Report from PMS Breakout Session

Chad Shive
KYTC/Division of Operations
Pavement Management
What is Pavement Preservation?

- Preventive Maintenance
- Minor Rehabilitation
- Routine Maintenance

Preventive Maintenance - A planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserve the system, retards future deterioration and maintains or improves the functional condition of the system (without substantially increasing structural capacity).
Concept of Pavement Preservation ($P^2$)

Original Pavement

Optimal Timing

Preventive Trigger

Rehabilitation Trigger

Pavement Condition vs. Time / Traffic
NHI Course Listing

- “The Preventive Maintenance Concept” NHI Course #130154
- “Selecting Pavements for PM” NHI Course #130158
- “Design and Construction of Quality PM Treatments” – Winter 03/04
- “Integrating PM into Pavement Management Systems” – Winter 03/04
Philosophy of Preventive Maintenance

Applying the right treatment

... To the right pavement

... At the right time
Robert Paine, P.E.
Practical Examples of Combining Maintenance and Rehabilitation Activities in a PMS Analysis

- Rehabilitation - Major treatment that has the effect of resetting many indexes to their original value.
- Maintenance - More minor treatment that has the effect of resetting some indexes slightly or not at all.
- Treatment - A single action taken by an agency to slow deterioration down or repair the effects of deterioration.
- Treatment Strategy - A course of action to be taken over the analysis period and consists of one or more treatments.
Steps in an Analysis

- Transform data to indexes,
- Transform indexes to analysis sections,
- Apply performance expressions to current index values (Do-nothing),
- Decision logic triggers treatments and creates several treatment strategies for every analysis section,
- Budget scenarios are defined,
- Optimization used to select the best strategy to satisfy an objective function for the network.
What is the Best Budget Split?

Percent Budget Split

Resulting PCI
Joe Kindler, P.E.
Economical Ideas and Common Sense

• Extend and expand your funding…

• Pavement maintenance goals:
  – Reduce moisture intrusion
  – Retard aging
Compared Costs Savings

• Alternative 1
  – Mill and Overlay - $5.50/yd$^2$
  – Perform mill and overlay at 1 and 9 years

• Alternative 2
  – ASI-GSB sealer $0.50/yd^2$
  – Perform mill and overlay at 1 year and ASI-GSB at 1, 5, 9 and 13 years
Savings

• Mill and Overlay - $11.00/yd²
• Mill and Overlay + ASI-GSB sealer - $7.50/yd²
• Total Savings of $350,000 over a 7 mile road
Pavements are engineered structures, therefore Engineering analysis:
- Improves pavement performance
- Can be used for network or individual problems
- Is essential for feedback purposes
Purpose and Benefits of PMS

- TRDI conducted a study for Arizona DOT in 1998, which compared pre-PMS data to post-PMS data.
- Roughness was found to be the best indicator of performance and shows the best correlation for data.
PMS Results in Longer Life

Roughness All Roads, All Pavements

- **PRE-PMS 1981-1983**
- **FULL PMS 1993-1995**

![Graph showing the relationship between roughness (in/mi) and age (years).](image-url)

- Tolerable Roughness 93 in/mi
- Age (years): 0-30
- Roughness (in/mi): 50-110

**Key Details**
- 81-83
- 81-83 95% Confidence
- 93-95
- 93-95 95% Confidence

- 12.2 yrs
- 2.7 yrs
- 15.0 yrs
- 12.7 yrs
- 2.0 yrs
- 14.7 yrs
Age Distribution
All Roads, All Pavements

Frequency

Age (Years)

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29

- 81-83
- 93-95
Adel Hedfi
Integration of Network Level PMS with Project Selection, Design and Implementation

Maryland’s Transition from a Traditional Planning Process to Proactive Planning Process.
Traditional Planning Process

• Collecting road condition data
• Priority listing (worst first)
• Annual meeting (select projects)
• Budget allocation
• Maintenance and rehabilitation projects
Proactive Planning Process

- Construction History
- Maintenance History
- Roadway Inventory
- Local Expertise
- Performance Data
Katie Zimmerman, P.E.
Integrating Preventive Maintenance into Pavement Management

• Existing Gaps
• Three approaches to Integration
• Steps to Improve Integration
Existing Gaps

- Data collection activities
- Condition Indexes
- Performance Models
- Treatment triggers and impact models
Approaches to Integration

- Pavement sections that are NOT candidates for rehabilitation or reconstruction
- Preventive maintenance treatments are considered collectively as a treatment
- Specific preventive maintenance treatments are recommended based on PMS information
Steps To Improve Integration

• Identify your needs
• Identify the gaps
• Develop a plan
  – Identify data sources
  – Collect data needed to support analysis
• Implement the plan
Benefits to Integration

- More coordinated work plans developed to accomplish agency goals
- Better able to demonstrate the benefits in using preventive maintenance treatments
- Better informed to make decisions about treatment needs
• Why do we perform maintenance work?
  – To correct or prevent defects
• MMS captures all maintenance activities and costs
• The Maintenance Rating Program captures the status of the network
Weighting is set for each defect.
By relating activities to defects, costs required to fix defects can be determined.
Mark Swanlund, P.E.
Profile Viewer and Analyzer Software

- Recommended for Development by the ETG
- Can read standard formats:
  - .erd
  - .txt
  - .ppf
  - others
Road Roughness Measures and Types of Profile Analysis

- Many types of road roughness measures are available:
  - IRI is influenced by wavelengths of 4’ to 100’
  - RN is influenced by wavelengths of 2’ to 33’

- Types of Profile Analysis
  - ASTM E-950
  - Cross correlation
  - Power Spectral Density
Cross Correlation

The maximum correlation coefficient achieved is 0.9, by offsetting the blue profile +4.5 feet.
Robert OrthMeyer
Pooled Fund Study - Improving the Quality of Pavement Profiler Measurement

- Four year Study
- Commitment from 15 states and FHWA
- $1,097,200 committed to date - $40,000 allocated by FHWA LTPP
- The Kick off meeting was held in first week of May
Study Objectives

- Deliver AASHTO Standard Practices and Standard Equipment Specification
- Establish Criteria for Calibration Centers
- Develop & Deploy Calibration Device
- Technical Review of Software & Bump Measurement
Kickoff Meeting Priorities

- Topic list of eight potential projects
- Established top priorities
- Develop budget
- Meet with Contracting Officer in July
- Publish Request for Proposals
Top Potential Projects

1. Reference Profile Device
2. Critical Profile Accuracy Requirements
3. Construction Acceptance and Correction Software
4. Certification / Validation Sites
For information or if your state would like to join...

Contact:
Robert Orthmeyer, P.E.
FHWA / RC – OF
708-283-3533
Robert.orthmeyer@fhwa.dot.gov
www.pooledfund.org