Executive Report

Wisconsin State Highway 2005
Maintenance, Traffic, and Operations Conditions

Issued, July 2006
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Introduction and Overview

About this report

This report is intended for high-level decision makers in WisDOT and partner organizations. It is issued annually to provide information on the condition of Wisconsin’s state highways. A companion report provides a more operational look at the information here, including county-level detail and more information on pavement, signs, and bridges, and is available on the reports page of the Compass website (http://dotnet/dtid_bho/extranet/compass/reports/index.htm from inside WisDOT or https://trust.dot.state.wi.us/extntgtwy/dtid_bho/extranet/compass/reports/index.htm from outside WisDOT).

The information in these reports is being used to help understand trends and conditions, prioritize resources, and set target future condition levels for our highway system. As more information is gathered, it will also be used to illustrate and understand the consequences of funding and policy shifts, and to demonstrate accountability to decision-makers at WisDOT and in the legislature.

Please consider the information not contained in this report when using it to make decisions. This report includes measures of bridges, traveled way, shoulders, drainage, roadsides, selected traffic devices, and selected aspects of winter. It does not include measures of preventive maintenance, operational services (like traveler information and incident management), or electrified traffic assets (like signals and lighting).

Feedback on format, content, and other aspects of the report is welcome and should be sent to Scott Bush, Compass Program Manager, at scott.bush@dot.state.wi.us or (608) 266-8666.

Key Observations on 2005 Targets

Operations supervisors and managers set targets annually, after the budget and winter expenditures are known. The targets reflect priorities, fiscal constraints, and goals for the year. Targets are not long-term goals.

If the operations budget were expanded to cover all basic routine maintenance needs, targets would be set at or close to 0% backlogged because operations workers would expect to address most routine maintenance needs within the maintenance season.

Key Observations:

- Region and county highway operations staff cooperated to deliver on their promises to live within constrained funding.
- With a few notable exceptions, targets were met.
- Features with backlogs that exceed the target include delineators, routine maintenance of non-regulatory signs, and removal of hazardous debris. These features have maintenance condition worse than expected.
- The backlog for several features is below the target indicating maintenance condition better than targeted. Most notable are distressed joint cracks in concrete pavements, raised pavement markers, special pavement markings, flumes, fences, litter, and noxious weeds.
• Roadside features may be the hardest to manage to their targets. The maintenance backlog for these features tend to be above their targets, up to 21% better than targeted (noxious weeds).

**Key Observations on 2005 Highway Maintenance Conditions**

Region and county highway operations staff cooperated to deliver on their promises to live within constrained funding.

**Key Observations:**

**Safety:**
- Rutting on asphalt pavement received a feature grade of C for 2004 and with preliminary data from 2005. This critical safety deficiency can contribute to hydroplaning in summer and icy pavement in the winter.
- Delineators received a feature grade of D; the second grade drop in as many years.
- Hazardous debris on the shoulders received a feature grade of D. Keeping hazardous debris off the shoulders prevents it from being somehow moved back into live traffic, and protects drivers of cars that may swerve or pull over onto the shoulder.
- Unpaved shoulder drop-off received a feature grade of F. Repair of shoulder drop-off contributes to safety by keeping cars from dropping down dramatically on one side and possibly over-correcting if one or two wheels leave the pavement.

**Travelled way:**
- Cracking and Slab breakup of concrete pavements received feature grades of D, and Faulting received a grade of F. All feature grades for concrete pavements are C or worse with little change in 2004 and preliminary data from 2005. Feature grades for concrete pavements are worse than for asphalt pavements.

**Traffic Management and Signs:**
- Routine maintenance of regulatory and warning signs received a feature grade of F and routine maintenance of other signs received a feature grade of D. 41% of regulatory and warning signs and 59% of other signs are being kept in use beyond their recommended service life. This means that WisDOT would need to replace those percentages of signs on the state system in 2006 to bring all signs up to standard.
- WisDOT places a higher priority on routine maintenance of regulatory and warning signs than of other signs. As a result, 33% of other signs are being used more than five years beyond their recommended service life while 23% of regulatory and warning signs are being used more than five years beyond their recommended service life.

