Integration of Network Level PMS with Project Selection, Design and Implementation

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Louisville, Kentucky
16,000 Lane Miles
$100 + Million Pavement Preservation Budget
Statewide Planning Managed at Chief Engineer’s Office
Project Implementation Managed at Districts
Maryland Has Seven Districts
Maryland Old Management Process

Road Condition data

Performance Indicators

Priority Listing

Road Condition Rank

45 1
50 2
53 3
61 4
66 5
74 6
80 7

M&R Actions

Budget Allocation

Annual Meeting

Road Survey
Old Project Selection Process

- Rank the pavements from worst to best based on current condition
- Create priority lists to fix worst pavements first

2002 Survey:

<table>
<thead>
<tr>
<th>Condition</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prioritized projects:

- P1
- P1
- P1
- P2
- P2
- P3
- P3

Priority Listing
Enhancing the Planning Process

Traditional Planning Process

- Budget
- Select Projects
- Resulting Outcome

Proactive Planning Process

- Budget
- Budget Allocation Planning
- Goals
- Predicted Outcome
- Select Projects
Adding New Management Tools

- Construction History
- Maintenance History
- Roadway Inventory
- Local Expertise
- Performance Data
- Design Tools
- Prediction Models
- Optimization Tools
- Project Selection

Maryland State Highway Administration
Instituting a Progressive Management System

Data
- Inventory Data
- Condition data
- Traffic Data
  - Pavement Families
  - Environment
  - Construction History
  - Costs/Benefits

Planning (Network Level)
- Generate Prediction Models
- Set Budget Limits
- Define Improvement Goals
- Generate Best M&R Strategies

Optimum Maintenance & Rehab Plan
- Project Selection
  - Identify Project Limits
  - Create Projects
  - Select Feasible Treatments
  - Refine Costs
  - Implement Project

Implementation (Project Level)
- Treatment Assignment
- Performance Modeling
- Network Optimization
  - Budget
  - Goals
- Traffic Data
- Environment
  - Traffic
  - Condition
  - Structure
  - Feasible Treatment
Network Optimization

Generate the Best M&R Plan

Provide Capability to Justify Budget Needs
Predicted Conditions

Network Condition Impact Based on Expected Funding Shorfalls

Average of $108 Million/FY

Maryland State Highway Administration

Axiom Decision Systems, Inc.
Predicted Conditions

Required Funding Level to Maintain Existing Conditions

Average of $132 Million/FY - $24 Million/FY gap

Maryland State Highway Administration
Predicted Conditions

Required Funding Level to Meet Modified Business Plan
Goals of 84% Acceptable

<table>
<thead>
<tr>
<th>Year</th>
<th>FY Budget Need</th>
<th>CY % Pavement in Acceptable Condition</th>
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</thead>
<tbody>
<tr>
<td>2003</td>
<td>104.1</td>
<td>83.0%</td>
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<tr>
<td>2004</td>
<td>129.2</td>
<td>83.2%</td>
</tr>
<tr>
<td>2005</td>
<td>136.9</td>
<td>83.6%</td>
</tr>
<tr>
<td>2006</td>
<td>145.1</td>
<td>83.8%</td>
</tr>
<tr>
<td>2007</td>
<td>147.2</td>
<td>83.9%</td>
</tr>
<tr>
<td>2008</td>
<td>146.2</td>
<td>84.2%</td>
</tr>
<tr>
<td>2009</td>
<td>150.7</td>
<td>84.0%</td>
</tr>
</tbody>
</table>

Average of $137 Million/FY - $29 Million/FY gap
Making the Connection

Network Level

Planning

Develop Statewide M&R Recommendations

Project Level

Implementation

Transform Recommendations Into Projects

Network Level Phase Synthesizes Data into General Terms and Distributions

Project Level Phase Uses More Detailed Input and Relies on a More Specific Analysis of Data
Establishing a Functional Link

Network

- Determine Budget Allocation Strategy
- Determine M&R Distributions
- Estimate Costs and Benefits
- Predict Overall Conditions

Project

- Select Specific Projects
- Evaluate Project Detailed Condition
- Finalize Accurate Costs

Network Analysis Must Encompass a Degree of Variability to Account for Deviations that Occur When Projects are Selected

Include Aspects of the Project Level Process into Network Formulation
Synchronizing the Two Phases of Analysis

Computing Costs
- **Network**: Average Cost Estimates
- **Project**: Detailed Cost Calculations

Use Variable Cost Values at the Network Level

Assessing Condition
- **Network**: One Condition Index
- **Project**: Several Condition Indices

Evaluate Multiple Indicators at the Network Level

Predicting Performance
- **Network**: Average Performance
- **Project**: Variable Performance

Use Probabilistic Models to Account for Variability

Defining Action Options
- **Network**: Thickness-Based Actions
- **Project**: Life-Based Actions

Use Same Action Classification Scheme
Linking Network and Project Level Plans

**Challenge:**
How to consolidate network level results into information that can guide the Project Level Analysis?
Objective: Create Project Level Plans in Correspondence with Network Level Recommendations

Approach: Provide Simple Network Assessment Attributes that can guide the Project Selection Process

Select Projects to Achieve Network Level Goals

Budget, Lane-Mile, and Life Goals Ensure Funding, Type, and Timing of Work Will be Met
The Application: Project Selection Tool
Thank You

Questions?

Comments?

Feedback?