Preserve Your Roadway Network

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FHWA Resource Center – Lakewood, CO
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Denver, CO
Key Topics of Discussion

- Every Day Counts (EDC-4)
- SHRP2 R26
- PPETG
- Free PP Web-based Training
- Tack Coat

Pavement & Materials
Technical Service Team
Pavement Preservation: When and Where

Benefits to Using a Whole-Life Approach to Pavement Preservation Project and Treatment Selection
# Technical Working Group Team

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role Details</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<tr>
<td>Leif Wathne</td>
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</tr>
</tbody>
</table>
EDC-4 When and Where

Vision

• Focus the use of preservation to **promote** effective strategies that **reduce** the annual cost of managing the pavement network at acceptable performance levels.

Mission

• Provide **guidance** and **implementation tools** that
  ✓ **Assist** agencies in selecting cost-effective pavement preservation projects that **sustain** pavement performance programs
  ✓ **Demonstrate** the cost savings and other benefits that can be realized through effective pavement preservation programs
  ✓ **Facilitate** accelerated national deployment of proven practices that support inclusion of pavement preservation as an asset management strategy.
National Goal
By the end of the project, ensure that at least 10 of the **States or local agencies** that have requested assistance have institutionalized policies governing the selection of pavement preservation projects to support sustainable pavement performance.
States Requesting Assistance

Requested Assistance:
- CA
- NV
- OR
- WA
- ID
- UT
- AZ
- NM
- CO
- WY
- MT
- ND
- SD
- NE
- KS
- OK
- TX
- LA
- MS
- AL
- GA
- SC
- FL
- NY
- PA
- VA
- WV
- NC
- TN
- AR
- OK
- NM
- AZ
- NV
- WA

No Assistance Requested:
- FLH
- MD
- DE
- NJ
- CT
- RI
- MA
- NH
- ME
- ND
- SD
- NE
- KS
- OK
- TX
- LA
- MS
- AL
- GA
- SC
- FL
- NY
- PA
- VA
- WV
- NC
- TN
- AR
- OK
- NM
- AZ
- NV
- WA

No Response:
- Alaska
- Hawaii
- DC
- PR
- VI
- FLH
Why Is This Important?
Federal Legislation

- Performance-based investment decisions
- Development of a 10-year Transportation Asset Management Plan
  - Includes consideration of life cycle planning & risk
  - Sets minimum standards for the use of pavement management systems
  - Links investments to performance targets
When and Where Program: Innovations

- Selection Guide
- Analysis Tool
- Peer-to-Peer Exchanges
- Communications Plan
- Asset Management
- Strategy Guidance
- Cost Effectiveness Metrics
Pavement Preservation – How
Pavement Preservation: How Quality Construction and Materials

Flexible Pavements
• Micro surfacing
• Chip Seal
• Slurry Seal/Scrub Seal
• Ultrathin bonded wearing course

Rigid Pavements
• Diamond grinding
• Partial-depth repair
• Full-depth repair
• Dowel bar retrofit/cross stitching
Pavement Preservation How

- Peer-to-Peer Exchanges
  - Share experiences and collect specifications
- Update Pavement Preservation Checklists
- Develop and Deliver Web-based Training
  - Flexible and Rigid Pavements
- Develop Best Practice Technology Briefs
- Develop Additional Communications Tools
Challenges

• Shifting from a worst-first strategy when funding is tight
  – Agencies tend to fight fires

• Availability of qualified contractors, strong construction practices, & good candidates for preservation treatments

• Quantifying the benefits to pavement preservation
  – Lack of adequate distress information
  – Inconsistency in terminology
  – Inconsistencies in treatment use
Challenges

• Aligning District/Region project selection with agency performance targets
  – Inconsistencies across the state
  – Project selection may or may not lead to statewide goals

• Allocating funding based on need (i.e., conditions)
  – Districts or Regions using preservation are penalized
# EDC-4 Deployment Team Implementation Plan

**April 25, 2017 DRAFT**

<table>
<thead>
<tr>
<th>State DOT Team Co-Chair</th>
<th>FHWA Division Team Co-Chair</th>
<th>EDC Team Initiative Title (Tool or Technology)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edmund Naras</td>
<td>Gregory Doyle</td>
<td>Pavement Preservation <em>(When, Where, and How)</em></td>
</tr>
</tbody>
</table>

