Selecting Projects for Treatments—An Overview

1. Inventory information
2. Current condition
3. Evaluate data
4. Current/projected pavement needs
5. Identify feasible preventive maintenance treatments
6. Conduct cost-effectiveness analysis
7. Select “best” treatment
What Do You Want/Need From Your Pavement Program?

Cost Savings

- ________________
- ________________
- ________________
- ________________
- ________________
An Illustration of Cost Savings

- Each $1.00 Spent at PCR 60-100 Costs $4.80 to $7.00
- Costs $20.00 at PCR 50-60
- Costs $48.00 at PCR 0-40

Improved Performance

<table>
<thead>
<tr>
<th>Yeares (Age)</th>
<th>10</th>
<th>15</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs $48.00 at PCR 0-40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs $20.00 at PCR 40-50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs $4.80 to $7.100 at PCR 50-60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pavement Condition Rating (PCR) Savings

<table>
<thead>
<tr>
<th>Age</th>
<th>0-40</th>
<th>40-50</th>
<th>50-60</th>
<th>60-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>15</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>20</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

% of System in Level

- % of System in Level Good
- % of System in Level Deteriorated

2003: 99.6%
2008: 91.1%
2015: 9.1%
2018: 9.0%
2020: 0.0%
2025: 20.0%
2030: 40.0%
2035: 60.0%
2040: 80.0%
2045: 100.0%
Safer Roads

Customer Satisfaction
Preventive maintenance program

- Results of doing same thing
- Goals and objectives

Bridging the Gap—Your

Pavement Program

Illustrations of Safe Roads
Defined by the treatment?
Just a fad?

A hoax or a little bit of self-delusion?
Defining Preventive Maintenance Concisely

"Keeping good roads good"

<table>
<thead>
<tr>
<th>Preventive Maintenance — AASHTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned strategy</td>
</tr>
<tr>
<td>Cost-effective treatments</td>
</tr>
<tr>
<td>Preserves the system</td>
</tr>
<tr>
<td>Maintains or improves functional condition</td>
</tr>
<tr>
<td>Retards future deterioration</td>
</tr>
<tr>
<td>Does not increase structural capacity</td>
</tr>
</tbody>
</table>

Defining Preventive Maintenance — AASHTO

Maintainance — AASHTO

"Keeping good roads good"
<table>
<thead>
<tr>
<th>Time</th>
<th>Pavement Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive Maintenance</td>
<td>Good</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Good</td>
</tr>
<tr>
<td>Routine/Corrective Maintenance</td>
<td>Poor</td>
</tr>
</tbody>
</table>

**Definitions Applied**

- Preventive Maintenance
- Rehabilitation
- Routine/Corrective Maintenance
- Preservation
- Reconstruction
Some Elements of Successful Programs

Program Objectives

- Needed to distinguish from other activities
- Raise internal and external profile
- Justify actions and expenditures

Guidance on project selection

Guidance on treatments

Program monitoring
Examples of Program Objectives

Percentages of pavement network in various conditions

Reduction in crashes

Reduction in negative customer feedback

Value of network

Develop a plan for accomplishing program to accomplish for what you want your pavement program to accomplish

Have reasonable goals or objectives

Know what you have

Background Summary

Objectives

Examples of Program

Various conditions

Percentages of pavement network in

Reduction in

Negative customer feedback

Reduction in

Crashes

}% Network

0 1 2 3 4 5 6 7 8 9 1 0 1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 2 0 2 1 2 2 3 2 4 2 5 2 6 2 7 2 8 2 9
Part II—Approaches to Solutions

Best Practices

Preservation Program

Dedicated funding

Appropriate contracting practices

Ability to demonstrate program benefits

Upper-level support

Research and training

Preservation partnerships

Test sections

Preservation engineer

Test Selection

Treatment Selection

Preservation

Best Practices

Appropriate contracting practices

Ability to demonstrate program benefits

Upper-level support

Research and training

Preservation partnerships

Test sections

Preservation engineer

Part II—Approaches to Solutions
Some Elements of Successful Programs

Guidance on Treatments

- How
- Why
- Where
- When
- What

Guidance on Project Selection

Program Monitoring

Guidance on Treatments

Successful Programs
Purpose

Crack Filling and Sealing

Placement of material into individual existing cracks

Description

- Reduce water infiltration
- Prevent intrusion of incompressibles
- Provide support to adjacent pavement