**Shoulders:**
- Unpaved shoulders drop-off/buildup received a feature grade of F. The statewide backlog for 2005 shows a modest improvement over 2004 and is on target with expectations. Unpaved drop-off is significantly worse in the NE region than in other regions.
- Hazardous debris received a feature grade of D. Hazardous debris is notably worse than targeted. Hazardous debris is significantly worse in the SW region than in other regions.
- Cracking on paved shoulders received a feature grade of D. This score is appreciably better than targeted.

**Drainage and roadsides:**
- Flumes received a feature grade of C; all other drainage features received grades of A or B. The maintenance backlog for flumes improved significantly in 2005 and the condition
of flumes is better than targeted. This observation cannot be explained by changes in maintenance practices or priorities.

- Roadside features may be the hardest to manage to their targets. The maintenance backlogs for these features tend to be significantly higher than targeted.
- Although the condition of litter improved measurably in 2005, the feature grade remains a D.
- Noxious weeds received a feature grade of C with a maintenance backlog much lower than targeted. Noxious weeds appear widespread in the NE and SE regions.

**Winter operations:**

- In keeping with WisDOT guidelines, during similar winter storm events, drivers on major urban freeways and highways have less time to wait until they see bare/wet pavement than do drivers on secondary roads. From storm to storm, however, most of the variability in this time is due to weather effects (type, duration and severity of storms throughout the winter season).
- The average time to bare/wet pavement during winter 2004-05 was 2 hours and 4 minutes which is 34 minutes less than the previous winter. This improvement comes even though we experienced a slightly more severe winter. The average Winter Severity Index (WSI) in 2004-05 was 31.9 versus 31.2 in the previous year. The average annual cost per lane mile for winter maintenance increased by approximately $100 in 2005. As expected, cost per lane mile increases with severity of the winter.

**Bridges:**

- 34% of decks statewide are in Fair condition and need reactive maintenance, based on their NBI ratings of 5 or 6. These include 29% of concrete bridges and 43% of steel bridges.
- Backlog for bridge inspection is calculated based on the mandatory inspection frequency for each inspection type. Initial and biennial routine inspections have the best records with only 2% of backlogs statewide. All bridges require initial and biennial routine inspections.
- Load-posted and in-depth inspections have the worst inspection backlogs with 90% and 93%, respectively of eligible bridges in need of inspection. However, only 21 and 61 bridges, respectively require these inspections. Compliance estimates of fracture critical and in-depth inspections are very preliminary. It will take 3 more years until the Highway Structure Information (HSI) database becomes current for all inspection types.

**Customer Satisfaction Survey**

Survey of the traveling public concerning traveling satisfaction is scheduled every two years. The last survey was conducted in February 2004; the next will be conducted in 2006. There is no new information for this report.

**Definitions**

The measures in this report were developed by teams of front-line practitioners and policy experts to reflect current practices for routine or reactive maintenance. They do not include measures of preventive maintenance.

**An A means that we are providing all the basics in routine maintenance.** A feature grade of A means that we have addressed most routine maintenance needs within the maintenance season, and there is not a significant backlog.
• Percent backlogged. This tells us what percent of that asset or feature is in a condition where we would do maintenance work on it, if we had the budget. An increasing percent backlogged reflects fiscal constraints, not inadequate work. See Appendix A for when an asset is considered backlogged.

• Feature grades. As more of an asset or feature is backlogged, its grade declines. These grades are weighted for importance. So something that contributes to safety – for example, guardrail – would decline more rapidly than something that was primarily aesthetic – for example, mowing. See the Compass website for details.

• 2005 targets. Targets are set annually, after winter spending has been completed, and are intended to reflect priorities and goals for the year, in light of fiscal constraint. They are set by operations supervisors and managers.

• PMMS category. In the pavement maintenance management system, each mile of road receives a rating for each distress. The rating will be excellent, fair, moderate, or bad, depending on extent and severity of distress. In the PMMS system, fair is called “good” and reflects the fact that pavement surface needs routine maintenance, but ride is minimally affected.

• Years past recommended service life. This tells us how many years ago a sign should have been replaced, based on national standards.

