Overview

Improvement Costs
- Trends
- Implications
- Timeliness of Improvements

Levels of Service - Scope of the Presentation
- State
  - Surface Condition
  - Lane Width
  - Shoulder Width
- County/Township
  - Gravel/Overlay Interval
  - Gravel/Overlay Thickness
- Bridges
  - Width
  - Load Limit
  - Detour Distance
## Improvement Costs

Source: NDDOT

<table>
<thead>
<tr>
<th>Type of Improvement</th>
<th>Average Cost/Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate Concrete Paving (two lanes in one direction)</td>
<td>$1,700,000</td>
</tr>
<tr>
<td>Resurfacing Interstate (hot bituminous pavement)</td>
<td>$500,000</td>
</tr>
<tr>
<td>Reconstruction 2-lane hwy (includes grading &amp; base)</td>
<td>$780,000</td>
</tr>
<tr>
<td>3” Overlay (hot bituminous pavement)</td>
<td>$275,000</td>
</tr>
<tr>
<td>Thin lift overlay</td>
<td>$125,000</td>
</tr>
<tr>
<td>Seal Coat</td>
<td>$28,000</td>
</tr>
<tr>
<td>Urban Reconstruction (51’ curb &amp; gutter)</td>
<td>$4,600,000</td>
</tr>
</tbody>
</table>
Cost Trends
Source: NDDOT

North Dakota's Overall Construction Cost Index

Years:
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009

Index:
- 85
- 100
- 115
- 130
- 145
- 160
- 175
- 190
- 205
- 220

The graph shows the overall construction cost index for North Dakota from 2001 to 2009, indicating a steady increase over the years.
National Highway Construction and Maintenance Cost Indices*
(Source: FHWA)

*These indices have been scaled to equal 100 in 1987.
Improvement Costs

Inflation Implications
- The same funding "buys" fewer improvements than it did five years ago
- Timeliness of improvements cannot be met in many cases
- Backlog of improvement projects
- Repair vs. resurface vs. reconstruct
Timeliness of Improvements

![Graph showing the cost-effectiveness of pavement preservation.](Graph.png)

**Source:** National Center for Pavement Preservation.
Improvement Costs

Repair vs. Resurface vs. Reconstruct

- Seal Coat $28,000/mile
- Thin Lift Overlay $125,000/mile
- 3” Overlay $275,000/mile
- Reconstruction $780,000/mile
Repair vs. Rehabilitation

Source: FHWA
Highway Performance Classification System

[Map of highway performance classification system for North Dakota]
Highway Performance Classification System

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number of Roadway Miles</th>
<th>Percentage of Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate</td>
<td>1,141</td>
<td>13.6</td>
</tr>
<tr>
<td>Interregional</td>
<td>1,894</td>
<td>21.7</td>
</tr>
<tr>
<td>State Corridor</td>
<td>1,405</td>
<td>16.7</td>
</tr>
<tr>
<td>District Corridor</td>
<td>2,568</td>
<td>30.6</td>
</tr>
<tr>
<td>District Collector</td>
<td>1,471</td>
<td>17.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,479</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Levels of Service

State System
- Surface Condition
- Lane Width
- Shoulder Width
Levels of Service

Surface Condition
- Very Good
- Good
- Fair
- Poor
Levels of Service

- Erosion Gullies and Deep Depressions
- Frequent Shallow Depressions, Some Deep
- Frequent Minor Depressions
- Surface Imperfections
- Airport Runways & Superhighways
- New Pavements
- Older Pavements
- Maintained Unpaved Roads
- Damaged Pavements
- Rough Unpaved Roads

Normal Use:
- 25 mph
- 40 mph
- 50 mph
- 60 mph
Levels of Service

Current Conditions - State System - Surface Condition

<table>
<thead>
<tr>
<th>Surface Condition</th>
<th>Percentage of System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>38</td>
</tr>
<tr>
<td>Good</td>
<td>26</td>
</tr>
<tr>
<td>Fair</td>
<td>29</td>
</tr>
<tr>
<td>Poor</td>
<td>6</td>
</tr>
</tbody>
</table>
## Levels of Service

### 20 Year Projections - State System
- **Surface Condition**

<table>
<thead>
<tr>
<th>Surface Condition</th>
<th>Percentage of System</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>32</td>
<td>-6</td>
</tr>
<tr>
<td>Good</td>
<td>30</td>
<td>+4</td>
</tr>
<tr>
<td>Fair</td>
<td>27</td>
<td>-2</td>
</tr>
<tr>
<td>Poor</td>
<td>11</td>
<td>+5</td>
</tr>
</tbody>
</table>
Levels of Service

Lane Width

- Standard = 12’
- Represents safety and condition
Levels of Service

Current Conditions
- Lane Width
  - 0.03% of miles deficient
  - Roughly 220 miles
Levels of Service

Shoulder Width
- Standard varies by HPCS
- Represents safety and condition

<table>
<thead>
<tr>
<th>Classification</th>
<th>Shoulder Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate</td>
<td>10 feet</td>
</tr>
<tr>
<td>Interregional</td>
<td>8 feet/4 feet</td>
</tr>
<tr>
<td>State Corridor</td>
<td>4 feet</td>
</tr>
<tr>
<td>District Corridor</td>
<td>2 feet</td>
</tr>
<tr>
<td>District Collector</td>
<td>2 feet</td>
</tr>
</tbody>
</table>
Levels of Service