## A – Team Members

- Curtis Bradley – MassDOT, OTP, Research
- Jackie DeWolfe – MassDOT, OST, Sustainable Mobility
- Cody Holemo – MassDOT, D-4, Highway Maintenance
- Jack Moran – MassDOT, Asset Management
- Andy Paul – MassDOT, Highway Design
- Jonathan Smith – MassDOT, Pavement Mgmt.
- John Livsey – Town of Lexington
- Alan Chicoine – CIM (Allstates Asphalt)
- Dan Patenaude – CIM (Sealcoating, Inc.)
- John Pourbaix – CIM
- Jason Dietz – FHWA, RC Pavmt & Mats TST

## B – Need/Application & Implementation Issues to Address

- No MassDOT Pavmt. Preservation (PP) policy/program across Districts (PP treatments used on project-by-project basis).
- Lack of dedicated funding/line item in STIP for PP treatments.
- Healthy Transportation Program (HTP) requirements can add project scope/cost that can make PP treatments not feasible.
- Need updated PP Manual/Treatment Matrix.
- No statewide effort for Local Agencies to consider “whole-life” investment and implement PP as standard business practice (some Local Agencies do apply PP on own).
- Preservation of sidewalks, bike-paths & other assets.
- Quantify benefits of PP (condition, financial, mobility, environ.)

## C – Desired Outcome (2017-2018 Goals)

2. Prepare & issue PP Communication Plan
3. Explore dedicated CIP/STIP funding/line item for PP treatments.
4. Assist & inform in updating Healthy Transportation Program (HTP) criteria applicable to PP treatment projects.
5. Identify at least 5 candidate 2019 PP projects in each Districts
6. Prepare updated PP Manual/Treatment Matrix
7. Engage Local Agencies on use of PP as “whole-life” investment and standard business practice.

## D – Performance Measures

1. Have not started/percent developed/completed (seven desired outcomes will be monitored as we go and reported in tables below)
EDC-4 Funding Opportunities:

- Accelerated Innovation Deployment (AID) Demonstration
  - *New* Notice of Funding Opportunity under FAST Act > GOAL: $10 million per year [23 U.S.C. 503(c)(2)(B)]

- State Transportation Innovation Council Incentive
  - Up to $100,000 per STIC per year [under AID]

- Increase Federal Share for Project Level Innovation
  - Increase federal share up to 5 percent of the total project cost [23 U.S.C. 120(c) (3)]
Guidelines for the Preservation of High-Traffic-Volume Roadways (R26)

Your guide to the most-affordable options for extending pavement life

Save Lives

Save Money

Save Time
R26 Activities

- Preservation Projects
- Technical Assistance
- MassDOT Showcase
- 4 Workshops
- Quarterly User group Conference Calls
- Peer Exchanges
- Outreach & Marketing
- **Round 7: On-Line Trng Development; State Trng**
Challenge

- Preserving Pavements on High-Traffic-Volume Roadways can yield significant benefits but carries a high level of risk,
- Many effective pavement preservation techniques exist, but until now they have been used, especially in urban settings, primarily for low-volume roads.

Research Goal

- Identify and develop pavement preservation technologies that can be used to extend the life of high-traffic-volume roads and avoid disruptive and costly major rehabilitation and reconstruction projects.
SHRP2 R26 Project Analysis Tool

This analytical tool is intended to be used to identify feasible pavement preservation projects on high-traffic-volume roads and to select the preferred preservation treatment for each project based on the conditions and characteristics of the project, the cost effectiveness of the treatment, and various other selection factors. It complements the guidance provided in the R26 publication, 'Guidelines for the Preservation of High Traffic Volume Roadways.' This tool is designed for use by pavement maintenance/preservation engineers, pavement management engineers, and other pavement practitioners responsible for making preservation decisions.

Getting

This analytical tool is divided into four different modules that are introduced below and accessed from the buttons on the right.

Project Analysis

The purpose of this tool is to apply the R26 treatment selection methodology to a pavement project, in order to determine appropriate treatments for that project. Click the 'Project Analysis' button to enter information for a specific pavement project, to apply the R26 methodology, and to determine recommended treatments for your project.

Treatment Toolkit Setup and Management

Treatment 'toolkits' are user-defined sets of selected preservation treatments, and their associated estimated performance and unit costs. Click the 'Toolkit Setup and Management' button to create a list of unique pavement preservation treatments for use in your project analysis. Note that each defined pavement preservation toolkit is specific to one of three pavement types: flexible, rigid, or composite.