Data
This report uses inventory data for bridges, pavement, routine maintenance of signs, and winter storms. It uses sample data for highway maintenance features. All the data were taken between September 13 and December 22, 2005. Analysis has been done to determine statistical significance for state-level data.
Executive Overview Reports
### Wisconsin 2005: Targets for Paved Traveled Way Maintenance Conditions

Targets are set annually, after winter spending has been completed, and are intended to reflect priorities for that year, given fiscal constraints. They are a measure of effective management, not system condition. Target analysis for paved traveled way is based on preliminary data available in September 2005.

<table>
<thead>
<tr>
<th>Element</th>
<th>Feature</th>
<th>Actual % backlog 2005</th>
<th>Target % backlog 2005</th>
<th>On target</th>
<th>Statewide</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveled way, asphalt</td>
<td>Alligator cracking</td>
<td>1%</td>
<td>5%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Block cracking</td>
<td>3%</td>
<td>5%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Edge raveling</td>
<td>15%</td>
<td>15%</td>
<td>★</td>
<td>SE NC, NE, SW NW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flushing</td>
<td>0%</td>
<td>1%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Longitudinal cracking</td>
<td>26%</td>
<td>25%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Longitudinal distortion</td>
<td>0%</td>
<td>1%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patch deterioration</td>
<td>9%</td>
<td>10%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rutting</td>
<td>9%</td>
<td>15%</td>
<td>6</td>
<td>NW, SW NE, NC, SE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface raveling</td>
<td>1%</td>
<td>2%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transverse cracking</td>
<td>24%</td>
<td>25%</td>
<td>★</td>
<td>NC, NE, SE, SW NW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transverse distortion</td>
<td>1%</td>
<td>5%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Traveled way, concrete</td>
<td>Distressed joints/cracks</td>
<td>33%</td>
<td>43%</td>
<td>10</td>
<td>SE NW NC, NE, SW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Longitudinal joint distress</td>
<td>21%</td>
<td>27%</td>
<td>6</td>
<td>SE NW NC, NE, SW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patch deterioration</td>
<td>28%</td>
<td>30%</td>
<td>★</td>
<td>SE NC, NE, SW NW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slab breakup</td>
<td>44%</td>
<td>45%</td>
<td>★</td>
<td>SE NW, SW NC, NE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface distress</td>
<td>20%</td>
<td>25%</td>
<td>★</td>
<td>NW, SE, SW NC, NE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transverse faulting</td>
<td>74%</td>
<td>75%</td>
<td>★</td>
<td>All</td>
<td></td>
</tr>
</tbody>
</table>

1. ★ This symbol indicates that the percent backlogged for that feature is statistically the same as the target, or within 5 percentage points.
2. Gap may be smaller than the difference between actual and target. Estimates of the gap are conservative and take into account sample size.
3. Only ‘unsealed’ cracking distresses are considered as backlogged.
### Wisconsin 2005: Targets for Highway Maintenance Conditions

Targets are set annually, after winter spending has been completed, and are intended to reflect priorities for that year, given fiscal constraints. They are a measure of effective management, not system condition.

<table>
<thead>
<tr>
<th>Element</th>
<th>Feature</th>
<th>Actual % backlog 2005</th>
<th>Target % backlog 2005</th>
<th>On target&lt;sup&gt;4&lt;/sup&gt;</th>
<th>Gap if target missed&lt;sup&gt;5&lt;/sup&gt;</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Worse condition</td>
<td>On Target</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Traffic</td>
<td>Centerline Markings</td>
<td>5%</td>
<td>5%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delineators</td>
<td>24%</td>
<td>15%</td>
<td>@</td>
<td>NE, NW, SE, SW</td>
<td>NC</td>
</tr>
<tr>
<td></td>
<td>Edgeline Markings</td>
<td>5%</td>
<td>6%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other signs (emergency repair)</td>
<td>1%</td>
<td>1%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other signs (routine)</td>
<td>59%</td>
<td>50%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Protective barriers</td>
<td>4%</td>
<td>3%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Raised pavement markers</td>
<td>15%</td>
<td>25%</td>
<td>@</td>
<td>NC, NE, NW, SE, SW</td>
<td>SE</td>
</tr>
<tr>
<td></td>
<td>Regulatory/warning signs    (emergency)</td>
<td>1%</td>
<td>0%</td>
<td>@</td>
<td></td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>Regulatory/warning signs    (routine)</td>
<td>41%</td>
<td>40%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special pavement markings</td>
<td>5%</td>
<td>25%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulders</td>
<td>Hazardous debris</td>
<td>12%</td>
<td>6%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cracking (paved)</td>
<td>52%</td>
<td>60%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potholes/raveling (paved)</td>
<td>7%</td>
<td>10%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross-slope (unpaved)</td>
<td>14%</td>
<td>20%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drop-off/build-up (unpaved)</td>
<td>36%</td>
<td>35%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td>Culverts</td>
<td>18%</td>
<td>15%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Curb &amp; gutter</td>
<td>7%</td>
<td>8%</td>
<td>@</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>4</sup> @ This symbol indicates that the percent backlogged for that feature is statistically the same as the target, or within 5 percentage points.

