Issues in Integrating Pavement Management and Preventive Maintenance

David G. Peshkin, P.E.
Applied Pavement Technology, Inc. (APTech)

Susan Massey, Chief,
Office of Roadway Rehabilitation
Presentation Topics

- The benefits of integration
- Typical gaps
- Current approaches being used
- Recommendations to improve integration efforts
Differences in Maintenance and Rehabilitation Programs

**Preventive Maintenance**
- Managed by maintenance area
- In-house or outsourced activities
- Short lead time before construction
- Annual program

**Rehabilitation**
- Program developed by planning and programming
- Executed by construction
- Constructed under contract
- Several years from project identification to construction
Benefits to Integrating These Areas

- To account for maintenance effects in pavement performance models
- To recognize the benefits associated with preventive maintenance treatments
- To identify the appropriate time to apply preventive maintenance
- To assist with the development of a coordinated, statewide preservation plan
Typical Gaps

- Pavement condition assessment techniques
- Condition indexes
- Pavement performance models
- Pavement treatment rules
- Treatment impact rules
Pavement Condition Assessment
What Distresses Should Be Included?

- What factors trigger the use of a preventive maintenance treatment?
- What benefits are realized by the application of the treatment?

- Crack sealing: Open or sealed cracks, quantities, severity
  - Lower severity cracks

- Chip seals: Oxidation, flushing, raveling
  - Waterproofed surface, improved friction
Other Condition Assessment Factors

Survey frequency
- Is the window of opportunity missed?
- Can preventive maintenance needs be predicted?

Processing of condition information
- How short is the window between identification of the need and construction of preventive maintenance treatments?
Condition Indexes

- Single composite index
  - Pavements rated between 70 and 100 might be candidates for preventive maintenance

- Remaining service life (RSL)
  - Pavements with a RSL of 10 years or more might be candidates for preventive maintenance

The appropriate treatment might be hard to identify without specific distress information available
Condition Indexes

Individual indexes or distress details

- Friction index (or amount of bleeding) to identify safety needs
- Structural index (or amount of fatigue cracking) to identify sections that are NOT good candidates for preventive maintenance
- Cracking index (or amount of L/T cracking) to identify candidates for crack sealing
- Functional index to identify candidates for seal coats
Pavement Performance Models

Pavement Condition

Preventive Maintenance

Rehabilitation

Pavement Age or Traffic
Pavement Treatment Rules

Load Associated Cracking
- Fatigue
  - Not appropriate for preventive maintenance

Non-Load Associated Cracking
- Longitudinal
  - ADT
    - <1000
      - Crack fill or chip seal
    - 1000-5000
      - Crack fill or chip seal
  - Transverse
    - >5000
      - Crack seal or thin HMA overlay

- Shrinkage
  - Fog seal or chip seal or thin HMA overlay
Treatment Impact Rules

Pavement Condition

- Good
- Poor

Time (Years)
Model Development Issues

- Models must be developed for each treatment type
- The database must be able to provide the information needed to support the models
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
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
General Recommendations

- Group all preventive maintenance treatments as a single treatment with an average cost and performance period.
- Select the category of preventive maintenance for pavements in good condition.
- Have Maintenance select the appropriate treatment based on field observations.
Example

Preventive Maintenance

Light to Moderate Rehabilitation

Heavy Rehabilitation

Reconstruction

PCI

AGE
Caltrans

Pavement Condition Ratings

Five-Year Plan

Distress, Ride

Treatment types

Treatment Selection
Treatment Rules

- Rehabilitation and reconstruction have a pavement distress matrix
- Preventive maintenance treatments are based on
  - locations without defects
  - treatment types
  - project history
Current Status

Five-year funding plan for maintenance and rehabilitation includes prevention
- over $90 million per year

Developing a pavement condition index with remaining service life

Developing the performance model for network analysis

Modifying pavement condition collection
- to support performance models
Current Status

- Reviewing current business processes
- Identifying gaps
- Developing implementation plan
Ohio Department of Transportation

Pavement Condition Ratings

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.
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
Recommendations

- Examine current capabilities
- Identify gaps between current practices and needs
- Develop a plan to address gaps
- Implement the plan
Thanks!

Susan Massey, P.E.
Caltrans HQ Maintenance
1120 N Street, MS 31
Sacramento, CA  95814
916.654.4792
Susan_Massey@dot.ca.gov

David Peshkin, P.E.
Applied Pavement Technology, Inc.
3010 Woodcreek Dr., Ste. J
Downers Grove, IL  60515
630.434.9210
dpeshkin@pavementsolutions.com