National Center for Pavement Preservation
Report of Activities for
A Post editor reports on the controversial 41,000-mile Interstate Highway System—where it goes, how fast it is being built, and how it will change the lives and habits of countless Americans.

The largest single construction project that man has ever undertaken can hardly fail to alter, in some degree, all of our lives. The big task is building a National System of Interstate and Defense Highways, now in its fifth year of a sixteen-year schedule. Eleven years from now all parts of our forty-eight contiguous states will have been placed on what amounts to a single high-speed ultralow road. Any American anywhere will be able to reach that road quickly and thereafter drive to any other area with hitherto unknown speed and comfort.

With rare exceptions the future traveler will progress along one-way strips of pavement three or more lanes wide, separated from opposing traffic by medians as wide as a normal street. He will meet no traffic lights, cross no intersections, and by far the greater part of his travel will be free of delay.

The National System of Interstate and Defense Highways, roughly a quarter of which is already in use, is a nationwide network of 41,000 miles. It will connect Houston, Maine, with the Mexican border below San Diego, California. It will link together Miami and the Canadian border above Bellingham, Washington. It will stop and perhaps reverse the rotting of cities, change and enlarge recreational patterns and induce business and industrial migrations. It will generate new businesses and communities by the hundreds. It will damage others temporarily, and it will permanently stimulate roadside form of small-business opportunity.
Fig. 3. Moose Lake, Minn. Man indicates with toe one of four 60-pound railroad rails attached to paver. Rails “iron out” the welded wire fabric, keep it flat as the hot mix is paved over it.
“NTPEP pools the physical and professional resources of State DOTs to coordinate national evaluation on proprietary, engineered products of common interest, including a wide array of highway safety products, construction and maintenance materials.”
Resolution PR-10-05
Approved by the Board of Directors
May 8, 2005
Phases of TSP²

1. Establish Pavement Preservation Technical Services Program.
2. Form Regional Pavement Preservation Partnerships.
3. Rollout Bridge Preservation Technical Services Program.
Technology Deployment Study –
Modifiers for Asphalt Emulsions,
Synthesis of Best Practices

FHWA, Central Federal Lands Highway Division

FHWA, Office of Asset Management
Purpose of Study

1. Develop new specifications for Polymer Modified Asphalt Emulsions (PME) used in the applications of chip seals, slurry seals, microsurfacing, and other typical uses.

2. Published in a field guide to be used by pavement practitioners of the FHWA.
Pavement Preservation Technical Assistance Review and Evaluation

FHWA, Office of Asset Management
What is it?

- Develop guidelines for improvement
- Agency self-assessment
- Provide state appraisal results
- Identify national trends
- Comparisons of agency results to national or regional trends
Training

Pavement Preservation: Applied Asset Management

Chip Seal Best Practice

Slurry/Micro-Surfacing Best Practice
Guangzhou, China
South China University of Technology
2008 Pavement Preservation Workshop
- Routine Maintenance
- Preventive Maintenance
- Rehabilitation
- Sustainable Financing
- Long-Term Network Planning
- Cost-Effective Decision Making
- Pavement Management System
- Optimization
Pavement preservation is a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations.
Flexible Surface Treatments

- Crack Filling
- Chip Seals
- Fog Seals *
- Slurry Seals
- Micro-surfacing
- Ultra-thin Overlays
- Profile Milling
- HIR

- Crack Sealing
- Cape Seals
- Sand Seals
- Scrub Seals
- Bonded Wearing Course
- Thin Overlays
- Mill & Resurface
- CIR

....and many others!
Pavement Preservation is **NOT** about Maintenance as Usual
Remaining Service Life Concept
Remaining Service Life (RSL) is the estimated number of years, from a specified date, until a pavement section reaches the threshold distress index. RSL is a function of the distress level and rate of deterioration.
Remaining Service Life

Distress Index (DI)

Time (Years)