<sup>5</sup> Gap may be smaller than the difference between actual and target. Estimates of the gap are conservative and take into account sample size.
| Roadsides | Ditches | 2% | 2% | ☐ | All | | Flumes | 19% | 30% | ☐ | 1 | SE | NC, NE, NW, SW | | Storm sewer system | 9% | 10% | ☐ | All | | Under-drains/edge-drains | 20% | 20% | ☐ | NW, SW | NC, NE, SE | | Fences | 2% | 14% | ☐ | 12 | All | | Litter | 62% | 75% | ☐ | 13 | NE, SW | NC, NW, SE | | Mowing | 35% | 40% | ☐ | NE, NW, SE | NC, SW | | Noxious weeds | 29% | 50% | ☐ | 21 | All | | Woody vegetation control | 3% | 5% | ☐ | All | | Woody vegetation control for vision | 1% | 5% | ☐ | All |
## Wisconsin 2005: Compass Report on Paved Traveled Way Conditions


<table>
<thead>
<tr>
<th>Element</th>
<th>What are we spending?</th>
<th>Feature</th>
<th>How much of the system still needs work at the end of the maintenance season?</th>
<th>How well-maintained is the system?</th>
<th>This feature contributes primarily to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dollars spent&lt;sup&gt;6&lt;/sup&gt; (in millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FY 03</td>
<td>FY 04</td>
<td>FY 05</td>
<td>2003</td>
<td>2004</td>
</tr>
<tr>
<td>Traveled way, asphalt</td>
<td>20.3</td>
<td>21.1</td>
<td>16.8</td>
<td>--</td>
<td>24</td>
</tr>
<tr>
<td>Alligator cracking</td>
<td>--</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>×</td>
</tr>
<tr>
<td>Block cracking</td>
<td>--</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>×</td>
</tr>
<tr>
<td>Edge raveling</td>
<td>--</td>
<td>14</td>
<td>15</td>
<td>15</td>
<td>×</td>
</tr>
<tr>
<td>Flushing</td>
<td>--</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>×</td>
</tr>
<tr>
<td>Longitudinal cracking</td>
<td>--</td>
<td>24</td>
<td>26</td>
<td>26</td>
<td>×</td>
</tr>
<tr>
<td>Longitudinal distortion</td>
<td>--</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>×</td>
</tr>
<tr>
<td>Patch deterioration</td>
<td>--</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>×</td>
</tr>
<tr>
<td>Rutting</td>
<td>--</td>
<td>11</td>
<td>9</td>
<td>9</td>
<td>×</td>
</tr>
<tr>
<td>Surface raveling</td>
<td>--</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>×</td>
</tr>
<tr>
<td>Transverse cracking</td>
<td>--</td>
<td>22</td>
<td>24</td>
<td>24</td>
<td>×</td>
</tr>
<tr>
<td>Transverse distortion</td>
<td>--</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>×</td>
</tr>
</tbody>
</table>

<sup>6</sup> Dollars not adjusted for inflation.

<sup>7</sup> Arrows indicate a statistically valid change from 2004 to 2005. Double arrows indicate a change of 8 or more percentage points, based on a conservative estimate using a 95% confidence interval.
### What are we spending?

