
NHI Course 131104

National Highway Institute

Federal Highway Administration
Related NHI Courses

- 131054: The Preventive Maintenance Concept
- 131058: Selecting Pavements for Preventive Maintenance
- 131103: Design and Construction of Quality Preventive Maintenance Treatments
Importance of Integration

- Each $1 in preventive maintenance saved $4 to $10 in the rehabilitation program
- Substantial improvement in condition and ride quality realized
- Pavement management was crucial to the development of cost-effective preventive maintenance programs
Course Guidelines

- Participation is essential
- Speak loudly so all participants can hear
- One person speaks at a time
- Return from breaks promptly
- Turn cell phones and pagers to vibrate mode
Course Materials

- Participant’s Workbook
- Reference Manual
Course Content

- Executive Summary
- Module 1: Course Introduction
- Module 2: Importance of Integration
- Module 3: Project-Level Performance Issues
- Module 4: Network Modeling and Analysis Tools
Course Content (cont.)

- Module 5: Incorporating Pavement Preservation into Strategic Decisions
- Module 6: Implementation Concepts
- Module 7: Summary and Wrap-Up
- Workshops
Before Getting Started…

- Are there questions on logistics?
- Are there questions about the course materials?
- Are there other questions that need to be addressed before moving on to the technical material?
Importance of Integration

Module 2
Key Concepts

- Pavement Preservation
- Preventive Maintenance
- Pavement Management
- Pavement Management System
- Integration
Importance of Preventive Maintenance

Without PM

With PM

Window of Opportunity
Cost-Effectiveness of Preventive Maintenance

Net Present Cost

With Preventive Maintenance

Without Preventive Maintenance
Pavement Management Components

Network Inventory

Condition Assessment

Database

Performance Models

Treatment List and Treatment Rules

Prioritization/Work Plan Development

Feedback Loop

Constraints

Other Uses
- GASB 34
- Maintenance

Analysis Models
Decision Levels

**Strategic Level**
- Committed Projects

**Network Level**
- Inventory → Analysis → Work Plan Development
  - Preservation Strategy and Funding Level
    - Decision Criteria
      - Legislature
      - Upper Management
      - Pavement, Maintenance, and Bridge Engineers
Decision Levels

Network Level:
- Inventory
- Analysis

Project Level:
- Final Project Selection
- Negotiation

Feedback

Decision Criteria
- Preliminary Work Plan Development

Potential Project List
Decision Levels

- At what level is network condition information collected?
- At what level are funding levels established?
- At what level are candidate projects established?
- At what level are projects designed?
- Which level typically uses the most detailed information?
Use of Pavement Management to Support Preventive Maintenance

- Demonstrate the benefits associated with preventive maintenance
- Estimate funding needs to achieve specific targets or goals
- Allocate available funding cost-effectively
- Identify and prioritize treatment needs
North Carolina Department of Transportation Simulation

- 1000-mile network
- Distribution of network conditions based on actual conditions
- Evaluated a “worst first” strategy
  - 50 miles of roads in poor condition resurfaced
- Evaluated a “pavement preservation” strategy
  - 100 miles of roads in fair condition addressed first before roads in poor condition
Simulation Results

Average Pavement Condition over Time

Pavement Condition Rating

Year

Worst First  Pavement Preservation
New York State Department of Transportation Example

- 1994 Base Condition
- 1999 Worst First
- 1999 Preventive Maintenance

% Excellent % Good % Fair % Poor

Data over time:
- 1994 Base Condition
- 1999 Worst First
- 1999 Preventive Maintenance
## Impact of Pavement Preservation Program on Safety - NY

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatality Rate Per 100 Million VMT New York</th>
<th>Fatality Rate Per 100 Million VMT U.S. Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>2.07</td>
<td>2.07</td>
</tr>
<tr>
<td>2000</td>
<td>1.13</td>
<td>1.52</td>
</tr>
</tbody>
</table>
Kansas Department of Transportation

% of System in Level

- Good
- Deteriorated

91.1% of System in Good Condition
0.90% of System in Deteriorated Condition
Thurston County
Appropriate Levels of Repair

Pavement Condition Rating (PCR)

- 0-40
- 40-50
- 50-60
- 60-100

Years (age)

- Preventive Maintenance
- Moderate Rehabilitation
- Heavy Rehabilitation
- Reconstruction
Thurston County - Costs

Pavement Condition Rating (PCR)

