treatment Selection Based on Distress

<table>
<thead>
<tr>
<th>Pavement Distress</th>
<th>Severity Level</th>
<th>Chip Seal</th>
<th>Scrub Seal</th>
<th>Microsurfacing</th>
<th>Thinlay</th>
<th>Mill &amp; Overlay</th>
<th>Reconstruct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rutting</td>
<td>Low</td>
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<td>Thermal Cracking</td>
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<td>Friction/Texture</td>
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<td></td>
<td>X</td>
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</tbody>
</table>

*Note: X indicates the treatment selection based on distress level.*
Example

- Which treatments are the right for the project?
  - Chip Seal
  - Scrub Seal
  - Microsurfacing
  - Thin asphalt overlay
## Estimated Life Extension

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Good Condition (PASER Rating 7 or more)</th>
<th>Fair Condition (PASER Rating 5-6)</th>
<th>Poor Condition (PASER Rating 4 or less)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin Overlay &gt; 1&quot;</td>
<td>10-14 years</td>
<td>9-12 years</td>
<td>4-6 years</td>
</tr>
<tr>
<td>Thin Overlay &lt; 1&quot;</td>
<td>8-12 years</td>
<td>7-10 years</td>
<td>2-4 years</td>
</tr>
<tr>
<td>Microsurfacing</td>
<td>6-8 years</td>
<td>4-6 years</td>
<td>2-4 years</td>
</tr>
<tr>
<td>Chip Seal</td>
<td>4-5 years</td>
<td>3-4 years</td>
<td>1-3 years</td>
</tr>
<tr>
<td>Scrub Seal</td>
<td>N/A</td>
<td>5-7 years</td>
<td>3-5 years</td>
</tr>
</tbody>
</table>
### Approximate Cost of Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cost Per Mile</th>
<th>Cost Per Square Yard</th>
<th>Annualized Cost ($/SY/YR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chip Seal</td>
<td>$18,000 - $27,000</td>
<td>$1.40 - $2.10</td>
<td>0.39</td>
</tr>
<tr>
<td>Chip Seal (w/ Fog)</td>
<td>$22,000 - $31,000</td>
<td>$1.70 - $2.40</td>
<td>0.41</td>
</tr>
<tr>
<td>Scrub Seal</td>
<td>$21,000 - $38,000</td>
<td>$1.60 - $3.00</td>
<td>0.31</td>
</tr>
<tr>
<td>Microsurfacing</td>
<td>$29,000 - $39,000</td>
<td>$2.25 - $3.00</td>
<td>0.38</td>
</tr>
<tr>
<td>Thin Overlay &lt; 1&quot;</td>
<td>$32,000 - $52,000</td>
<td>$2.50 - $4.00</td>
<td>0.33</td>
</tr>
<tr>
<td>Thin Overlay &gt; 1&quot;</td>
<td>$43,000 - $65,000</td>
<td>$3.30 - $5.00</td>
<td>0.35</td>
</tr>
</tbody>
</table>

- 1 mile of road = 5280 (length) X 22 (width) = 12907 SY

**Notes:**

*Numbers above are for single application layer and do not include crack filling, milling, patching, paint removal, pavement markings, etc.*
Example

- What provides me the biggest bang for the buck?
  - Chip Seal 3-4 years ($0.39/sy/yr)
  - Scrub Seal 5-7 years ($0.31/sy/yr)
  - Microsurfacing 4-6 years ($0.36/sy/yr)
  - Thin asphalt overlay <1” 7-10 years ($0.33/sy/yr)
  - Thin asphalt overlay >1” 9-12 years ($0.35/sy/yr)
In addition to indicating the surface condition of a road, a given rating also includes a recommendation for needed maintenance or repair. This feature of the rating system facilitates its use and enhances its value as a tool in ongoing road maintenance.

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<tr>
<td>6</td>
<td>Good</td>
</tr>
<tr>
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Safety

Watch For Us Campaign

WATCHFOR.US
Watch For Us Campaign

- Wisconsin Statistics 2016 data
  - Construction Zone Crashes 2,811
  - Construction Zone Fatalities 9
  - Construction Zone Injuries 1,112

- [http://watchfor.us/](http://watchfor.us/)
Contacts

- WAPA
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