<table>
<thead>
<tr>
<th>Element</th>
<th>Dollars spent (in millions)</th>
<th>Feature</th>
<th>Condition change: 2004 to 2005</th>
<th>% of system backlogged</th>
<th>2005 Feature grades</th>
<th>This feature contributes primarily to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveled way, concrete</td>
<td>3.7  3.1  3.2</td>
<td>Distressed joints/cracks</td>
<td>↑</td>
<td>34  34</td>
<td>33</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Longitudinal joint distress</td>
<td>--</td>
<td>22  21</td>
<td>21</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patch deterioration</td>
<td>--</td>
<td>28  28</td>
<td>28</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slab breakup</td>
<td>↑</td>
<td>46  45</td>
<td>44</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface distress</td>
<td>--</td>
<td>21  20</td>
<td>20</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transverse faulting</td>
<td>--</td>
<td>76  74</td>
<td>74</td>
<td>X</td>
</tr>
</tbody>
</table>
## Wisconsin 2005: Compass Report on Highway Maintenance Conditions

<table>
<thead>
<tr>
<th>Element</th>
<th>What are we spending?</th>
<th>Feature</th>
<th>How much of the system still needs work at the end of the maintenance season?</th>
<th>How well-maintained is the system?</th>
<th>This feature contributes primarily to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dollars spent(^8) (in millions)</td>
<td></td>
<td>% of system backlogged</td>
<td>2005 Feature grades</td>
<td>Critical safety / mobility</td>
</tr>
<tr>
<td></td>
<td>FY 03</td>
<td>FY 04</td>
<td>FY 05</td>
<td>2003</td>
<td>2004</td>
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<tr>
<td>Traffic &amp; safety (selected)</td>
<td>17.8</td>
<td>16.9</td>
<td>15.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centerline markings</td>
<td>--</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Delineators</td>
<td>▼</td>
<td>19</td>
<td>21</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Edgeline markings</td>
<td>▲</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Other signs (emergency repair)</td>
<td>▼</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other signs (routine)</td>
<td>▼▼</td>
<td>n/a</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective barriers</td>
<td>▼</td>
<td>18</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Raised pavement markers</td>
<td>--</td>
<td>11</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Reg./warning signs (emergency)</td>
<td>--</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Reg./warning signs (routine)</td>
<td>▼</td>
<td>n/a</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^8\) Dollars not adjusted for inflation.
\(^9\) Arrows indicate a statistically valid change from last year to this year. Double arrows indicate a change of 8 or more percentage points, based on a conservative estimate using a 95% confidence interval.
\(^10\) 2004 is the first year with inventory data on routine maintenance of Other signs and Regulatory/warning signs.
<table>
<thead>
<tr>
<th>Element</th>
<th>What are we spending?</th>
<th>Feature</th>
<th>How much of the system still needs work at the end of the maintenance season?</th>
<th>How well-maintained is the system?</th>
<th>This feature contributes primarily to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dollars spent (in millions)</td>
<td></td>
<td></td>
<td>2005 Feature grades</td>
<td>Critical safety</td>
</tr>
<tr>
<td></td>
<td>FY 03</td>
<td>FY 04</td>
<td>FY 05</td>
<td>2003</td>
<td>2004</td>
</tr>
<tr>
<td>Special</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pave</td>
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<td></td>
</tr>
<tr>
<td>markings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous</td>
<td>↑</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>debris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cracking</td>
<td>↓</td>
<td>46</td>
<td>51</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>(paved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potholes</td>
<td>↓</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>raveling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(paved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-slope</td>
<td>↑</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>(unpaved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drop-off/</td>
<td>↑</td>
<td>45</td>
<td>37</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>build-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td>--</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>(unpaved)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culverts</td>
<td>↓</td>
<td>14</td>
<td>17</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Curb &amp; gutter</td>
<td>↓</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Ditches</td>
<td>--</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Flumes</td>
<td>↑↑</td>
<td>20</td>
<td>32</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Storm sewer</td>
<td>--</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under-drains</td>
<td>↓</td>
<td>15</td>
<td>14</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>edge-drains</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>2</td>
<td></td>
<td></td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

11 There were not enough field observations of noise barriers and retaining walls to draw a statistically valid conclusion about their condition in years 2004 and 2005.
### What are we spending?