Included Pavement Performance Measures

When conducting a project analysis, you may only want to include certain performance measures (e.g., only certain distresses) in your analysis. Click the 'Included Pavement Performance Measures' button to set the specific performance measures to be used for each pavement type.

Resources

Click the 'Resources' button to access many useful R26-related references to help you with the development of pavement preservation toolkits, and associated project analyses.
Section Selection

The first step of the section analysis is to add a new section or open an existing section. Use the controls below in the 'Section List' area to 'Add,' 'Copy,' 'Delete,' and organize sections in the section list. To run an analysis on a particular section, select that section in the section list and click the 'Next' button.

Section Details: Default Flexible Section

General Information
- Highway Route / Road Name: 0
- Location (City/County): 0
- Limits (Begin/End Mileposts or Reference Points):
  - Begin: 0.00
  - End: 0.00
- Section Length, miles: 0.00
- Num. Lanes in Each Direction: 0

Pavement Type and Structure
- Pavement Type: Flexible Pavement (HMA surface on aggregate or stabilized base)
- Pavement Structure: HMA Overlay of Flexible Pavement

Construction/Rehab Information
- Last Construction Year (i.e., year original pavement was built or last rehabilitated): 2000
- Year that Preservation Treatment is Expected to be Applied: 2008

Traffic Information
- 2-way Avg. Daily Traffic (ADT), veh/day: 0
- Percentage of Trucks in ADT, %: 0.0
- Setting/Environment: Rural

Environmental Information
- Is the Pavement Section located in a Noise-Sensitive Area: No

Section List

Pavement Type: Flexible

Section Details

Current Section: Default Flexible Section
**Toolkit Selection**

The next step of the project analysis process is to select an available "toolkit" that contains the treatments that you want to consider for application on your project. The list of available pavement type-specific toolkits is shown below. Please select your desired toolkit from the list and click the "Next" button to continue the analysis process. If you need to define a new toolkit, use the provided "Add" or "Copy" list-control buttons.

<table>
<thead>
<tr>
<th>Toolkit List</th>
<th>Included?</th>
<th>Treatment Type</th>
<th>Performance, yrs</th>
<th>In-Place Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Crack Fill</td>
<td>2.5</td>
<td>$0.65/ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crack Seal</td>
<td>4.0</td>
<td>$1.10/ft</td>
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<tr>
<td></td>
<td></td>
<td>Slurry Seal (Type III)</td>
<td>4.0</td>
<td>$0.88/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Microsurfacing (Single-Course)</td>
<td>4.0</td>
<td>$2.25/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Microsurfacing (Double-Course)</td>
<td>5.0</td>
<td>$4.25/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chip Seal (Single-Course, Conv. Binder)</td>
<td>5.0</td>
<td>$1.75/sy</td>
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<tr>
<td></td>
<td></td>
<td>Chip Seal (Single-Course, Poly. Binder)</td>
<td>6.0</td>
<td>$3.00/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chip Seal (Double-Course, Conv. Binder)</td>
<td>7.0</td>
<td>$3.25/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chip Seal (Double-Course, Poly. Binder)</td>
<td>8.5</td>
<td>$4.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ultrathin Bonded Wearing Course</td>
<td>6.5</td>
<td>$5.00/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ultrathin HMA Overlay</td>
<td>5.5</td>
<td>$2.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thin HMA Overlay</td>
<td>7.5</td>
<td>$4.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mill-and-Thin HMA Overlay</td>
<td>8.5</td>
<td>$7.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HIR-I (Surface Recycling)</td>
<td>6.5</td>
<td>$2.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HIR-II (Remixing)</td>
<td>9.0</td>
<td>$4.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HIR-III (Repaving)</td>
<td>9.0</td>
<td>$5.25/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CIR</td>
<td>8.0</td>
<td>$2.50/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profile Milling</td>
<td>3.0</td>
<td>$0.00/sy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ultrathin Whitetopping</td>
<td>0.0</td>
<td>$20.00/sy</td>
</tr>
</tbody>
</table>

Threshold PCI (trigger for rehabilitation) 40 (note: the 'Threshold PCI' value is used for all treatment...
**Analysis Type**

The next step is to choose the analysis type. Click the button below that matches the analysis type you want to:

**Project and Treatment Selection**

To perform a full analysis involving both project selection (i.e., is preservation a feasible strategy for a particular pavement section?) and treatment selection (i.e., which preservation treatment is the preferred option for the pavement section), click on the “Project and Treatment Selection” button.

