Presentation Outline

- Bridge Preservation Components
- Preventive Maintenance
- Needs Assessment
- Work Plans
- Creating Projects
- Creating Programs
Bridge Preservation Components

- Bridge Preservation
  - Rehabilitation
  - Preventive Maintenance
    - Condition-Based Activities
    - Cyclical (Non-Condition-Based) Activities

Source: NHI Bridge Preservation Training
Elements of a Systematic Preventive Maintenance Program

1. Goals, Objectives, and Measures
2. Performance Evaluation
3. Plan Implementation
4. Work Plan
5. Budgeting and Alternatives Evaluation
6. Needs Assessment
7. Inventory and Condition Assessment

Source: NHI Bridge Preservation Training
Needs Assessment and Data Management Process

Data

Inventory
Condition
Preservation Activities
Cost

Analysis

Analysis Results

Needs Results

Source: NHI Bridge Preservation Training
• Inventory information
  – Average Daily and Truck Traffic, geometry, location, and type

• Condition data
  – NBES, BMEs, ADEs, and NBI Condition Ratings

• Preservation and rehabilitation activities

• Cost data
  – Preservation costs, rehabilitation costs, and annual budget
Preservation Cost Data

Bridge Element Cost Elicitation Form

REINFORCED CONCRETE BRIDGE DECK

Element #: 12 Units: ft² Type: NBE

For each action, fill in the practice that is used by WisDOT to protect, repair, rehabilitate, or replace the bridge element referenced on this form or select the typical practice. Enter the WisDOT typical cost per unit for the selected practice.

<table>
<thead>
<tr>
<th>Action</th>
<th>Practice</th>
<th>Used</th>
<th>Typ. Cost ($ / Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect</td>
<td>Wash &amp; remove debris from bridge deck annually.</td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Perform sealing and waterproofing procedures every 3-5 years.</td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>WisDOT Practice:</td>
<td>Sweep and remove debris from bridge deck bi-annually.</td>
<td>✓</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Perform sealing and waterproofing procedures every 10 years.</td>
<td>✓</td>
<td>3.70</td>
</tr>
</tbody>
</table>

| Repair | Typical Practice: | Perform small deck surface repairs for spalls and delaminations. | ✓ | 12.84 |
| | Perform crack sealing procedures if crack widths are 0.007" or larger. | | NA |

Typical cost refers to cost without low high outliers.
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| Element #: | 12 | Units: | ft² | Type: | NBE |

**Additional Information:**

**Protect**

Bridge cleaning generally consists of collecting and properly disposing of trash and debris.

Bridge washing involves pressure washing off salts, dust, sand, and any remaining undesired material from exposed concrete bridge deck surfaces, leading to the removal of the chloride from the bridge.

Environmental requirements and considerations play a big role in bridge deck cleaning and washing.

Equipment typically includes hand tools, power brooms, air compressors, and vacuum / water trucks.

Traffic control may need to be maintained for bridge cleaning and washing activities.

Pressure washing and vacuum equipment is recommended to have equipment pressure of at least 30-40 ksi per minute, minimum flow rate of 16 gallons per minute, and a water tank of 4000 gallon capacity.

Deck sealing/waterproofing is done by applying a sealant or similar substance to the concrete deck to reduce its surface porosity and stabilize the outer layer, aiding in resisting water and chloride.

Deck preparation has a large impact on the effectiveness of this action. Sand, shot, or air blasting is typically used to eliminate moisture and oil residues on the deck.

Any moisture on the deck must be allowed to properly dry prior to sealant application. Drying time of the deck depends on air temperature and degree of rain fall, typically ranging from 1 to 3 days.

Sealants should also be applied to curbs and barriers in the splash zone.

An abrasive material may also need to be applied to the deck to create the necessary anti-skid traffic surface.

**Repair**

Deck surface repairs are considered a temporary repair since all of the chloride contaminated concrete
• Threshold triggers for condition-based actions
  – Total needs for condition-based preventive maintenance activities
• Threshold triggers for cyclical preventive maintenance
  – Total needs for cyclical preventive maintenance activities
• Life cycle cost analysis for rehabilitation versus replacement
  – Total needs for rehabilitation projects
Needs Results Component

- Total needs = Cyclical + Condition-based + Rehabilitation

$2,400,000 = $500,000 + $900,000 + $1,000,000

- Total needs of bridge preservation program are based on:
  - Inventory
  - Condition
  - Cost
• Goals, objectives, and performance measures established

• Needs identified and prioritized

• Best strategy defined and priced

• Budget approved

• Budget matched with needs

• Work planned

• Preventive maintenance given high priority
Evaluate Needs
Perform Analysis (Iterations)
Identify Work Candidates
Create Projects
Create Programs

Source: NHI Bridge Preservation Training
Project Selection Process

Initial Selection from PM Condition-Based Activities And Rehabilitation

PM Cyclical Activities

Group by Cost-Effectiveness

Add by Location

Add by Similar Activity or Timing

Evaluate Project

Approve?

yes

Program

Source: NHI Bridge Preservation Training
Initial Selection from Projects

Add or Remove Projects
Adjust Projects Priorities or Rank
Set Budgets
Allocate Funding by Year

Evaluate Program

Approve?

yes

Schedule

no

Source: NHI Bridge Preservation Training
Questions?

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