### How much of the system still needs work at the end of the maintenance season?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Condition change: 2004 to 2005</th>
<th>% of system backlogged</th>
<th>2005 Feature grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003 2004</td>
<td>0 10 20 30 40 50 60 70</td>
<td>A B C D F</td>
</tr>
<tr>
<td>Fences</td>
<td>↑↑↑ 14 4</td>
<td>2</td>
<td>x</td>
</tr>
<tr>
<td>Litter</td>
<td>↑↑ 67 70</td>
<td>62</td>
<td>x</td>
</tr>
<tr>
<td>Mowing</td>
<td>↑ n/a12 40</td>
<td>35</td>
<td>x</td>
</tr>
<tr>
<td>Mowing for vision</td>
<td>13 n/a 26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noxious weeds</td>
<td>↑ 19 30</td>
<td>29</td>
<td>x</td>
</tr>
<tr>
<td>Woody vegetation</td>
<td>↑ 4 4</td>
<td>3</td>
<td>x</td>
</tr>
<tr>
<td>Woody veg. control for vision</td>
<td>-- 0 1</td>
<td>1</td>
<td>x</td>
</tr>
</tbody>
</table>

### How well-maintained is the system?

### This feature contributes primarily to:

- Critical safety
- Safety/mobility
- Ride/comfort
- Stewardship
- Aesthetics

---

12 Definition of Mowing and Mowing for Vision was different in 2003. It is not comparable to results from 2004 and 2005.

13 There were not enough field observations of mowing for vision to draw a statistically valid conclusion about its condition in 2005.
### Regions 2005: Compass Report on Highway Maintenance Conditions

<table>
<thead>
<tr>
<th>Element</th>
<th>Feature</th>
<th>How much of the system needs work at the end of the season?</th>
<th>What did it cost to achieve this condition?</th>
<th>Region Percent of System Backlogged(^{14})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveled way, asphalt*</td>
<td>Alligator cracking</td>
<td></td>
<td></td>
<td>NC</td>
</tr>
<tr>
<td></td>
<td>Block cracking</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Edge raveling</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Flushing</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Longitudinal cracking</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Longitudinal distortion(^{15})</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Patch deterioration</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Rutting</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Surface raveling</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Transverse cracking</td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Transverse distortion(^{15})</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>Dollars spent on traveled way, asphalt (in millions)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Traveled way, concrete*      | Distressed joints/cracks       |                                                            |                                             | 26    | 26  | 41  | 50  | 28   | 33%        |
|                             | Longitudinal joint distress    |                                                            |                                             | 12    | 14  | 31  | 38  | 15   | 21%        |
|                             | Patch deterioration             |                                                            |                                             | 25    | 28  | 24  | 38  | 26   | 28%        |
|                             | Slab breakup                   |                                                            |                                             | 38    | 39  | 45  | 58  | 42   | 44%        |
|                             | Surface distress               |                                                            |                                             | 10    | 19  | 27  | 22  | 20   | 20%        |
|                             | Transverse faulting            |                                                            |                                             | 78    | 71  | 74  | 80  | 71   | 74%        |
|                             | **Dollars spent on traveled way, concrete (in millions)** | | | | | 3.2 |

| Traffic and safety (selected devices) | Centerline markings |                                                            |                                             | 3     | 2   | 9   | 6   | 5    | 5%         |
|                                      | Delineators              |                                                            |                                             | 13    | 22  | 25  | 26  | 33   | 24%        |
|                                      | Edgeline markings        |                                                            |                                             | 5     | 1   | 8   | 3   | 5    | 5%         |
|                                      | Other signs (emergency repair) |                                                            |                                             | 0     | 0   | 0   | 1   | 4    | 1%         |
|                                      | Other signs (routine)     |                                                            |                                             | 66    | 62  | 59  | 50  | 61   | 59%        |
|                                      | Protective barriers       |                                                            |                                             | 0     | 10  | 4   | 5   | 1    | 4%         |
|                                      | Raised pavement markers   |                                                            |                                             | 12    | 4   | 11  | 25  | 23   | 15%        |
|                                      | Regulatory/warning signs (emergency) |                                                            |                                             | 1     | 0   | 0   | 2   | 1    | 1%         |

\(^{14}\) Where there were fewer than 25 observations of a feature in a region, the score for that region is not shown.