**Treatment Selection Only**

If a decision has already been made that a pavement section should receive a preservation treatment, but an evaluation of which treatment to select for the pavement is needed, click on the “Treatment Selection Only” button.
## Flexible Pavement Overall Condition/Performance

Enter overall condition/performance data for the pavement section for the expected year of the preservation treatment. Use historical PMS data, field survey data, or both to develop inputs that best reflect the pavement conditions at the time the treatment is expected to be applied. Click on the 'Next' button to proceed.

### Overall Pavement Condition:

**Pavement Condition Index**

75

### Structural Distress:

<table>
<thead>
<tr>
<th>Condition Measure</th>
<th>Input Description</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rutting</td>
<td>Is average rutting &gt; 0.5 in and primarily unstable (i.e., [a] lack of structural support in base, subbase, and/or subgrade or [b] lateral displacement of unstable HMA mix layers)?</td>
<td>Yes</td>
</tr>
<tr>
<td>Potholes and Deteriorated Patches</td>
<td>Is combined surface area of potholes and medium- to high-severity deteriorated patches &gt; 5%?</td>
<td>Yes</td>
</tr>
<tr>
<td>Fatigue Cracking</td>
<td>Is combined wheelpath surface area containing medium- and high-severity alligator cracking and/or longitudinal wheelpath cracking &gt; 10%?</td>
<td>Yes</td>
</tr>
<tr>
<td>Heaves/Swell and Depressions</td>
<td>Is combined surface area containing medium- and high-severity heaves/swell and/or depressions (due to lack of structural support) &gt; 5%?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Pavement Surface Characteristics:

<table>
<thead>
<tr>
<th>Condition Measure</th>
<th>Input Description</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Roughness Index (IRI)</td>
<td>IRI determined using standard ????</td>
<td>100 in/mi</td>
</tr>
<tr>
<td>Friction Number</td>
<td>Friction Number obtained using locked-wheel skid trailer operated at 40 mi/hr and using a smooth test tire (FN40S), ASTM E274.</td>
<td>50 FN</td>
</tr>
<tr>
<td>Pavement-tire noise</td>
<td>Pavement-tire noise in terms of On-Board Sound Intensity (OBSI), ASTM WK26025/AASHTO TP 76-10.</td>
<td>50 dBA</td>
</tr>
</tbody>
</table>

### Other Parameters:

<table>
<thead>
<tr>
<th>Condition Measure</th>
<th>Input Description</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials-related distress (MRD)</td>
<td>Are there notable signs of MRD (e.g., asphalt stripping, tender mix) throughout the pavement section?</td>
<td>Yes</td>
</tr>
<tr>
<td>Surface layer delamination</td>
<td>Is surface area of delaminated/debonded HMA layer(s) &gt; 5%?</td>
<td>Yes</td>
</tr>
<tr>
<td>Drainage issues</td>
<td>Are there notable signs of drainage problems (e.g., pumping, clogged underdrains) throughout the pavement section?</td>
<td>Yes</td>
</tr>
<tr>
<td>Nondestructive deflection testing (NDT) issues</td>
<td>Has NDT testing shown high deflections, indicating significant areas of weak pavement?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
List of Candidate Treatments

Based on the entered detailed condition information, the R26 methodology was used to assess the applicability of treatments for the current pavement section. ‘Recommended’ treatments are those that meet R26 PCI and Age ‘window of opportunity’ requirements, and have a computed score >= 2.0. Use the provided check boxes to select treatments you want to consider for the current section. Click the ‘Next’ button to further evaluate the feasibility of your treatments.