Current Conditions – State System - Shoulder Width

<table>
<thead>
<tr>
<th>Classification</th>
<th>Shoulder Width</th>
<th>% of Miles Below HPCS Guidelines</th>
<th>Number of Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate</td>
<td>10 feet</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Interregional</td>
<td>8 feet/4 feet</td>
<td>20</td>
<td>366</td>
</tr>
<tr>
<td>State Corridor</td>
<td>4 feet</td>
<td>35</td>
<td>491</td>
</tr>
<tr>
<td>District Corridor</td>
<td>2 feet</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>District Collector</td>
<td>2 feet</td>
<td>5</td>
<td>73</td>
</tr>
</tbody>
</table>
County Levels of Service

Survey

- Overlay Interval
- Overlay Thickness
- Gravel Interval
- Gravel Thickness
- Blading Interval
County Levels of Service

Overlay Interval – number of years between overlay treatment
- Representative of paved surface quality

Overlay Thickness
- Thicker overlay = longer life, but higher costs
County Levels of Service

County Responses
- Overlay Interval
  - Average - 18.5 years
  - Range - 15-25 years
  - Most Frequent - 20 years
- Overlay Thickness
  - Average - 2.33
  - Range - 1.5-3.5 inches
  - Most Frequent - 2 inches
County Levels of Service

Gravel interval – number of years between regraveling

Gravel Thickness – yards/mile of gravel applied during regraveling (excludes spot graveling)
County Levels of Service

County Responses
- Gravel interval
  - Average – 6 years
  - Range – 3-15 years
  - Most Frequent – 5 years
- Regional Variations
Gravel Interval

6 years
5 years
4.4 years
4.5 years
12.5 years
2.33 years
9.25 years
5 years
5 years
5 years
Levels of Service

County Responses

- Gravel thickness
  - Average – 932 cu. yd./mile
  - Range – 300-2100 cu. yd./mile
  - 1,000 cu.yd./mile = 2” of gravel on a 24’ driving surface

- Regional Variations
Regional Variations in Gravel Thickness – Cubic yd/mile
Gravel Cost

<table>
<thead>
<tr>
<th>Region</th>
<th>Average</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>$6.75</td>
<td>$10.00</td>
<td>$4.50</td>
</tr>
<tr>
<td>Region 2</td>
<td>$5.80</td>
<td>$7.15</td>
<td>$3.00</td>
</tr>
<tr>
<td>Region 3</td>
<td>$5.66</td>
<td>$12.50</td>
<td>$3.00</td>
</tr>
<tr>
<td>Region 4</td>
<td>$6.06</td>
<td>$10.00</td>
<td>$3.70</td>
</tr>
<tr>
<td>Region 5</td>
<td>$6.94</td>
<td>$10.02</td>
<td>$3.86</td>
</tr>
<tr>
<td>Region 6</td>
<td></td>
<td>$11</td>
<td>$9.00</td>
</tr>
<tr>
<td>Region 7</td>
<td>$4.04</td>
<td>$4.50</td>
<td>$3.39</td>
</tr>
<tr>
<td>Region 8</td>
<td></td>
<td>$5.73</td>
<td></td>
</tr>
<tr>
<td>Region 9</td>
<td></td>
<td></td>
<td>$6.83</td>
</tr>
</tbody>
</table>
Blading Interval

- 2 per month
- 2.4 per month
- 2.8 per month
- 1.33 per month
- 3.33 per month
- 0.91 per month
- 2 per month
- 2 per month
Levels of Service

Bridges

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>1123</td>
<td>25</td>
</tr>
<tr>
<td>County</td>
<td>3187</td>
<td>71</td>
</tr>
<tr>
<td>City or Township</td>
<td>64</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>74</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,925</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

- 12% (526) of the state’s bridges are on the National Highway System
- Expected to receive priority funding from Federal government and provide good service into the future
Levels of Service

Bridge Cost
- 100’ L x 30’ W bridge replacement cost is roughly $330,000

Bridge LOS
- Roadway Width
- Load Limit
- Detour Distance
Levels of Service

Roadway Width

- Represents accessibility and safety
- Ninety-six percent of non-NHS bridges are two lanes
- Two-lane bridges – recommended width is 28’; curb to curb (12’ lanes with 2’ lateral clearance)
- Less than 25% of non-NHS two lane bridges meet this standard
Levels of Service

Roadway Width

- 75% of non-NHS two lane bridges have roadway widths of at least 23 feet (10’ lanes with 1.5’ lateral clearance)
Levels of Service

Load Limit

- Represents accessibility
- Legal limit of a loaded 5 axle semi – 80,000 lbs.
- Twenty-six percent of non-NHS bridges can safely accommodate trucks weighing 80,000 lbs
- Approximately 68% of non-NHS bridges can safely accommodate trucks weighing 46,000 lbs
Levels of Service

Detour Distance
- Represents connectivity
- If the bridge was no longer in service, how far is the detour to the closest bridge?
  - 25% less than 2 miles
  - 50% less than 3 miles
  - 75% less than 6 miles
  - 90% less than 18 miles
Summary

Cost Trends

- The same dollar buys fewer improvements than in the past
- Backlogs occur and improvements cannot be implemented on a timely (optimal) basis
Summary

Levels of Service

– Where are we now?
  • State – 64% Good or better
  • County – Average gravel every 6 years, average overlay every 18 years

– Where will we be 20 years from now?
  • With existing revenue, overall system condition will decrease and inflation may continue to devalue the buying power of the revenue

– Choices/Prioritization