- **Seals/Slurries** (5-7 Years) $11,460
- **Thin Overlays** (10-12 Years) $55,000
- **Recycle** (15-20 Years) $234,110
- **Reconstruct** (20-25 Years) $549,398
Thurston County - Summary

Pavement Condition Rating (PCR)

Each $1.00 Spent at PCR 60-100

Costs $4.80 to $7.00 at PCR 50-60

Costs $20.00 at PCR 40-50

Costs $48.00 at PCR 0-40

Years (age)
Integration Requirements

- **Method of identifying preventive maintenance needs**
- **Models that reflect future pavement performance with and without preventive maintenance treatments**
- **Prioritization process that considers preventive maintenance**
- **Analysis period long enough to display the impact of preventive maintenance**
Integration Gaps

- Not tracking maintenance histories and performance
- Not collecting data to support preventive maintenance treatment selection and timing
- Maintaining independent databases
- Others?
Why Address Integration Issues?

- Develop a more coordinated work plan to accomplish agency goals
- Better demonstrate the benefits in using preventive maintenance treatments
- Keep the decisions at the appropriate level within the agency
- Make better informed decisions about treatment needs
Project-Level Performance Issues

Module 3
Level of Detail Comparisons

Network Diagnostic Surveys
• High-speed road monitoring
• Rutting, distress, roughness, skid, video record

Structural Evaluation
• Deflection testing
• Pavement thickness
• Traffic projections

Project-Level Evaluation
• Detailed visual inspection
• Maintenance records
• Traffic flow
• Accident records
Questions to be Addressed

- Is it structurally adequate?
- Is it functionally adequate?
- Is the rate of deterioration normal?
- Are the materials durable?
- Is drainage adequate?
- Has previous maintenance been normal?
- What geometric factors are important?
Impact of Preventive Maintenance Treatments on Pavement Performance
Impact on Cracking - Arizona

![Graph showing the impact on cracking in Arizona from 1985 to 2000. The graph includes data points for each year and a trend line indicating an increase in cracking percentage over time.]
Impact on Roughness (Joints Repaired) - Pennsylvania

![Graph showing the impact on roughness over years with data points for each year from 1992 to 2000.}

Year


IRI

0 20 40 60 80 100 120 140
Impact on Roughness (Joints Not Repaired) - Pennsylvania

Year


IRI

0 20 40 60 80 100 120 140 160
Texas SPS-3 Test Sections

<table>
<thead>
<tr>
<th>ID</th>
<th>Highway</th>
<th>Date Constructed</th>
<th>Date of Survey</th>
<th>KESAL per year</th>
<th>Thin Overlay</th>
<th>Slurry Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>48D3</td>
<td>IH20</td>
<td>9/90</td>
<td>7/95</td>
<td>530</td>
<td>85.6</td>
<td>84.6</td>
</tr>
<tr>
<td>48M3</td>
<td>US59</td>
<td>10/90</td>
<td>3/97</td>
<td>40</td>
<td>91.1</td>
<td>93</td>
</tr>
</tbody>
</table>
Effect of Traffic – Texas

![Graph showing the effect of traffic on distress score for various treatments: Thin Overlay, Slurry Seal, Crack Seal, Control, and Chip Seal. The graph compares low traffic and high traffic conditions.](image)
Reductions in IRI Rate of Change Due to Maintenance Expenditures

<table>
<thead>
<tr>
<th>Increase in Expenditure Level ($/lane mile/year)</th>
<th>Patching and Joint and Crack Sealing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North</td>
</tr>
<tr>
<td>$50 to $100</td>
<td>0.29</td>
</tr>
<tr>
<td>$100 to $150</td>
<td>0.17</td>
</tr>
<tr>
<td>$150 to $200</td>
<td>0.12</td>
</tr>
<tr>
<td>$200 to $250</td>
<td>0.10</td>
</tr>
<tr>
<td>$250 to $300</td>
<td>0.07</td>
</tr>
</tbody>
</table>
The Impact of Treatment Timing on Pavement Performance
Effect of Timing on Performance

- Do-nothing curve
- Preventive treatment performance curve
- Stop-gap treatment performance curve
Suggested Optimal Timing

- Fog seals, 1 to 3 years
- Crack seals, 2 to 4 years
- Chip seals, 5 to 7 years
- Slurry seals, 5 to 7 years
- Thin overlays, 5 to 10 years
Effect of Proper Timing

- Distress Points
- Treatment Applied
- Do Nothing
- Preventive Maintenance
- Life Extension