Terminal Threshold

RSL = 12 years

RSL = 9 years

RSL = 2 years

RSL = 4 years

Treatment A: 5 year life extension

Treatment B: 10 year life extension

Road B

15 yrs

0

20

40

60

80

100

0  5  10  15  20  25

15 yrs

30 yrs

RSL = 4 years

RSL = 2 years

RSL = 9 years

RSL = 12 years
## Typical Life Extensions

(Years)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Good Condition (PCI=80)</th>
<th>Fair Condition (PCI=60)</th>
<th>Poor Condition (PCI=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fog Seal</td>
<td>1 - 3</td>
<td>0 - 1</td>
<td>0</td>
</tr>
<tr>
<td>Chip Seal</td>
<td>4 - 10</td>
<td>3 - 5</td>
<td>0 - 3</td>
</tr>
<tr>
<td>Slurry Seal</td>
<td>3 - 5</td>
<td>1 - 3</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Micro-Surfacing</td>
<td>4 - 8</td>
<td>3 - 5</td>
<td>1 - 4</td>
</tr>
<tr>
<td>Thin HMA</td>
<td>4 - 10</td>
<td>3 - 7</td>
<td>2 - 4</td>
</tr>
</tbody>
</table>
Network Evaluation

Quick Assessment Method
Example:

Department Network
Network Size = 4,356 lane miles
Current Condition

**Pavement Remaining Service Life (years)**

**Percent of Network Pavement**

The graph illustrates the distribution of pavement service life across different conditions. The x-axis represents the pavement service life in years, ranging from 0 to 25. The y-axis shows the percent of network pavement, ranging from 0 to 6.

The data suggests a varying distribution with peaks at certain service life durations, indicating different conditions and their frequencies within the network.
Condition - One Year Later
Highway Department = 4,356 lane miles

Each year the network will lose

4,356 lane mile years
## Reconstruction Evaluation

<table>
<thead>
<tr>
<th>Project</th>
<th>Lane Miles</th>
<th>Design Life</th>
<th>Lane Mile Years</th>
<th>Lane Mile Costs</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>22</td>
<td>25 yrs</td>
<td>550</td>
<td>$463,425</td>
<td>$10,195,350</td>
</tr>
<tr>
<td>#2</td>
<td>18</td>
<td>30 yrs</td>
<td>540</td>
<td>$556,110</td>
<td>$10,009,980</td>
</tr>
<tr>
<td>Total</td>
<td>1,090</td>
<td></td>
<td></td>
<td></td>
<td>$20,205,330</td>
</tr>
</tbody>
</table>
### Rehabilitation Evaluation

<table>
<thead>
<tr>
<th>Project</th>
<th>Lane Miles</th>
<th>Design Life</th>
<th>Lane Mile Years</th>
<th>Lane Mile Costs</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3</td>
<td>22</td>
<td>18 yrs</td>
<td>396</td>
<td>$263,268</td>
<td>$5,791,896</td>
</tr>
<tr>
<td>#4</td>
<td>28</td>
<td>15 yrs</td>
<td>420</td>
<td>$219,390</td>
<td>$6,142,920</td>
</tr>
<tr>
<td>#5</td>
<td>32</td>
<td>12 yrs</td>
<td>384</td>
<td>$115,848</td>
<td>$3,707,136</td>
</tr>
<tr>
<td>Total</td>
<td>1,200</td>
<td></td>
<td></td>
<td></td>
<td>$15,641,952</td>
</tr>
</tbody>
</table>
## Step 3

### Pavement Preservation Evaluation

<table>
<thead>
<tr>
<th>Project</th>
<th>Lane Miles</th>
<th>Life Ext.</th>
<th>Lane Mile Years</th>
<th>Lane Mile Costs</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>#101</td>
<td>12</td>
<td>2 yrs</td>
<td>24</td>
<td>$2,562</td>
<td>$30,744</td>
</tr>
<tr>
<td>#102</td>
<td>22</td>
<td>3 yrs</td>
<td>66</td>
<td>$7,743</td>
<td>$170,346</td>
</tr>
<tr>
<td>#103</td>
<td>26</td>
<td>5 yrs</td>
<td>130</td>
<td>$13,980</td>
<td>$363,480</td>
</tr>
<tr>
<td>#104</td>
<td>16</td>
<td>7 yrs</td>
<td>112</td>
<td>$29,750</td>
<td>$476,000</td>
</tr>
<tr>
<td>#105</td>
<td>8</td>
<td>10 yrs</td>
<td>80</td>
<td>$54,410</td>
<td>$435,280</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>412</td>
<td></td>
<td>$798,760</td>
</tr>
</tbody>
</table>
# Network Needs Summary