### Candidate Treatment List:

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>R26 PCI Range</th>
<th>R26 PCI Check</th>
<th>R26 Age Range, yrs</th>
<th>R26 Age Check</th>
<th>R26 Distress Score</th>
<th>R26 Distress Score &gt;2.0?</th>
<th>Treatment Recommendation</th>
<th>Include?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mill-and-Thin HMA Overlay</td>
<td>60 to 75</td>
<td>PASS</td>
<td>7 to 12</td>
<td>PASS</td>
<td>2.20</td>
<td>YES</td>
<td>RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>HIR-III (Repeaving)</td>
<td>60 to 75</td>
<td>PASS</td>
<td>7 to 12</td>
<td>PASS</td>
<td>2.20</td>
<td>YES</td>
<td>RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>CIR</td>
<td>60 to 75</td>
<td>PASS</td>
<td>7 to 12</td>
<td>PASS</td>
<td>2.20</td>
<td>YES</td>
<td>RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>Chip Seal (Double-Course, Conv. Binder)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>2.00</td>
<td>YES</td>
<td>RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>Chip Seal (Double-Course, Poly. Binder)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>2.00</td>
<td>YES</td>
<td>RECOMMENDED</td>
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</tr>
<tr>
<td>Thin HMA Overlay</td>
<td>60 to 80</td>
<td>PASS</td>
<td>6 to 12</td>
<td>PASS</td>
<td>2.00</td>
<td>YES</td>
<td>RECOMMENDED</td>
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</tr>
<tr>
<td>HIR-II (Remixing)</td>
<td>60 to 75</td>
<td>PASS</td>
<td>7 to 12</td>
<td>PASS</td>
<td>2.00</td>
<td>YES</td>
<td>RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>HIR-I (Surface Recycling)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>1.80</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
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<tr>
<td>Chip Seal (Single-Course, Poly. Binder)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>1.60</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
</tr>
<tr>
<td>Ultrathin Bonded Wearing Course</td>
<td>65 to 85</td>
<td>PASS</td>
<td>5 to 10</td>
<td>PASS</td>
<td>1.60</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
</tr>
<tr>
<td>Ultrathin HMA Overlay</td>
<td>65 to 85</td>
<td>PASS</td>
<td>5 to 10</td>
<td>PASS</td>
<td>1.60</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
</tr>
<tr>
<td>Ultrathin Whitetopping</td>
<td>60 to 80</td>
<td>PASS</td>
<td>6 to 12</td>
<td>PASS</td>
<td>1.20</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
</tr>
<tr>
<td>Crack Fill</td>
<td>75 to 90</td>
<td>PASS</td>
<td>3 to 6</td>
<td>FAIL</td>
<td>0.20</td>
<td>NO</td>
<td>POSSIBLE</td>
<td></td>
</tr>
<tr>
<td>Profile Milling</td>
<td>80 to 90</td>
<td>FAIL</td>
<td>3 to 6</td>
<td>FAIL</td>
<td>1.60</td>
<td>NO</td>
<td>NOT RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>Crack Seal</td>
<td>80 to 95</td>
<td>FAIL</td>
<td>2 to 6</td>
<td>FAIL</td>
<td>0.60</td>
<td>NO</td>
<td>NOT RECOMMENDED</td>
<td></td>
</tr>
<tr>
<td>Slurry Seal (Type III)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>-</td>
<td>-</td>
<td>NOT INCLUDED</td>
<td></td>
</tr>
<tr>
<td>Microsurfacing (Single-Course)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>-</td>
<td>-</td>
<td>NOT INCLUDED</td>
<td></td>
</tr>
<tr>
<td>Microsurfacing (Double-Course)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>-</td>
<td>-</td>
<td>NOT INCLUDED</td>
<td></td>
</tr>
<tr>
<td>Chip Seal (Single-Course, Conv. Binder)</td>
<td>70 to 85</td>
<td>PASS</td>
<td>5 to 8</td>
<td>PASS</td>
<td>-</td>
<td>-</td>
<td>NOT INCLUDED</td>
<td></td>
</tr>
</tbody>
</table>
Treatment Cost Effectiveness Computation Approach

Specify which approach to use to evaluate the cost effectiveness of the candidate preservation treatments. Click on the 'Next' button to proceed with the cost effectiveness evaluation.

**Equivalent Annual Cost (EAC)**

This approach involves a simple calculation of the treatment in-place cost divided by the expected treatment performance (i.e., pavement life extension provided by the treatment). A lower EAC signifies a more cost-effective treatment.

