Pavement Preservation at PennDOT

NEPPP – December 12, 2007
TOPICS:

- PennDOT Highway System
- Pavement Management
- Pavement Preservation
- Condition Assessment
- Performance Measurement
### State Owned Highway System:

<table>
<thead>
<tr>
<th>Network</th>
<th>Total Linear Miles</th>
<th>Total Segment Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate</td>
<td>1,285</td>
<td>2,570</td>
</tr>
<tr>
<td>Other NHS</td>
<td>3,596</td>
<td>5,346</td>
</tr>
<tr>
<td>Non-NHS ADT ≥ 2000</td>
<td>13,483</td>
<td>14,382</td>
</tr>
<tr>
<td>Non-NHS ADT &lt; 2000</td>
<td>21,403</td>
<td>21,439</td>
</tr>
<tr>
<td>Total</td>
<td>39,767</td>
<td>43,737</td>
</tr>
</tbody>
</table>

Segment Mile = Linear Miles for Undivided Routes, Directional Miles for Divided Routes
Pavement Management:

- Best treatment to apply to a selected pavement section
- Maintenance and rehabilitation strategies at the right time
- Quantify needs over any projected time
Pavement Management:

- Focus on higher level roadways first
- Do not neglect lower facilities
- Balance rehabilitation and preservation
- Improve some roadways, preserve others
- Not a “worst first” approach
Pavement Treatment Types:

- Preservation – cost effective treatments to retard future deterioration, and maintain or improve functional condition
  - bituminous resurfacing with leveling and/or milling
  - microsurfacing
  - seal coat
  - diamond grinding
  - base repair / concrete patching
Pavement Preservation:

- Plan and strategy defined through the Maintenance Efficiency and Cost Effectiveness (MECE) initiative
- Pavement cycle charts to be the basis for selecting appropriate treatments
- Defined cycles for High-level Bituminous, Low-level Bituminous, Concrete, and Unpaved roadways
Pavement Preservation:

- **High-level Bituminous Roadways (Resurfacing Network):**
  - Interstates, NHS routes, high to medium service
  - Maintained by routine resurfacings

- **Low-level Bituminous Roadways (Seal Coat Network):**
  - Maintained by routine seal coats
# Pavement Management

## Bureau of Maintenance and Operations

### High-level Bituminous Roadways (Resurfacing Network)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crack sealing</td>
<td>3 to 5 years</td>
</tr>
<tr>
<td>Micro-surfacing (optional)</td>
<td>5 to 10 years</td>
</tr>
<tr>
<td>Resurfacing</td>
<td>8 to 12 years</td>
</tr>
<tr>
<td></td>
<td>(with no interim surface seal)</td>
</tr>
<tr>
<td></td>
<td>13 to 17 years</td>
</tr>
<tr>
<td></td>
<td>(with an interim surface seal)</td>
</tr>
<tr>
<td>Seal coat paved shoulders (optional)</td>
<td>5 to 7 years</td>
</tr>
</tbody>
</table>

### Low-level Bituminous Roadways (Seal Coat Network)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crack sealing</td>
<td>3 to 5 years</td>
</tr>
<tr>
<td>Seal coat (rural) or Macro-surface</td>
<td>4 to 7 years</td>
</tr>
<tr>
<td>Micro-surface or level (urban)</td>
<td>5 to 6 years</td>
</tr>
<tr>
<td>Resurface or level</td>
<td>15 to 20 years</td>
</tr>
</tbody>
</table>

### Concrete Pavements

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint sealing</td>
<td>5 years</td>
</tr>
<tr>
<td>Concrete patching</td>
<td>Years 15, 20 and 25</td>
</tr>
<tr>
<td>Diamond Grinding</td>
<td>15 to 20 years</td>
</tr>
<tr>
<td>Overlay</td>
<td>20 to 30 years</td>
</tr>
<tr>
<td>Seal coat shoulders (if bituminous)</td>
<td>5 to 7 years</td>
</tr>
</tbody>
</table>
Functional Pavement Life:

- Full Depth Bituminous Pavements (High-level) - 40 years
- Concrete Pavements - 35 years
- Composite Pavements - 60 years
Effect of Pavement Preservation

![Graph showing the effect of pavement preservation on the condition of a pavement over time. The graph compares the condition of the pavement with and without preservation, showing a significant improvement in condition with the application of preservation methods.](image-url)
Condition Assessment:

- Skid friction
- Structural functionality
- Videologging
- Roughness
  - High Speed
  - Light Weight
Videologging:

- Replaced manual surveys
- Roughness
- Panoramic roadway images
- Feature types and locations
- 27,000 miles per year
  - Entire NHS annually
  - Non-NHS biennially
Use of Data

- Uniform statewide condition evaluation
- Allocation of county maintenance funds
- Monitor condition and assess future needs
- Monitor performance of pavement designs, materials, and maintenance techniques
- Identify candidate projects
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Deterioration of Bituminous Pavement
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Deterioration of Concrete Pavement
System Performance Measures

<table>
<thead>
<tr>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Interstate with Excellent &amp; Good IRI</td>
</tr>
<tr>
<td>% Interstate with Poor IRI</td>
</tr>
<tr>
<td>% Other NHS with Excellent &amp; Good IRI</td>
</tr>
<tr>
<td>% Other NHS with Poor IRI</td>
</tr>
<tr>
<td>% Non-NHS w/ ADT &gt; 2000 with Excellent &amp; Good IRI</td>
</tr>
<tr>
<td>% Non-NHS w/ &gt; 2000 ADT with Poor IRI</td>
</tr>
<tr>
<td>% Non-NHS Routes with Inadequate Pavement Width</td>
</tr>
<tr>
<td>% of Annual Surface Improvement</td>
</tr>
</tbody>
</table>

Each year, the rideability of each roadway network is measured and compared to target values.

Also measured is the reduction of pavement with inadequate width.

Finally, the amount of annual surface improvement is tracked.
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Pavement Cycle Assessment

- Low-level bituminous with surface age > 7 years
- Concrete with surface age > 30 years
- Low-level bituminous with resurfacing layer > 20 years
- High-level bituminous with surface age > 17 years
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