Time
Effect of Improper Timing

- Distress Points vs. Time
- Treatment Applied
- Do Nothing Preventive Maintenance
- Life Extension
- 50 Distress Points
- 0 Distress Points
Average Equivalent Uniform Annual Cost (EUAC) Ratios for PCI Ranges
Strategies to Assist With Timing

- Earlier thresholds
- Quick delivery contracts
  - Montana
  - Caltrans
  - Michigan
  - Georgia
  - New York
Links to the Network-Level

- **Guidelines for using treatments**
  - Preventive maintenance manual

- **Compatible data collection efforts**
  - Frequency and timing of surveys
  - Availability of desired information
  - Accuracy of survey data
Network Modeling and Analysis Tools

Module 4
Approaches to Integration –1

- Establish treatment rules for rehabilitation and reconstruction
- Pavement sections that are NOT candidates for rehabilitation or reconstruction are candidates for maintenance

Rehabilitation and Reconstruction OR Preventive Maintenance Candidate
Approaches to Integration - 2

- Preventive maintenance treatments are considered collectively as a treatment and the specific treatment is not identified

**Treatments Considered**
- Preventive Maintenance
- Thin Overlay
- Mill and Fill
- Structural Overlay
- Reconstruction
Example

PCI

Preventive Maintenance

Light to Moderate Rehabilitation

Heavy Rehabilitation

Reconstruction

AGE
Ohio Department of Transportation

- Pavement Condition Ratings
  - 75< Condition <85
- Agency Guidelines
- Distress, Ride, Skid
  - Structural Deducts
  - Rate of Deterioration
- Treatment Selection
Treatment Rules Based on Timing

- Rehabilitation and reconstruction activities are triggered based on condition information.
- Preventive maintenance treatments are triggered based on time since last activity.
Approaches to Integration – 3

- Specific preventive maintenance treatments are recommended based on information available in the pavement management system.
Improvements in Condition

- Add points

- Change distress severity
  - Medium and high severity cracks go to Low severity after crack sealing
  - Corresponding changes to indexes are calculated and used to establish rules
Change in Rate of Deterioration

- Do-nothing curve
- Same curve different point
- Different curve
- Reset curve
Pros and Cons to Approach 3

- Allows an agency to incorporate treatment selection with project identification
- Models can be more specific to the treatment
- Requires more supporting information in the pavement management system
Condition Surveys and Condition Index Calculations

- Types of distress surveyed
- Use of individual versus composite indices
- Frequency of surveys
- Others?
Pavement Performance Models

- Ability to develop distinct curves for each treatment and condition index
- Availability of necessary information in the database
Family Modeling Approach

Sample family: Original HMA Interstates (no overlays)
Preventive Maintenance Treatment Performance
Treatment Rules

- Treatment Feasibility Rules
  - Decision trees
  - Treatment cycles
- Treatment Reset Rules
- Construction Cost Rules
Minnesota Decision Tree – Part 1

Too Much Load Related Distress?

Yes → Rehabilitation or Reconstruction Decision Trees

No → Rutting > 10%

Yes → Last Rehab = OVL or Construction AND PSR > Trigger

No → Next Slide

Rut Fill

Yes → Medium Mill and Overlay

No → Too Many Cracks

Yes → Medium Mill and Overlay

No → Thin Mill and Overlay
Minnesota Decision Tree – Part 2

- Last Rehab = OVL or Construction
  - Yes: Good Crack Fill Candidate
    - Yes: Crack Fill
    - No: Good Crack Seal Candidate
      - Yes: Crack Seal
      - No: Surface Treatment Candidate
  - No: Further branches consider curb thickness, traffic, and severity of transverse cracks
What treatments are appropriate?

What other factors affect treatment selection?

When is preventive maintenance not appropriate?

What types of cracking occur?

What causes the cracking?