**Required:** 4,356 lane mile years

<table>
<thead>
<tr>
<th>Programmed Activity</th>
<th>Lane Mile Years</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction (40 lane miles)</td>
<td>1,090</td>
<td>$20,205,330</td>
</tr>
<tr>
<td>Rehabilitation (82 lane miles)</td>
<td>1,200</td>
<td>$15,641,952</td>
</tr>
<tr>
<td>Pavement Preservation (84 lane miles)</td>
<td>412</td>
<td>$798,760</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,702</strong></td>
<td><strong>$36,646,042</strong></td>
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</tbody>
</table>
## Evaluation Conclusion

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Size (needs)</strong></td>
<td>4,356</td>
</tr>
<tr>
<td></td>
<td>(lane mile years)</td>
</tr>
<tr>
<td><strong>Programmed Activity</strong></td>
<td>2,703</td>
</tr>
<tr>
<td></td>
<td>(lane mile years)</td>
</tr>
<tr>
<td><strong>Deficit</strong></td>
<td>1,653</td>
</tr>
<tr>
<td></td>
<td>(lane mile years)</td>
</tr>
</tbody>
</table>
Network Costs

Reconstruction, Rehabilitation & Resurfacing costs from Highway Statistics -2001, FHWA
Preventive Maintenance treatment costs from 2001 data, Michigan DOT
### Steps to Address Minimal Needs

**Required:** 4,356 lane mile years

<table>
<thead>
<tr>
<th>Programmed Activity</th>
<th>Lane Mile Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction (40 lane miles)</td>
<td>820</td>
</tr>
<tr>
<td>Rehabilitation (82 lane miles)</td>
<td>1,125</td>
</tr>
<tr>
<td>Pavement Preservation (84 lane miles)</td>
<td>412</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,702</strong></td>
</tr>
</tbody>
</table>

**Savings** = $6.1 M

**Step 1**
## Steps to Address Minimal Needs

**Savings = $6,101,940   Needs = 1,999 LMY**

<table>
<thead>
<tr>
<th>Preservation Treatment</th>
<th>Life Ext</th>
<th>Lane Miles</th>
<th>Lane Mile Years</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Reseal</td>
<td>4 yrs</td>
<td>31</td>
<td>124</td>
<td>$979,600</td>
</tr>
<tr>
<td>Thin HMA Overlay</td>
<td>10 yrs</td>
<td>16</td>
<td>160</td>
<td>$870,560</td>
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<tr>
<td>Micro-surfacing</td>
<td>7 yrs</td>
<td>44</td>
<td>308</td>
<td>$1,309,000</td>
</tr>
<tr>
<td>Chip Seal</td>
<td>5 yrs</td>
<td>79</td>
<td>395</td>
<td>$1,104,420</td>
</tr>
<tr>
<td>Crack Seal</td>
<td>2 yrs</td>
<td>506</td>
<td>1,012</td>
<td>$1,296,372</td>
</tr>
</tbody>
</table>

1,999 $5,559,952

**Step 2**
Steps to Address Minimal Needs

Required: 4,356 lane mile years

<table>
<thead>
<tr>
<th>Programmed Activity</th>
<th>Lane Mile Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction</td>
<td>820</td>
</tr>
<tr>
<td>(31 lane miles )</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>1,125</td>
</tr>
<tr>
<td>(77 lane miles )</td>
<td></td>
</tr>
<tr>
<td>Pavement Preservation</td>
<td>2,411</td>
</tr>
<tr>
<td>(2,083 lane miles )</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4,356</td>
</tr>
</tbody>
</table>

Net Savings = $541,988

Step 3
Quick Assessment Method

- Establishes Network Need
- Evaluates
  - Reconstruction
  - Rehabilitation
  - Preventive Maintenance
- Incorporates
  - Design Life
  - Life Extensions
Summary
Conclusions

- Pavement Preservation is a “decision” that will improve highway network condition at lower cost.
- Failure to adopt Pavement Preservation has financial consequences.
State of the Practice Pavement Preservation

- Improved Resources
  - National Center for Pavement Preservation
  - Michigan State University

Engineering Building

National Center Building
Questions?

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Thank You!