\(^{15}\) Some roundings were done to the percent backlog numbers in the region and state level.
How much of the system needs work at the end of the season?
What did it cost to achieve this condition?

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent of System Backlogged</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>NE</td>
</tr>
<tr>
<td>Regulatory/warning signs (routine)</td>
<td>45</td>
</tr>
<tr>
<td>Special pavement markings</td>
<td>0</td>
</tr>
<tr>
<td><strong>Dollars spent on traffic and safety (selected) (in millions)</strong></td>
<td>15.8</td>
</tr>
<tr>
<td>Shoulders</td>
<td>Hazardous debris</td>
</tr>
<tr>
<td></td>
<td>Cracking (paved)</td>
</tr>
<tr>
<td></td>
<td>Potholes/raveling (paved)</td>
</tr>
<tr>
<td></td>
<td>Cross-slope (unpaved)</td>
</tr>
<tr>
<td></td>
<td>Drop-off/build-up (unpaved)</td>
</tr>
<tr>
<td></td>
<td>Erosion (unpaved)</td>
</tr>
<tr>
<td><strong>Dollars spent on shoulders (in millions)</strong></td>
<td>7.5</td>
</tr>
<tr>
<td>Drainage</td>
<td>Culverts</td>
</tr>
<tr>
<td></td>
<td>Curb &amp; gutter</td>
</tr>
<tr>
<td></td>
<td>Ditches</td>
</tr>
<tr>
<td></td>
<td>Flumes</td>
</tr>
<tr>
<td></td>
<td>Storm sewer system</td>
</tr>
<tr>
<td></td>
<td>Under-drains/edge-drains</td>
</tr>
<tr>
<td><strong>Dollars spent on drainage (in millions)</strong></td>
<td>5.7</td>
</tr>
<tr>
<td>Roadsides</td>
<td>Barriers</td>
</tr>
<tr>
<td></td>
<td>Fences</td>
</tr>
<tr>
<td></td>
<td>Litter</td>
</tr>
<tr>
<td></td>
<td>Mowing</td>
</tr>
<tr>
<td></td>
<td>Noxious weeds</td>
</tr>
<tr>
<td></td>
<td>Woody vegetation control</td>
</tr>
<tr>
<td><strong>Dollars spent on roadsides (in millions)</strong></td>
<td>20.2</td>
</tr>
</tbody>
</table>

*Information is based on partial, preliminary 2005 data*

The Bureau of Highway Operations (BHO) reports winter performance measures in the Annual Winter Maintenance Report and is now in the process of developing standards for those performance measures. As standards get developed, this Compass Report on Winter Operations will begin measuring how we are meeting expectations.


Statewide measures for winter

<table>
<thead>
<tr>
<th></th>
<th>2003-04</th>
<th>2004-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to bare/wet pavement</td>
<td>2 hours 38 minutes</td>
<td>2 hours 4 minutes</td>
</tr>
<tr>
<td></td>
<td>after the storm ended</td>
<td>after the storm ended</td>
</tr>
<tr>
<td>Cost per lane mile</td>
<td>$1,279</td>
<td>$1,374</td>
</tr>
<tr>
<td>Winter severity index</td>
<td>31.2</td>
<td>31.9</td>
</tr>
<tr>
<td>Winter related crash</td>
<td>26 per 100 million</td>
<td>25 per 100 million</td>
</tr>
<tr>
<td></td>
<td>vehicle miles traveled</td>
<td>vehicle miles traveled</td>
</tr>
</tbody>
</table>

Key findings

- In keeping with WisDOT guidelines, during similar storm events, drivers on major urban freeways and highways have less time to wait until they see bare/wet pavement than do drivers on secondary roads. From storm to storm, however, most of the variability in this time is due to weather effects (type, duration, and severity of storms throughout the winter season).
- The average time to bare/wet pavement during winter 2004-05 was 2 hours and 4 minutes which is 34 minutes less than the previous winter. This improvement comes despite a slightly more severe winter. The average Winter Severity Index (WSI) in 2004-05 was 31.9 versus 31.2 in the previous year.
- As expected, cost per lane mile increases with the severity of the winter, except for the SE region which has the lowest average WSI but the highest cost per WSI point.