**Decision Tree for Cracking**

- **Load Associated**
  - Fatigue
    - Not appropriate for preventive maintenance
  - Longitudinal
    - ADT
      - <1000
        - Crack fill or chip seal
      - 1000-5000
        - Crack fill or chip seal
      - >5000
        - Crack seal or thin HMA overlay

- **Non-Load Associated**
  - Transverse
  - Shrinkage
  - Fog seal or chip seal or thin HMA overlay
Checking Treatment Triggers

Block Cracking

Age since 1st Chip Seal

Condition
## Impact of Maintenance on IRI

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mean Change in IRI</th>
<th>Adjusted Mean Change in IRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint and crack filling</td>
<td>-0.294</td>
<td>-0.432</td>
</tr>
<tr>
<td>Joint and crack sealing</td>
<td>-0.225</td>
<td>-0.340</td>
</tr>
<tr>
<td>Full depth patching</td>
<td>-0.515</td>
<td>-0.570</td>
</tr>
<tr>
<td>Microsurfacing</td>
<td>-0.292</td>
<td>-0.324</td>
</tr>
</tbody>
</table>
## Impact of Maintenance on a Condition Index

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean Observed Change in PCI</th>
<th>Mean Change in PCI After Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-depth patching ACC/PCC</td>
<td>1.08</td>
<td>3.50</td>
</tr>
<tr>
<td>ACC partial-depth patching</td>
<td>1.00</td>
<td>5.72</td>
</tr>
<tr>
<td>Microsurfacing</td>
<td>2.10</td>
<td>4.76</td>
</tr>
<tr>
<td>Pavement fog seal</td>
<td>1.00</td>
<td>6.47</td>
</tr>
</tbody>
</table>
Ogden City, Utah

The diagram shows the percent of network surface area with different remaining service life intervals.

- **0-3 years**: 21% in 1996, 4% in 2001
- **4-6 years**: 15% in 1996, 17% in 2001
- **7-9 years**: 18% in 1996, 25% in 2001
- **10-14 years**: 33% in 1996, 37% in 2001
- **15+ years**: 14% in 1996, 18% in 2001
Indiana Department of Transportation - Interstates

**Average condition**

<table>
<thead>
<tr>
<th>Year of analysis</th>
<th>Rehabilitation/ Preventive Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>$100 million/ $15 million</td>
</tr>
<tr>
<td>1999</td>
<td>$125 million/ $12.5 million</td>
</tr>
<tr>
<td>2000</td>
<td>$125 million/ $25 million</td>
</tr>
</tbody>
</table>

- **Rehabilitation/ Preventive Maintenance**
  - $100 million/ $15 million
  - $125 million/ $12.5 million
  - $125 million/ $25 million
MDOT - Reconstruction Only

![Graph showing the percentage of lane miles in poor, fair, and good conditions from 1997 to 2037. The graph indicates an increase in the percentage of lane miles in good condition over the years.]
MDOT - Reconstruction and Rehabilitation

The chart shows the percentage of lane miles in poor, fair, and good conditions from 1997 to 2037. The data indicates an increase in the percentage of lane miles in good condition over the years, while the percentage in poor and fair conditions has decreased.
MDOT - With Preventive Maintenance


Percent of Lane Miles

- Poor
- Fair
- Good
Incorporating Pavement Preservation into Strategic Decisions

Module 5
Strategic-Level Issues

- The establishment of performance criteria for various road classifications
- The distribution of funding levels by district, including both targeted and actual funding levels
- The evaluation of trade-offs between the expansion of the network versus preservation of existing systems
Strategic Management Framework

Goals, Policies, and Budgets

Integration  Technology  Information
Strategic Information for Executives, Legislators, Stakeholders

Managed Business Processes

Tactical Information for Effective Program Delivery (e.g., benefit/cost models, predictions of performance and outcomes, etc.)
Remaining Service Life
8 years

Remaining Service Life
0 years
Legislative Involvement

- Pennsylvania DOT: “…Governor now has a maintenance-first philosophy, and he is putting his money where his mouth is”
- North Carolina DOT: Requires reporting of conditions and costs
- California DOT: Reduce backlog from 14,300 lane miles to 5,500 lane miles
Establishing Goals and Budgets

- Indicate the objective for the program in terms of what will be achieved and when it will be accomplished
- Example: Michigan set a 10-year goal for 95% of its expressways and 85% of its non-expressways to be in fair or good condition
- Monitor the progress towards the goal
CALTRANS GIS Map

- 1998 SHOPP Midcycle Projects
  - CAPM
  - Rehabilitation
  - Long Life Pavement
- 1998 Pavement Condition Survey
  - Rough Riding (1-6)
  - Major Structural Problem Only (7-8)
  - Minor Structural Problem Only (9-10)
  - Class 3 Road Needs (11-14)
- NO NEEDS - CAPM PROJECTS
- NO NEEDS - REHAB PROJECTS
- NO NEEDS - LONG LIFE PROJECTS
- REHAB NEEDS - CAPM PROJECTS
- REHAB NEEDS - NO PROJECTS
- CAPM CANDIDATES - NO PROJECTS
### NCDOT Maintenance Performance Measures - Primary

