Pavement Management’s Role in an Asset Management World

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Background

• Increased attention on asset management with passage of MAP-21
• With focus on asset management, is pavement management less important?
• Is there a future for pavement management beyond data collection?
Expanding Role of Pavement Management

- Network-level life-cycle cost analysis
- Cross-asset investment trade-off analysis
- Managing risks impacting agency’s strategic goals and objectives
- Integrating pavement management data with other asset data
Using Pavement Management to Support Transportation Asset Management Activities

(AASHTO 2011)
Pavement Life Cycle Management

- Describe life cycle costs and explain their importance
- Model typical deterioration trends
- Develop whole-life management strategies
- Document life cycle costs
Example Case Study: MnDOT

• Three life-cycle strategies compared:
  ▪ **Worst-First**: No preventive maintenance, major rehab/reconstruction after 25-30 years
  ▪ **Typical**: Reflects current practices of routine mill and overlays with crack sealing and surface treatments in-between
  ▪ **Desired**: Improved end-of-life strategies, using treatments such as full-depth restoration in-lieu of repeated mill and overlays
Example Cast Study: MnDOT (cont’d)

- Agency’s current policy saves approximately $17 Billion when compared to the worst-first strategy (over entire inventory)
- The desired strategy will result in savings of approximately $600 million over the current strategy (over entire inventory)

(MnDOT 2014)
Investment Scenario Development

- Typical analysis focus only on pavements to develop a capital program
- Asset Management Plan requires 10-year investment strategies linked to performance targets
- Account for investment needs for other assets

(CDOT 2014)
Risk Management

RESPONSIBILITY: Executives  
TYPE: Risks that impact achievement of agency goals and objectives and involve multiple functions  
STRATEGIES: Manage risks in a way that optimizes the success of the organization rather than the success of a single business unit or project.

RESPONSIBILITY: Program managers  
TYPE: Risks that are common to clusters of projects, programs, or entire business units  
STRATEGIES: Set program contingency funds; allocate resources to projects consistently to optimize the outcomes of the program as opposed to solely projects.

RESPONSIBILITY: Project managers  
TYPE: Risks that are specific to individual projects  
STRATEGIES: Use advanced analysis techniques, contingency planning, and consistent risk mitigation strategies with the perspective that risks are managed in projects.

(FHWA 2012)
## Risk Management: Sample Risk Register

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Cause(s)</th>
<th>Impact(s)</th>
<th>Likelihood</th>
<th>Consequence Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of or Deferred Funding</td>
<td>Change in federal funding or reduction in fuel tax revenue</td>
<td>Reduction in available funding, reduction present pavement program</td>
<td>5</td>
<td>4 1 2 2 3 1</td>
</tr>
<tr>
<td>Volatility in Prices (Inflation)</td>
<td>Political or economic changes, or natural inflation</td>
<td>Reduction in available funding, reduction present pavement program</td>
<td>3</td>
<td>4 1 2 2 3 1</td>
</tr>
</tbody>
</table>

The table above illustrates the risk register for two identified hazards. The likelihood of occurrence is scored on a scale of 1 to 5, with 5 being the highest. The consequence scores for each impact are also indicated, ranging from 1 to 4, with 4 being the highest. The impacts include economic (Econ.), legal, public expense (Public Exp.), safety, reputation (Reput), and environmental (Env.).
## Likelihood & Consequence Ratings

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High or Almost Certain</td>
<td>Near Certainty (90%) or likely to occur within the year</td>
<td>Catastrophic Impact on System Performance</td>
<td>5</td>
</tr>
<tr>
<td>High or Likely</td>
<td>Highly Likely (70%) or likely to occur within 2 years</td>
<td>High/Large Impact on System Performance</td>
<td>4</td>
</tr>
<tr>
<td>Moderate</td>
<td>Likely (50%) or likely to occur within 3 to 5 years</td>
<td>Moderate/Noticeable Impacts on System Performance</td>
<td>3</td>
</tr>
<tr>
<td>Low or Unlikely</td>
<td>Unlikely (20-30%) or likely to occur within 6 to 10 years</td>
<td>Low/Some Noticeable Impacts on System Performance</td>
<td>2</td>
</tr>
<tr>
<td>Very Low or Rare</td>
<td>Remote (10%) or not likely to occur for 10 or more years</td>
<td>Insignificant/Little Noticeable Impacts on System Performance</td>
<td>1</td>
</tr>
</tbody>
</table>
Enhancements to Support Asset Management Activities

- Integrate asset data
- Develop asset register
- Improve performance modeling
- Capture maintenance costs
- Analyze trade-offs across asset classes
- Evaluate and manage risks
Concluding Remarks

• Pavement management tools serve as basis for making investment priorities and decisions
• Use of pavement management systems is evolving
• Recognize enhancements needed to support other asset management activities to ensure viability and long-term sustainability
Thank You!

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