The detailed Compass Report on Winter Operations begins on page 42 of this document.
## Bridge Condition

<table>
<thead>
<tr>
<th>Feature</th>
<th>NC</th>
<th>NE</th>
<th>NW</th>
<th>SE</th>
<th>SW</th>
<th>statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decks in Fair condition</td>
<td>18%</td>
<td>25%</td>
<td>40%</td>
<td>56%</td>
<td>24%</td>
<td>34%</td>
</tr>
<tr>
<td>Superstructures in Fair condition</td>
<td>13%</td>
<td>16%</td>
<td>34%</td>
<td>52%</td>
<td>20%</td>
<td>29%</td>
</tr>
<tr>
<td>Substructures in Fair condition</td>
<td>18%</td>
<td>30%</td>
<td>32%</td>
<td>53%</td>
<td>17%</td>
<td>31%</td>
</tr>
<tr>
<td>Number of state-maintained bridges</td>
<td>600</td>
<td>759</td>
<td>1023</td>
<td>1073</td>
<td>1423</td>
<td>4878</td>
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<tr>
<td>Dollar spent on bridges (in millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$10.6</td>
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</table>

## Bridge Special Inspection Compliance

<table>
<thead>
<tr>
<th>Inspection Type</th>
<th>Region</th>
<th>NC</th>
<th>NE</th>
<th>NW</th>
<th>SE</th>
<th>SW</th>
<th>statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent of Bridges backlogged</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td># of Bridges backlogged</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Initial</td>
<td></td>
<td>2%</td>
<td>3%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
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<td></td>
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<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Routine</td>
<td></td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
<td>6%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>18</td>
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<td>61</td>
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<td>91</td>
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<tr>
<td>Load Posted</td>
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<td>100%</td>
<td>75%</td>
<td>100%</td>
<td>75%</td>
<td>90%</td>
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<td>--</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>In-depth(^\text{17})</td>
<td></td>
<td>100%</td>
<td>83%</td>
<td>93%</td>
<td>90%</td>
<td>100%</td>
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<td></td>
<td>5</td>
<td>5</td>
<td>14</td>
<td>19</td>
<td>14</td>
<td>57</td>
</tr>
<tr>
<td>Fracture Critical(^\text{17})</td>
<td></td>
<td>50%</td>
<td>36%</td>
<td>40%</td>
<td>62%</td>
<td>30%</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>16</td>
<td>10</td>
<td>8</td>
<td>13</td>
<td>52</td>
</tr>
<tr>
<td>Underwater Diving</td>
<td></td>
<td>71%</td>
<td>53%</td>
<td>18%</td>
<td>90%</td>
<td>31%</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>46</td>
<td>33</td>
<td>17</td>
<td>19</td>
<td>34</td>
<td>149</td>
</tr>
<tr>
<td>Underwater Probe/Visual</td>
<td></td>
<td>16%</td>
<td>62%</td>
<td>27%</td>
<td>29%</td>
<td>53%</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65</td>
<td>171</td>
<td>131</td>
<td>67</td>
<td>199</td>
<td>633</td>
</tr>
</tbody>
</table>

## Bridge Maintenance Needs

<table>
<thead>
<tr>
<th>Maintenance Action</th>
<th>Region</th>
<th>NC</th>
<th>NE</th>
<th>NW</th>
<th>SE</th>
<th>SW</th>
<th>statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck – Seal Surface Cracks</td>
<td></td>
<td>9%</td>
<td>5%</td>
<td>8%</td>
<td>8%</td>
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\(^{16}\) Bridge decks, superstructures, and subsctuctures that receive NBI ratings of 5 or 6 are regarded to be in fair condition and warrant reactive maintenance treatments.

\(^{17}\) Compliance estimates of fracture critical and in-depth inspections are very preliminary. It will take 3 more years until the HSI database becomes current for all inspection types.
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