#### ELEMENT 1  
**Roadway Pavement**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Performance Measures</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement Maintenance</td>
<td>PCR</td>
<td>98</td>
<td>93</td>
<td>86</td>
<td>70</td>
<td>&lt;70</td>
</tr>
<tr>
<td>Pavement Condition Rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Service Level**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Acceptable Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
</tbody>
</table>

#### ELEMENT 2  
**Unpaved Shoulders and Ditches**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Performance Measures</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Shoulder</td>
<td>FT</td>
<td>1%</td>
<td>5%</td>
<td>8%</td>
<td>11%</td>
<td>&gt;11%</td>
</tr>
<tr>
<td>High Shoulder</td>
<td>FT</td>
<td>1%</td>
<td>4%</td>
<td>6%</td>
<td>10%</td>
<td>&gt;10%</td>
</tr>
<tr>
<td>Lateral Ditches</td>
<td>FT</td>
<td>2%</td>
<td>6%</td>
<td>9%</td>
<td>12%</td>
<td>&gt;12%</td>
</tr>
<tr>
<td>Lateral Ditch Erosion</td>
<td>FT</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>&gt;4%</td>
</tr>
</tbody>
</table>

**Service Level**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Acceptable Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
</tbody>
</table>
# Statewide Average - Primary System

<table>
<thead>
<tr>
<th>Maintenance Activity</th>
<th>Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pavement</strong></td>
<td></td>
</tr>
<tr>
<td>Pavement</td>
<td></td>
</tr>
<tr>
<td><strong>Unpaved Shoulders and Ditches</strong></td>
<td></td>
</tr>
<tr>
<td>Low Shoulder</td>
<td></td>
</tr>
<tr>
<td>High Shoulder</td>
<td></td>
</tr>
<tr>
<td>Lateral Ditches</td>
<td></td>
</tr>
<tr>
<td>Lateral Ditch Erosion</td>
<td></td>
</tr>
<tr>
<td><strong>Drainage</strong></td>
<td></td>
</tr>
<tr>
<td>Crossline Pipe</td>
<td></td>
</tr>
<tr>
<td>Driveway Pipe</td>
<td></td>
</tr>
<tr>
<td>Curb &amp; Gutter</td>
<td></td>
</tr>
<tr>
<td>Catch Basin &amp; Drop Inlet</td>
<td></td>
</tr>
<tr>
<td>Other Drainage Features</td>
<td></td>
</tr>
<tr>
<td><strong>Roadside</strong></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
</tr>
<tr>
<td>Brush &amp; Tree Control</td>
<td></td>
</tr>
<tr>
<td>Litter &amp; Debris</td>
<td></td>
</tr>
<tr>
<td>Slope</td>
<td></td>
</tr>
<tr>
<td>Guardrail</td>
<td></td>
</tr>
<tr>
<td><strong>Traffic Control Devices</strong></td>
<td></td>
</tr>
<tr>
<td>Traffic Signs</td>
<td></td>
</tr>
<tr>
<td>Pavement Striping</td>
<td></td>
</tr>
<tr>
<td>Words &amp; Symbols</td>
<td></td>
</tr>
<tr>
<td>Pavement Markers</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
</tr>
<tr>
<td>Turf Condition</td>
<td></td>
</tr>
<tr>
<td>Misc. Vegetation Management</td>
<td></td>
</tr>
</tbody>
</table>

---

NHI Course 131104: Pavement Preservation - 4
Minnesota DOT

- Set a funding goal of $40 million based on information provided by the pavement management system
- Established procedures for distributing money to the districts and assisting the districts with project and treatment selection
Transportation Asset Management

- Defined as a strategic approach to allocating resources for the preservation, operation, and management of our Nation’s transportation infrastructure
- FHWA emphasis on the use of asset management concepts for system preservation activities
“The citizens and taxpayers that use our transportation system expect excellence, integrity, reliability, and sustainability to be reflected in the decisions public officials implement on their behalf. …More use of technical tools to quantify the economic efficiency of proposed investment alternatives will help transportation executives meet these expectations.”
Role of Management Systems in Supporting Asset Management Decisions

- Policy Goals and Objectives
- Integrated Analysis of Options and Tradeoffs
- Resource Allocation Decisions, Investment Choices
- Implementation – Program Delivery
- System Monitoring and Performance Results