**Benefit-Cost Ratio (BCR)**

This more detailed approach considers both the long-term benefits and costs associated with using a particular treatment. The Performance Benefit (PB) is quantified by computing the area under the pavement performance curve, while the cost is computed as a Net Present Value (NPV) life-cycle cost. The BCR is then computed by dividing the benefit by the life-cycle cost. A higher BCR signifies a more cost-effective treatment.

$$BCR = \frac{PB}{NPV (\$)}$$
# Selection of Preferred Treatment Alternative - Decision Factors

Identify the decision factors to be used in determining the preferred treatment, and specify the level of importance weightings for those factors. Note that the sum of the 'category weighting' values must equal 100%. The individual 'factor' weightings within each included category must also equal 100%.

<table>
<thead>
<tr>
<th>Category</th>
<th>Category Weighting</th>
<th>Factor</th>
<th>Factor Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Factors</td>
<td>0 %</td>
<td>Initial Cost</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost Effectiveness</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agency Cost</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>User Cost</td>
<td>0 %</td>
</tr>
<tr>
<td>Construction/Materials</td>
<td>0 %</td>
<td>Availability of Qualified Contractors</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Availability of Quality Materials</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conservation of Materials/Energy</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weather Limitations</td>
<td>0 %</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>0 %</td>
<td>Traffic Disruption</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety Issues</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ride Quality and Noise Issues</td>
<td>0 %</td>
</tr>
<tr>
<td>Agency Policy/Preference</td>
<td>0 %</td>
<td>Continuity of Adjacent Pavements</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continuity of Adjacent Lanes</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Local Preference</td>
<td>0 %</td>
</tr>
</tbody>
</table>

**Total Category Weighting:** 0 %

**Total Factor Weighting:** 0 %
BCR - Performance Definition of Current Pavement and Future Rehabilitation

Using the chosen analysis period and the following figure as a guide, define the life-cycle performance model of the pavement, focusing on the current pavement and future rehabilitation. Also, enter the estimated construction cost of the current pavement and the estimated construction cost of future rehabilitation treatments. Click on the 'Next' button to continue with the analysis setup.

Illustration of Benefit/Cost Analysis Details

The following figure is figure 3.3 from the R26 Report. It illustrates the benefits and costs associated with a pavement preservation treatment strategy. Use this figure as a reference while filling out inputs (at the right) associated with the current pavement section.

Current Pavement Information Inputs

1. Year current pavement was constructed (previously defined):

2. Established/specified 'Threshold PCI' (from Toolkit definition):

3. Year original pavement will reach 'Threshold PCI' (i.e., year rehab is expected):

4. Year preservation treatment is expected to be applied (previously defined):

5. Estimated PCI of current pavement at time of preservation treatment (previously defined):

6. PCI of Rehabilitated Pavement at Time of Rehabilitation (assumed 100):

7. Expected performance of rehabilitation treatment (years until PCI drops to user-specified 'Threshold PCI'), years:

8. Estimated construction cost of rehabilitation treatment, $:
PPETG Update

• Update Research and Implementation Roadmap for Pavement Preservation
  – Leads: Anita Bush, Magdy Mikhail

• “Top 10” List: Characteristics of a “World Class” Pavement Preservation Program
  – Lead: Judith Corley-Lay

• Performance Measures for Specifications
  – Lead: David Peshkin

• Calculating the Benefits of a Pavement Preservation Program
  – Leads: Mike Rossi, Sui Tan

• Distress Warrants
  – Leads: Jim Moulthrop, Larry Scofield
Purpose

- Identify quantifiable or observable measures for treatments to assess if the treatment is constructed as intended
- Assumption: not a material specification, not present during construction
Approach

• Develop list of preservation treatments for both rigid and flexible pavements
• Summarize the purpose or purposes of the treatment
• Identify measures of placed treatments that reflect acceptable or defective design, materials, or construction practices
Approach (contd.)

- Focus on measures reflecting design and construction
- Distinguish between those measures and in-service performance measures beyond the control of the contractor
Potential Users