**Crack Filling and Sealing**
Crack Filling

- Nonworking cracks
- Crack width: 0.2 in to 1.0 in
- Little crack preparation
- Lower-quality materials
- Often used as stop-gap activity
- Treatment life: 2 to 10 years
- Average cost: $0.60/ft to $1.00/ft
- Extension of life: 2 to 4 years

Crack Sealing

- Working cracks
- Crack width: 0.2 in to 0.75 in
- Requires crack preparation
- Higher-quality material
- Average cost: $0.60/ft to $1.00/ft
- Treatment life: 2 to 10 years
- Extension of life: 2 to 4 years
### Measure of Effectiveness

<table>
<thead>
<tr>
<th>Crack Filling and Sealing</th>
<th>Corrects</th>
<th>Slows/Reduces Severity</th>
<th>Prevents/Delays</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction</td>
<td></td>
<td></td>
<td>Rutting</td>
<td></td>
</tr>
<tr>
<td>Roughness</td>
<td></td>
<td></td>
<td>Roughness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moisture Damage</td>
<td></td>
</tr>
<tr>
<td>Negatively Affects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roughness</td>
<td></td>
<td></td>
<td>Rutting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moisture Damage</td>
<td></td>
</tr>
<tr>
<td>Limiting Linear Cracking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture Damage</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New or Recently Rehabilitated Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Good Sealing Candidates

- Limited structural deterioration
- Good base support
- Little or no raveling at crack face
- Little or no secondary cracking
- Limited linear cracking
- New or recently rehabilitated surface
## Microsurfacing

**Description**

- Mixture of high-quality aggregates and polymer-modified emulsion binder

**Purpose**

- Inhibit raveling and surface oxidation
- Improve surface friction
- Fill ruts/minor surface irregularities
- Seal pavement surface
- Fill minor surface irregularities
- Improve surface friction
- Inhibit raveling and surface oxidation

**Other Considerations**

- Polymer-modified emulsion (chemically sets)
- Placed up to several stone thicknesses
- Applicable for night work and high traffic conditions
- Cost: $1.25/yd² to $2.00/yd²
- Treatment life: 4 to 7 years
- Extension of life: 5 to 7 years
- Treatment life: 4 to 7 years
- Treatment life: 4 to 7 years
### Microsurfacing

**Measure of Effectiveness**
- Corrects
- Slows/Reduces Severity
- Prevents/Delays
- Negatively Affects
  - Moisture damage
  - Raveling
  - Rutting
  - Roughness
  - Oxidation
  - Stripping

**Purpose**
- Rolled onto the pavement and aggregate chips
- Application of asphalt

**Description**
- Application of asphalt and aggregate chips
- Rolled onto the pavement

---

<table>
<thead>
<tr>
<th>Stripping</th>
<th>Oxidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Prevents/Delays</td>
<td>Roughness</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minor Roughness</td>
<td>Rutting</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Poor Roughness</td>
<td>Raveling</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minor Raveling</td>
<td>Cracking</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Poor Cracking</td>
<td>Moisture damage</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minor Moisture damage</td>
<td></td>
</tr>
</tbody>
</table>

**Corrects**
- Moisture damage
- Raveling
- Rutting
- Roughness
- Poor friction

**Seal pavement**
- Seal pavement
- Enrich hardened/oxidized pavement
- Retard reflection cracking on HMA overlays
- Seal pavement
### Good Chip Seal Candidates

- Fabric and chip seals
- Cape seals
- Double or triple chip seals
- Single chip seals

### Chip Seal Variations

<table>
<thead>
<tr>
<th>Single chip seals</th>
<th>Double or triple chip seals</th>
<th>Cape seals</th>
<th>Fabric and chip seals</th>
</tr>
</thead>
</table>