Quality Information
Transportation Systems Assets

DATA BASE

Executive Information System Functions

Location Referencing

Traffic Census Data

BMA

Programming & Planning Analysis for Bridges

PMA

Programming & Planning Analysis for Pavements

MMA

Programming and Planning Analysis for Maintenance Management

SMA

Programming & Planning Analysis for Safety

BMS Data

PMS Data

GIS

MMS Data

SMS Data
Implementation Concepts
Module 6
Implementation Issues

- Technical issues
- Institutional issues
- Organizational issues
Inability to Track Maintenance

Code: 1200  Pothole Patching

Material Used:

Equipment Used:

Labor Hours:
Multiple Referencing Systems

**MP 12**

**MP 12.0135**

**MP 12 + 01**
Guidelines for Selecting a Common Reference System

- Pick a system that is attribute and application neutral
- Get help and do it quickly
- Leverage other efforts
Lack of Support for Early Intervention

- Shorten the time between project identification and construction
- Public perception issues
Delaware County, Ohio

Delaware County Seniors Need Property Tax Relief and Safe Roads and Bridges. Vote ‘Yes’ on November 3rd! This is a continuation, it is not a new tax.
Alabama DOT Ribbon Cutting
PennDOT Press Release

“...we continuously strive to be as cost-effective as possible with every dollar we have available. ... we will continue to explore new technologies that will help us do a better job for our customer. By preserving roads with the right type of treatment at the right time we can keep costs down and provide the biggest benefit possible to our customers.”
Lack of Performance Data

- Treatment histories
- Treatment objective
  - Preventive
  - Stop-gap
- Treatment cost
- Do-nothing performance curves
Observations on Pavement Management Databases

- A pavement management analysis limits the amount of data stored
- Subsurface pavement thickness and material information is often missing
- Traffic load data is missing
- Other useful information is missing
Lack of Integrated Databases

- Multiple sources of data within an agency
- Data integration
  - Data warehousing
  - Linking databases
Duplication of Effort

- Improve efficiency and consistency
- Example: Level of Service (LOS) and pavement condition surveys
Understanding the Pavement Management System

- Understand the decision process
- Understand the impact maintenance activities have on treatment selection
- Be sure decisions are being made at the appropriate level
Organizational Structure Issues

Decentralized Centralized

Higher Lower

Level of Coordination Required for Decisions
Developing an Action Plan

- Benchmark existing practices
- Identify steps needed to be taken
- Prioritize the steps
- Prepare the action plan
### Benchmarking Practices

<table>
<thead>
<tr>
<th>A1: Agency pavement preservation policies are supported through the use of pavement management activities</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A2: The agency’s capital maintenance funding allocations for roads are based on an assessment of pavement needs</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Identify and Prioritize Actions

- Where do gaps exist between good practice and agency practice?
- What steps can the agency take to reduce the gaps?
- Which issues are organizational issues and which are local issues?
- Which actions will have the greatest immediate benefit to the agency?
Guidelines

- Start small and build gradually
- Involve as many stakeholders as possible
- Recognize change doesn’t happen immediately
- Promote the plan and build acceptance
- Document and promote progress
Success Stories: Organizational Structure

- NCDOT: Pavement Preservation Engineer
- Pavement Management Engineers in districts (Utah, Virginia)
Success Stories: Contracting Issues

- SDDOT: First chip application
- MDOT: Reduced design and developed warranties
Success Stories: Technical Issues

- Iowa DOT: Effects of preventive maintenance
- MnDOT: Network-level decision trees and review of preventive treatment selection
- MDOT: Single referencing system
- Integrating maintenance management and pavement management systems
- Data warehousing
- Manuals of Practice
Long-Term Research

- Performance studies
- Technology transfer/sharing results
- Data integration issues
Maintaining an Integrated Approach

- Develop a feedback loop
- Link Manuals of Practice to pavement management treatment selection
- Develop a steering committee
- Diagram relationships between sources of data and users
- Other ideas?
Summary and Wrap-Up

Module 7
Future Efforts

- FHWA’s Expert Task Group (ETG)
- National Center for Pavement Preservation
- Regional/State Preservation Groups
- AASHTO Subcommittee on Maintenance – Pavement Task Force
- Outreach Efforts
- Foundation for Pavement Preservation (FP²)
- Others
Key Points

- Importance of preventive maintenance
- Role of pavement management in supporting a preventive maintenance program at the project, network, and strategic levels
- Integration is a key to developing coordinated pavement preservation plans