- Developing contracts fair to both contractor and owner
- Post-construction inspection
- Acceptance
- Warranty or performance specifications
- Others
<table>
<thead>
<tr>
<th>Preservation Treatment</th>
<th>Treatment Purpose</th>
<th>Applicable Acceptance and Performance Measures</th>
<th>Comments</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Joint Resealing/Filling</td>
<td>Minimize infiltration of surface water into the pavement structure and incompressible material into the joint.</td>
<td>Pull test (silicone)</td>
<td>Present (Y/N) Excess present? Adhesion Cohesion Moisture infiltration</td>
<td>In service evaluation looks at debris/trash retention. Dips or sags are installation defects. Bubbles in the sealant do not indicate sealant failure.</td>
</tr>
<tr>
<td>Concrete Crack Sealing</td>
<td>Minimize infiltration of surface water into the pavement structure and incompressible material into the crack.</td>
<td>Pull test (silicone)</td>
<td>Present (Y/N) Excess present? Adhesion Cohesion Moisture infiltration</td>
<td></td>
</tr>
<tr>
<td>Diamond Grooving</td>
<td>Reduce hydroplaning potential by improving tire-pavement contact when pavement surface is wet.</td>
<td>Dimensions (depth, width, spacing)</td>
<td>Friction w/locked wheel trailer and smooth tire</td>
<td></td>
</tr>
<tr>
<td>Cross Stitching</td>
<td>Limit movement of a longitudinally cracked slab or slabs separating across a longitudinal joint; holding together a transverse crack.</td>
<td>Hole spacing Groove present and flush with surface</td>
<td>Joint or crack opening Slab integrity Additional cracking</td>
<td>Slab integrity refers to damage (e.g., cracking, spalling) to the slab that occurs following the treatment.</td>
</tr>
<tr>
<td>Slab Stabilization</td>
<td>Fill voids beneath a slab to provide uniform support or raise a slab to restore grade.</td>
<td>Filled or reduced void Smoothness Deflection</td>
<td>Slab integrity Smoothness Deflection Void reoccurrence</td>
<td>Technique is not commonly used.</td>
</tr>
<tr>
<td>Preservation Treatment</td>
<td>Treatment Purpose</td>
<td>Applicable Acceptance and Performance Measures</td>
<td>Comments</td>
<td>References</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------</td>
<td>----------------------------------------------</td>
<td>----------</td>
<td>------------</td>
</tr>
</tbody>
</table>
Free PP Web-based Training

FHWA/ISSA partnership

• Flexible surfaced
  – Chip Seal, Micro Surfacing, Slurry Seal Boxes,
  http://slurry.org/Docs/WBTPhase1/ISSA_WBT_Login_Instructions.pdf

• Rigid surfaced (spring 2018?)
Outreach to Industry

• FHWA-ARRA-AEMA-ISSA Presidents Meeting (Jan. 11, 2017)
• Next meeting July, 2017?
Outcomes From 47 Workshops

- FHWA Best Practices Tech Brief
- AASHTO SOM Specification Was Submitted
- NCHRP 20-05 Synthesis - Tack Coat Study
- Increasing Application Rates
- DOTs Specification Revisions
- Going to Stiffer Base Asphalts
- Verifying Calibration of Distributor
- Treat Tack as Separate Pay Item vs. Incidental Item
Common Tack Coat Questions

- **What is the Optimal Application Rate?**
  - Surface Type
  - Surface Condition

- **Workshop Recommended Ranges**

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Residual Rate (gsy)</th>
<th>Appx. Bar Rate Undiluted* (gsy)</th>
<th>Appx. Bar Rate Diluted 1:1* (gsy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Asphalt</td>
<td>0.020 – 0.045</td>
<td>0.030 – 0.065</td>
<td>0.060 – 0.130</td>
</tr>
<tr>
<td>Existing Asphalt</td>
<td>0.040 – 0.070</td>
<td>0.060 – 0.105</td>
<td>0.120 – 0.210</td>
</tr>
<tr>
<td>Milled Surface</td>
<td>0.040 – 0.080</td>
<td>0.060 – 0.120</td>
<td>0.120 – 0.240</td>
</tr>
<tr>
<td>Portland Cement Concrete</td>
<td>0.030 – 0.050</td>
<td>0.045 – 0.075</td>
<td>0.090 – 0.150</td>
</tr>
</tbody>
</table>

*Assume emulsion is 33% water and 67% asphalt.
Monitoring Dilution

• Verify dilution amount
• Dilution cannot be used to “stretch” tack
• Residual value is key.

This Workshop recommends dilution by supplier only.
Common Tack Coat Questions

• What Type of Bond Testing?
  – Shear
  – Torsion
  – Pull off
  – Cyclic

• All have advantages and disadvantages

• Further research and acceptance will likely lead to a generally preferred method.
What questions do you have?
Thank you!
For Questions/Comments:

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720-963-3213

jason.dietz@dot.gov

Pavement & Materials Technical Service Team