### Good Chip Seal Seal Candidates

- Relatively smooth surface
- Rutting < 1 in
- Few or no potholes
- No medium- or high-severity fatigue
- Cracks < 0.25 in wide
- Structurally sound
- In past: low-volume; now: almost any
## Chip Seals

**Measure of Effectiveness**

- Corrects
- Slows/Reduces Severity
- Prevents/Delays
- Negatively Affects
- Moisture damage
- Raveling
- Rutting
- Roughness

### Project Selection

**Characteristics of Candidate Pavements**

**Selection Tools**

- Getting the most bang for your buck

<table>
<thead>
<tr>
<th>Roughness</th>
<th>Rutting</th>
<th>Raveling</th>
<th>Moisture damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stripping</td>
<td>Ridge</td>
<td>Minor bleeding</td>
<td>Poor friction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negatively Affects</th>
<th>Prevents/Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rutting</td>
<td>Rutting</td>
</tr>
<tr>
<td>Roughness</td>
<td>Rutting</td>
</tr>
<tr>
<td>Raveling</td>
<td>Raveling</td>
</tr>
<tr>
<td>Cracking</td>
<td>Raveling</td>
</tr>
<tr>
<td>Moisture damage</td>
<td>Moisture damage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slow/Reduces Severity</th>
<th>Corrects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Performance are and • Two measures of functional structural problems maintenance can correct underlying

True or False: preventive condition

Maintenance treatments are in preventive candidate pavements for preventive

Candidate pavements for preventive

Project Selection Exam

Two measures of functional

Project Selection Illustrated
### Project Selection Tools

- Decision trees or matrices
- Engineering judgment
- Successful past practice
- Results from test sections
- Common sense

### Example Selection Tool: HMA Decision Matrix

<table>
<thead>
<tr>
<th>Seal Coat</th>
<th>Slurry Seal</th>
<th>Microsurfacing</th>
<th>Traffic</th>
<th>Improving Friction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least Susceptible</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Extensive cracking</td>
</tr>
<tr>
<td>Moderate Susceptible</td>
<td>NR</td>
<td>R</td>
<td>R</td>
<td>Few tight cracks</td>
</tr>
<tr>
<td>Most Susceptible</td>
<td>R</td>
<td>M</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>ADT &gt; 5,000</td>
<td>NR</td>
<td>M</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>ADT &gt; 2,000</td>
<td>R</td>
<td>R</td>
<td>NR</td>
<td></td>
</tr>
</tbody>
</table>

R = Recommended; NR = Not recommended; M = Marginal
Select projects to maximize B/C

Calculate treatment life cycle costs

Consider benefit (B) or applying a treatment

The "Bang for the Buck" Concept

Example Selection Tool: HMA Decision Tree
### Benefit/Cost Comparison

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Benefit</th>
<th>Cost</th>
<th>B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500</td>
<td>$1.5</td>
<td>333</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>$3.5</td>
<td>286</td>
</tr>
<tr>
<td>C</td>
<td>250</td>
<td>$0.5</td>
<td>500</td>
</tr>
<tr>
<td>D</td>
<td>1000</td>
<td>$0.3</td>
<td>333</td>
</tr>
<tr>
<td>E</td>
<td>650</td>
<td>$2.7</td>
<td>241</td>
</tr>
</tbody>
</table>

### Quantifying Benefit

- Age, Years
- Condition Indicator
- Treatment Area
- Untreated Pavement Performance
Program Monitoring

Program Monitoring

Organized Process

Summary: It's an

and externally

Communicates program status internally

resource allocation

Supports (or justifies) budgets and

Generates facts about what works

Tracks progress toward objectives

Program Monitoring
<table>
<thead>
<tr>
<th>Time</th>
<th>Preventive Maintenance</th>
<th>Rehabilitation</th>
<th>Reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preventive</td>
<td>Maintenance</td>
</tr>
</tbody>
</table>

**Summary (2):** Do the Right Thing!

- www.pavementpreservation.org
- www.aema.org
- www.igga.net
- www.surry.org
- www.arra.org
- www.igga.net
- www.pavementpreservation.org
Thank you!

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Urbana, IL 61801
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